Pak Dat To

Organisational culture analysis

A case study in Case Company X

School of Technology and Innovations
Master's thesis in Economics & Business Administration
Technical communications

Vaasa 2023

Vaasan yliopisto
School of Technology and Innovation
Tekijä: Pak Dat To
Tutkielman nimi: Organisational culture analysis: A case study in Case Company X
Tutkinto: Kauppatieteiden maisteri
Oppiaine: Tekninen viestintä
Työn ohjaaja: Tomi Pasanen
Valmistumisvuosi: 2023 **Sivumäärä:** 73

TIIVISTELMÄ:
Tässä tutkimuksessa analysoitiin kyselytutkimuksella, millaista organisaatiokulttuuria esiintyy tapausyrityksessä X, eritoten yksikössä A. Tätä tutkittiin kyselyllä, joka perustui Westrumin teoriaan. Teoria tarjoaa viitekehyksen, jonka mukaan organisaatioita on mahdollista arvioida. Tapausyritys X on liiketoiminnallisesti kansainvälinen organisaatio, joka keskittyy informaatioteknologiaan skaalautuen dataan, pilvipalveluihin ja automaatioon. Itse yksikkö A tulee olemaan tässä tarkastelun kohteena ja tälle yksikölle toteutettiin tämä tutkimus ja teetetty kysely. Kyselyn suunnittelussa Westrumin organisaatiokulttuurinen teoria, siihen liittyvä viitekehys, sekä yksikkö A:n tavoitteet on otettu huomioon. Päätavoitteena on muodostaa kyselystä saadusta datasta kvantitatiivista dataa, jonka avulla on mahdollista tehdä johtopäätöksiä ja vastata tutkimuskysymykseen ja hypoteesiin.

Hypoteesi on se, että on mahdollista toteuttaa kysely, joka perustuu Westrumin organisaatiokulttuuriseen teoriaan, ja saamaan dataa työntekijöiltä, jonka avulla on mahdollista analysoida tilannetta organisaatiokulttuurin näkökulmasta. Eritoten tätä tilannetta on analysoitu yksikkö A:ssa. Kyselyä toteutettaessa käytettiin alkuun yksinkertaista satunnaisotantaa ja kysely lähetettiin 815 työntekijälle, jotka työskentelevät yksikkö A:ssa, sähköpostin välityksellä. Vastausaikaa kyselylle oli kolme viikkoa. Vastauksia saatiin 165 kappaletta ja näiden pohjalta kvantitatiivinen analyysi toteutettiin. Kysely oli suunniteltu niin, että vastaaja voi valita, onko työskennellyt yli vuoden vaiko alle vuoden yksikkö A:ssa. Tämän avulla kyselyssä oli mahdollista havaita, miten vastausjoukko jakautuu työvuosien perusteella. Kyselyssä käytettiin Likert-skaalaa, jonka asteikko on 1–7. Arvo 1 tarkoittaa ”täysin eri mieltä” ja arvo 7 tarkoittaa ”täysin samaa mieltä”. Kyselystä saatu data kvantitatiivisesti analysoitiin käyttämällä Excelin keskiarvo, mediaani ja pylväsdiagrammi -funktioita. SPSS ohjelmassa käytettiin funktioita kuten kuvaavaa tilastoa, riippumattomien näytteiden T testiä, parinäytteen T testiä ja Spearmanin korrelaatiotestiä. Kvantitatiivinen data, joka on kerätty tilastollisten näytteiden ja testien pohjalta, juurtavat johtopäätöksiä tutkimuksen lopuksi.

Tutkimus osoitti sen, että kysely, perustuen Westrumin teoriaan ja teoreettiseen viitekehykseen, on antanut dataa, jonka perusteella on mahdollista analysoida nykyistä organisaatiokulttuurin tilaa yksikkö A:ssa. Westrumin teoreettinen viitekehys jakaa organisaatiokulttuurin kolmeen typologiaan; patologiseen, byrokraattiseen ja generatiiviseen. Tilastollisesti analysoidun datan avulla oli mahdollista juurtaa alustava johtopäätös organisaatiokulttuurista, joka toi ilmi, että yksikkö A:n kulttuuri sijoittuu generatiiviseen kulttuurimuotoon. Tilastollisen analyysin perusteella oli myös mahdollista huomata, että vastausjoukkojen vastauksien välillä ei ollut tilastollisesti merkittävää eroa ja korrelaatiot kysymysten välillä olivat vahvat.

Avainsanat: Organisational culture, pathological, bureaucratic, generative, Westrum’s organisational culture theory, safety culture

UNIVERSITY OF VAASA
School of Technology and Innovation
Author: Pak Dat To
Title of the Thesis: Organisational culture analysis: A case study in Case Company X
Degree: Master of Economics Sciences (M.Sc.)
Programme: Technical communications
Supervisor: Tomi Pasanen
Year: 2023 **Pages:** 73

ABSTRACT:
This research analysed the type of organisational culture that occurs in Case Company X, particularly in Unit A, by using designed survey, which is based on certain theory and objectives. Case Company X is an international organisation, which focuses on information technology and software engineering, scaling up to data, cloud services, and automation. Unit A itself will be the subject of this research and for this certain unit, a designed survey was sent to its employees. Survey was designed based on Westrum's organisational culture theory and its theoretical framework, and objectives of Unit A have been taken into account as well. Quantitative research is conducted, and the data received from survey is being statistically analysed. The main objective is to form quantitative information from the data obtained from the survey and draw conclusions and answer the research question and hypothesis of this research.

The hypothesis is that it is possible to analyse the current organisational culture situation by conducting a designed survey based on Westrum's theory. The survey was initially conducted by using simple random sampling method and it was sent to 815 employees in Unit A, via email. The response time for answering the survey is set to three weeks. A total of 165 employees out of 815 employees answered to the survey and a quantitative analysis was conducted on the basis of these. The survey was designed in a way that the employee can choose if employee itself have worked for more than a year or less in Unit A. With this, it was possible to see in the survey data how the response group is distributed according to the years of work. The survey is based on a Likert-scaling, values distributing from 1 to 7. A value of 1 means "strongly disagree" and a value of 7 means "strongly agree". The data obtained from the survey was quantitatively analysed by using Excel's mean, median, and bar chart -functions. SPSS software's descriptive statistics, T test for independent samples, paired samples T test and Spearman's correlation -functions were used. Quantitative data were collected on the basis of statistical data samples and tests, and conclusions were based on it.

The research showed that the survey, based on Westrum's theory and theoretical framework, has provided data that makes it possible to analyse the current organisational and cultural situation in Unit A. The Westrum's theoretical framework divides organisational culture into three typologies which are pathological, bureaucratic, and generative. Using statistically analysed data, it was possible to draw a preliminary conclusion about the organisational culture, which revealed that the culture of unit A is based on generative culture typology. Based on the other statistical analyses, it was possible to observe that there was no statistically significant difference between the responses of the respondents and that the correlation between same paired questions was strong, but the correlation between same themed questions was weak.

KEYWORDS: Organisational culture, pathological, bureaucratic, generative, Westrum's organisational culture theory, safety culture

Contents

Pictures

Figures

Tables

Abbreviations

IT = Information Technology

SWE = Software Engineering

1 Introduction

As organisations attempt to improve their performance, they must pay greater attention to organisational culture, which has become a critical determinant in organisational outcomes, safety, and overall performance. There are aspects in modern organisational practises that include of important principles and expectations (Soomro & Shah, 2018, p. 267). Concentrating more on organisational culture creates a more supportive environment for improving overall performance, safety, and performance inside the organisation, as well as better information flow, which allows for more accurate forecasting of how organisations will respond to developing indications (Westrum, 2004).

The purpose of this research is to discover whether the designed survey based on Westrum's theory can provide certain data which can determine organisational culture. Research study will conduct a quantitative analysis from the survey responses, looking for statistical data from respondents, which includes descriptive statistics, t-tests, and correlation tests.

Deeper meanings are reviewed as the research progresses. These meanings and the significance of the field will be addressed as the research proceeds. This research will make use of Dr. Ron Westrum's organisational culture theory, as the theory tends to encompass the theoretical framework of this research. Westrum's organisational culture theory emphasises the notion that an organisation's culture can be categorised into three typologies: pathological, bureaucratic, and generative, and with each typology encompassing a distinct culture type. (Westrum, 2004).

1.1 Research structure

The structure of the research will be following: introduction, literature review in two part, methodologies, results, discussion, and conclusion. Literature review will look over literature and scientific publications that support the subject and objective of the research.

The methodology section will describe the chosen methodology for the research and statistical analysis method that will be used for sorting the data. En route to the results and discussion section, the results section will offer the quantitative research's findings, which include analysed data with descriptive statistics, t-test, and correlation analysis. The discussion will interpret the research findings and relate them to the research questions and objectives, and in the end, conclusion will be provided.

1.2 Background and methodology

As software engineering (SWE) and information technology (IT) organisations tend to evolve through time, they must be more aware of current trends that aid in the organisations' development processes. Modern organisations aspire to maximise work outputs, boost worldwide collaboration, practise agile software development, rapidly build systems, and launch products and services. As SWE organisations strive to achieve this objective, they must address a key issue, namely the overall well-being of their software developers, by emphasising the relevance of organisational culture. (Zimmermann & Sadowski, 2019, pp. 109-110).

This research is being conducted for a software engineering company which is specialising in IT and SWE. Due to the necessity for confidentiality, this organisation is referred as a "case company X." For clarity, this study shall refer to the unit as a "Unit A".

On Finland’s level, Unit A has over 800 employees, with around 600 of them being IT and SWE -professionals. As this unit already has a large number of employees, it is essential that the organisational culture benefits everyone. According to Hogan and Coote (2013, p. 1618), understanding organisational culture can help shape the process of innovation and organisation’s performance, ultimately resulting in behaviours that sustain and encourage organisational renewal. Therefore, it comes to reason that it is essential to focus on improving organisational culture in order to improve performance. This research will

analyse the organisational culture of case company X's Unit A by mailing survey questionnaires to employees.

1.3 Hypothesis and limitations

The following research will test the hypothesis that it is possible to collect data by using designed survey based on Westrum's theory in order to demonstrate Unit A organisational culture outcomes through statistical analysis.

1.3.1 Limitations

Knowing the limitations of the research before beginning the literature review will assist in understanding the golden mean of the research since it explains why some aspects are covered and why some are not. This research's limitations are that it will conduct research just for Unit A, which is based on Finland, and not for the entire Case Company X since the number of employees would be too large if the entire Case Company X's all units were considered. Because Case Company X is also international, conducting study on organisational cultures may have different connotations in different countries. The survey and analysis will be conducted solely for Unit A Finland's personnel, not for clients, as obtaining survey data from clients would be difficult due to legislation and rules.

Within the constraints of this study, Westrum's organisational theory will serve as a theoretical framework. The study will be conducted quantitatively rather than qualitatively, which means there will be no in-depth interviews with employees. The survey itself will provide quantitative answers, as employees' responses are sorted through using Likert-scaling, and not considering in-depth interviews is due to the large number of responses, which makes the study too wide ranged. The descriptive statistics, t-test, and correlation analysis are used as statistical methods and the reason for performing statistical analysis as using these approaches is that it can provide data and results for quantitative research questions which can support the overall hypothesis.

1.4 Scope of the literature review

As the hypothesis is that it is possible to use survey, based on Westrum's theory, to find out the views and perceptions of software engineers and organisational culture in the unit, literature reviews' keywords should be bound to this research hypothesis and objectives. Below this text, there is table 1, where can be seen keywords, databases, and hits. The document type that are primarily used are academic scholar journals.

Keywords	Database	Hits
"Organisational culture"	Google Scholar	1920
AND	Jstor	14
"Westrum"	ScienceDirect	326
	ProQuest	93
	Wiley	118
"Ron Westrum"	Google Scholar	703
AND	Jstor	76
"Safety Culture"	ScienceDirect	14
	ProQuest	20
	Wiley	16
"Pathological"	Google Scholar	9700
AND	Jstor	32
"Bureaucratic"	ScienceDirect	63
AND	ProQuest	96
"Generative"	Wiley	1764
AND		
"Organisational culture"		

Table 1. Scope of the literature review.

From the table 1, there are databases which gives hits for certain Boolean -values. During the research process, primarily these databases and hits are reviewed. However, it is important to notice that all academic scholar journals that are cited in this research might not be from the certain database, which are informed in the table 1. As finding other academic scholar journals might vary and be found from different databases.

2 Literature review of organisational cultures

As the research studies of SWE organisational culture and how theory of organisational culture can help supporting the study, academic literature will aid in this process. As the chapter progresses, it will address earlier literature and scientific research on organisational culture and aspects bound to it such as organisational commitment, performance, employee well-being, communication, flow, and safety. These past literature and scientific articles will be covered, and their findings will be presented in order to create a base understanding for approaching methodology chapter. The findings of the reviewed literature and scientific publications and utilise them to relate the hypotheses of this research.

2.1 Organisational culture preview

When it comes to organisations, it is critical to understand culture as a concept. According to Jeffrey Donnithrone (2013), understanding "culture" as a meaning can be difficult at first, but its impact is quite clear - because the term "culture" has been used to describe many different things, which risks neutralising its true significance, culture becomes meaningless as an analytical tool if it can be used to explain everything. As a result, categorising it is difficult because it is a collection of distinct social patterns with inherent meanings and psychological processes (Matsumoto & Hwang, 2019). Overall, culture can be defined as the entire collection of ideas that serve as the foundation of any society, and it can have multiple meanings and connotations, as well as be fashioned into numerous representations (Martinez et al., 2015; Westrum, 2004). Overall, it has an impact on its surroundings by giving meaning to both material and non-material issues. That is, material is everything we see, hear, and feel, whereas non-material is our habits, attitudes, and way of thinking. In some ways, culture is everything that distinguishes a group of people, and it encompasses every aspect of individuals. (Causadias, 2020; White, 1959).

Organisational culture can create shared behavioural standards by strengthening a shared understanding of values, beliefs, and assumptions (Hald et al., 2020). According to Schein (1985), culture is a framework that contains a pattern of fundamental assumptions that have worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to the group's problems of external adaptation and internal integration. It is possible to comprehend how culture occurs in organisations by extending the concept of culture to organisations. As previously stated, culture identifies a group of people and develops distinct social patterns with underlying meanings and psychological processes (Matsumoto & Hwang, 2019; Causadias, 2020). In organisations, culture can be seen as shared beliefs, values, and assumptions (Paais & Pattiruhu, 2020). Culture is significant in shaping our perception of everything around us; it is the cause, and resulting behaviour is the effect (Lee, 2016).

2.2 Organisational culture

Organisation culture, which consists of collective values, beliefs, and assumptions, influences employee attitudes and behaviours. Culture shapes organisations in such a way that shared system values are maintained throughout the organisation, and eventually organisations can find their own way of functioning and achieving their goals. (Hartnell et al., 2011; Hald et al., 2020). It is possible for organisational culture to restructure itself in a way that it will be able to guide members and employees on how and where the organisation’s direction is expected to go, and show how the culture works in a way that it can encourage members and employees to work more enthusiastically in order to achieve better performance, efficiency, commitment, and consistency inside the organisation. (Soomro and Shah, 2019; Paais and Pattiruhu, 2020; Donnithrone, 2013). When an organisation's culture is successful, it can increase employees' affective commitment to the organisation, implying that the organisation and the employee have an emotional bond because their fundamental values and assumptions are comparable and shared. (Gajda and Zbierowski, 2022).

Throughout history, numerous definitions and viewpoints on organisational culture have arisen. Understanding the features of this topic is advantageous while conducting research on it since it makes it easier to review and comprehend its underlying meanings and intentions. According to Edgar Schein (2010), organisational culture generates patterns of basic assumptions about how employees and people act and interact with their surroundings. As stated by Schein (2010), organisational culture exists on three layers within the organisation: basic assumptions, values, and artefacts. Basic assumptions develop over time when members of a collective group or organisation make meaning of interaction and bonding. The second level, values, are viewed as collective values and behaviours that those who are aware of them can discuss. Values provide a viewpoint from which the group and members can perceive and interact with the relationships, situations, and environment around them. Artefacts are the most obvious and observable level since they can be integrated in procedures, technologies, statements, and overall working methods.

According to management scholars Cameron and Quinn (2011), organisational culture is a collection of values, beliefs, behaviours, practises, and attitudes that can assist the organisation and its employees in understanding what goals it must pursue and what it regards as a valuable asset. Organisational behaviour experts Robert Kegan and Lisa Lahey (2016, pp. 55-56) mentions that organisational culture helps to build an environment where it can build social practises and encourages personal development among its members - it also encourages to build a web of social practises that can shape and be shaped by member conversation. As can be seen, definitions and perspectives differ, but the structure of organisational culture is essentially the same - the goal is to create an environment that eventually can assists members of the organisation in developing values and social behaviours that lead to a better outcome for all.

Because organisational culture shapes the environment of each organisation, understanding its impact on IT organisations is critical. As previously stated, an organisation's

culture influences how employees learn, acquire, and share knowledge, and this is true as well for IT organisations. (Rabelo and colleagues, 2015). Organisations must adapt to the rapid advancement of technology in order to thrive in today's international marketplaces. The importance and value of IT and digital transformation in organisations have grown significantly as it provides more competitive advantages; understanding for example technologies such as cloud computing increases the efficiency of organisations. As a result, organisational culture has a significant impact on how to use new technology. Organisations must foster and reinforce a culture of leadership, values, communication, cohesion, and member trust. The culture itself is more important because it ultimately influences the company's values and decision-making. This is significant because, in the long run, it allows a company to use information more effectively and gain a competitive advantage. (Garro-Abarca et al., 2021; Jasimuddin & Zhang, 2014).

2.3 Organisational culture’s impacts

Organisational culture has a significant impact on the type of environment that it can create for its surroundings. It can impact whether the environment is safe, whether information flows freely, and whether it is innovative or creative. (Naranjo-Valencia et al., 2016). One study conducted by Naranjo-Valencia and others (2016) looked at the relationships between culture, innovation, and performance to see if there was a link and if culture affected innovation and performance. According to the findings, culture is a determinant of an organisation's resourceful environment and can significantly foster it towards greater creativity. In this situation, organisational culture must have a positive influence on its organisations, which means it must foster safety, communication, innovation, freedom, and positive employee support. With this type of organisational culture, organisations can create an environment in which employees are more satisfied and driven to complete their work, and teamwork behaviour and perceived support for innovation capability improve. (Magill et al., 2020; Yang, 2016).

Organisational culture provides numerous additional benefits aside from innovation and performance. Speaking of teamwork and collaboration (Sampson et al., 2022), organisational reputation and brand image (Laforet, 2014), and organisational attraction (Chen et al., 2022). According to Sampson and others (2022), organisational culture influences collaboration and teamwork by creating a climate that promotes and embraces employee performance, employee engagement, and clan culture. According to Sampson and others (2022) clan culture implies that there is a sense of collaboration and team spirit among the people working together in an organisation; additionally, this generates a highly collaborative work environment in which individuals are valued and communication with others is prioritised.

Sylvie Laforet (2014) discusses organisational reputation and brand image building and explains why it is critical to study organisational culture because it influences organisational behaviour, which in turn influences organisational goals, objectives, and decision-making, which in turn influences organisational overall performance and leadership. Performance and leadership influence how organisations can embrace brand-oriented policies, visions, and strategies, and it is with these factors that an organisation's entire brand image is built. And, if the organisation's brand image produces positive results, it may increase brand attraction to the organisation (Chen et al., 2022). Chen and others (2022) found that if an organisation creates a brand image that delivers positive results while emphasising a good philosophy and appeal, the brand is more desirable, and the organisation is hence more appealing.

As previously stated, organisational culture has an effect on a variety of organisational aspects. Overall, the organisational culture appears to be an important asset, as it can enable the creation of a positive work culture that promotes productivity, employee engagement, and enhanced employee experience, and it binds all organisational components, determines identity, provides motivation, and directs members towards shared beliefs and objectives. Job satisfaction among employees is also increased as a result of these effects. (Bagis et al., 2021; Jigjiddorj et al., 2021). Organisational culture has a

significant impact on job satisfaction because job satisfaction is closely linked to the culture that fosters job commitment, performance, and organisational commitment. A culture capable of retaining commitments, ensuring sustainability, and encouraging individuals to become more goal-oriented produces job satisfaction among employees, fostering long-term commitment between organisations and employees. (Jigjiddorj et al., 2021).

2.4 Organisational culture perspective on organisational performance factors

It is critical to include alternative perspectives that affect organisational performance in this literature review so that the various aspects that contribute to an organisation's success can be understood and appreciated. Other than organisational culture, additional research can be used to identify performance-influencing factors. According to the reviewed literature, increased employee engagement (Dobre, 2013), increased employee attentiveness (Yu & Li, 2022), and increased sensitivity to employees' voices and opinions (Abdulgalimov et al., 2020) all have a positive impact on organisational performance.

Dobre (2013) claims that employee motivation is the most powerful determinant of an organisation's success, and that human capital is the most valuable asset of an organisation that, if not managed effectively, can lead to the organisation's decline. According to Dobre (2013), employee motivation is based on organisational empowerment and recognition, and as long as organisations strive to reduce job dissatisfaction and use motivating factors like achievement, recognition, responsibility, and the work itself to increase employee motivation and trust, these qualities can lead to improved productivity and loyalty - and thus the organisation can perform better.

According to Yu and Li (2022), in order for organisations to thrive in performance, they must be deeply connected with their employees, which has a significant positive impact on their affective commitment, continuance commitment, and normative commitment.

This generation of employees has a stronger sense of self-worth, a desire for respect and understanding, expects to be valued by their leaders, and is concerned about work-life balance, which results in lower organisational commitment and job satisfaction, as well as high job-hopping and turnover rates. Yu and Li (2022) states that organisations must pay attention to employees' organisational commitment and forecast their turnover behaviour from the standpoint of retention in order to keep up with the new generation of employees. Employee engagement and empowerment must also be improved, as well as opportunities for workers to participate in operations and listen to and act on employee feedback, rather than simply hearing it and doing nothing. According to Yu and Li (2022), when an organisation is committed to engaging and empowering its employees, it is more likely to achieve the best results.

Abdulgalimov and others (2020) states that organisations will function better if they are more sensitive to their employees' views and ideas. Organisations that collect and respond to employee opinions and voices have higher employee retention and satisfaction, a better reputation, and a better understanding in both directions within the organisation. Organisations that act on offering opinions will create a trusting environment and thus improve organisational performance.

3 Theoretical frameworks

This chapter will review theoretical frameworks, and bring forth Ron Westrum's organisational culture theory as it will serve as the theoretical framework for this research. As this chapter continues, this study will present additionally three other theoretical frameworks as well. The study will make a comparison of theories and explain why Westrum's theory is the optimal theoretical framework for this research. As there are numerous other theoretical frameworks that study organisational cultures, such as Edgar Schein's Model of Organisational Culture, Cameron and Quinn's Competing Values Framework, and Hofstede's Cultural Dimensions Theory, focus of these theories will be covered in this study. As these theories will be reviewed through this chapter, there will be review of how a specific type of theoretical framework would be the most ideal theory to support for organisational culture in the way of improving the way of working.

Concepts of the theories, including fundamentals and relevance to this topic of research, will be covered. Chapter will go through also the focus points that each theory will support.

3.1 Organisations' modern challenges

It is important to think about the realities of modern organisations because this allows for the development of an appropriate theoretical framework. (Muscalu & Halmaghi, 2015). Muscalu and Halmaghi (2015) states that as organisational culture is a way of thinking, looking, problem solving, and belonging to a team, it can help guiding in which theoretical framework is best for an organisation and what kind of culture should be its guiding principle.

Digitalisation is becoming increasingly important in organisations and, more broadly, in society as a result of the increasing growth of technology, which enables digital transformation and innovation at all levels of business and life (Davidovski, 2018). In the World

Economic Forum (2020) report, businesses and organisations in general are about to accelerate their digitalisation as work processes, learning, remote work expansion, and job automation developing, resulting in the formation of new technology specialties. As forth digitalisation is currently a major trend transforming society and organisations, it has the potential to reduce costs, improve turnaround times, and provide high performance.

Many organisations, however, are still unaware of the potential effects and benefits of digital transformation. As the COVID-19 created uncertainty into the organisational environment, organisations and management embraced digitalisation for the sake of business continuity. Organisations that refuse to engage with the effects of digitalisation will miss out on identifying key opportunities and risks associated with digital transformation. (Parviainen et al., 2022; Gupta et al., 2022; Baptista et al., 2020). Job losses, data breaches, security breaches, and social tensions in the software engineering industry may all occur as a result of the impact that digitalisation will have on our modern organisations. This will increase the risk we face and according to Ivanova and others (2019), the increasing adoption of information technology will have a significant impact on managerial functions in organisations, necessitating a rethinking of management strategies and tactics for making the most of the constantly evolving technology. They believe that linking management theory and practises to scientific and analytical tools can help to develop a comprehensive and methodical approach to managing digital organisational culture - a working organisational culture. Ivanova and others (2019) mentions that the emergence of digital technology in all sectors of the economy and other aspects of society requires the creation of comprehensive measures to investigate potential consequences and train people on new work skills.

Risks within organisations increases as more aspects become visible as a result of digitalisation. As a result, modern organisations must pay attention to this and begin to recognise safety culture, as it can improve overall organisational performance. (Stosic et al.,

2022). While the current research is being conducted for a SWE and IT organisation, it binds digitalisation and the risks that it carries.

Uncertainty, disruptions, new technologies, complexity, and incompleteness are the risks that SWE and IT organisations confront. Generally, SWE and IT organisations are getting more complex, distributed, and concurrent, and security concerns are having an increasing impact on them. Monitoring the process and avoiding vulnerabilities are significant factors in SWE, which involves code execution and other code-related tasks. (Menezes et al., 2018; Khan et al., 2022). Many SWE and IT organisations still do not adhere to best practises for incorporating safety into their organisational culture due to a lack of awareness, a fear of time, cost overruns, the usage of third-party components, and a lack of experienced professionals. (Menezes et al., 2018; Khan et al., 2022).

Organisations also confront common risk factors such as unachievable targets, incorrect estimations, poorly defined system requirements, insufficient project progress presentation, and unplanned risks. (Menezes et al., 2018; Khan et al., 2022). As of now, it is more vital to have an organisational culture that supports and leads with a safety culture attitude since safety is a key component of an organisation's responsibility and moral commitment, and it can lead to financial gain in the long term. (Tappura et al., 2022). According to Tappura and others (2022), safety culture is the individual and group attitudes, beliefs, values, and behaviour in an organisation regarding occupational safety and health.

Ivanova and others (2019) stated that tensions in the technology field are increasing in the form of job losses, data breaches, and security breaches, Matthews, and others (2022) sympathise with this meaning because they believe that safety culture is an aspect that organisations should pay more attention to nowadays. According to Matthews and others (2022), if organisations pay greater attention to safety culture and consider it as an error management culture, it can help organisations reduce rework and unplanned work. Stemn and others (2019) also claim that if organisational culture ignores

safety culture, the organisation will have a higher accident rate than those with a high safety culture. As a result, it is essential to foster a culture in which beliefs and attitudes supportive of the adoption of new technologies are shared.

3.2 Westrum's organisational culture

Yli-Kaitala & Toivanen (2021) mentions that an organisation's culture is made up of collective ideas, conventions, and ideals and it has a considerable impact on how its members act and think. Therefore, the influence of overall culture, organisations are able to build and restructure their own ways of working and achieving certain goals, whilst at the same time ensuring that all members and employees are following the same set of basic principles. (Hald et al., 2020; Hartnell et al., 2011). Ron Westrum, Emeritus Professor of Sociology, at Harvard University and University of Chicago, has considered organisational cultures and how they can influence how members act and think. During Westrum's research, he has investigated how organisational culture can affect organisational performance and how it might change the processes that lead to outcomes. (ResearchGate, 2023; Westrum, 2004).

> *"To speak of organisational culture is to take on many problems. Approaches to organisational culture have been diverse, and even with systems safety as a focus, there appears to be no common understand about what culture is. Does culture pertain to the whole organisation or also to its parts? How is culture different from climate? Can culture be measured by surveys of individuals, or must it be inferred from organisational behaviour? These questions are important but addressing them would take us too far afield." (Westrum, 2004, p. 22).*

Westrum has studied organisational cultures and conducted research on how they can affect organisational outcomes. Westrum believes that in order for organisational culture to thrive forward and achieve better performance outcomes, it must focus on keeping the environment safe and information flow effective, because accidents are more likely to occur in an organisation with no or poor information flow or safety, which

eventually leads to declining performance. (Westrum, 2004). Westrum believes that overall organisational culture has a significant influence in facilitating and avoiding certain elements, which is why he formed his typology of organisational cultures. As a result, Westrum came up with his organisational culture typology, which assists in identifying organisational cultures that are most beneficial for efficient information flow, safety, and, eventually, higher performances. Westrum's aim with the typologies is to characterise the organisational culture of a group or organisation and acquire insights into the type of organisational culture that exists. (Westrum, 2004; Westrum, 2014).

Westrum had researched human factors in system safety, particularly in the context of accidents in highly complicated and risky technological domains such as aviation and healthcare. Westrum created a typology of organisational cultures in 1988 to aid in the recognition of many features that occur in organisations. (Westrum, 2014). Later on, Westrum looked more into organisational culture and discovered that organisational culture and organisational performance go hand in hand. According to Westrum (2004), the core concept is that leaders establish organisational culture in units and teams. By leaders' behaviours, which include rewarding and punishing, leaders ultimately give off the impression that what they feel is important. As organisations, units, and teams follow these leaders' preferences, these preferences become the concern of the organisation's workforce. As a result, Westrum developed the following typologies: pathological, bureaucratic, and generative, which help to determine what types of preferences and patterns occur in the organisation. (Westrum, 2004).

3.2.1 The three cultures model

Westrum (2004) studied organisational cultures first in aviation and in healthcare and he wanted to specifically study how to prevent accidents and improve outcomes and performances. He developed a list of typologies that were meant to guide and assist in recognising different aspects that might occur in certain types of organisational cultures. According to Westrum (2004), he intended to construct typologies in order to compare

how organisations processed information. The typologies are presented in the picture (1) below. Westrum (2014) states that organisational culture should invest greatly into information flow enhancing because organisations function on information. He describes that if information would stop flowing in the organisation, organisation itself could not function well, and as information flow would in the end get worser, it would lead to bad performances. Westrum developed sub meanings, which can describe what types of characteristics are strongly related to what typology and the characters of processing information.

Table 1 How organisations process information

Pathological	Bureaucratic	Generative
Power oriented	**Rule oriented**	**Performance oriented**
Low cooperation	Modest cooperation	High cooperation
Messengers shot	Messengers neglected	Messengers trained
Responsibilities shirked	Narrow responsibilities	Risks are shared
Bridging discouraged	Bridging tolerated	Bridging encouraged
Failure→ scapegoating	Failure→ justice	Failure→ inquiry
Novelty crushed	Novelty→ problems	Novelty implemented

Picture 1. Typology of organizational cultures (Westrum, 2004).

Westrum described and identified three different characteristics that can occur in organisations and each of these are associated with different culture types.

Power orientation is a characteristic of pathological organisations which results to the following qualities: *Low cooperation*; refers to a refusal of cooperation and teamwork among members, *messenger shooting*; refers to being unfair to someone who has received bad news or information, *responsibilities shirked*; refers to avoiding work and other responsibilities, *bridging discouraged*; refers to avoiding communication between

others, *failures scapegoated*; refers to when blaming begins, and *novelty crushing*; refers to when there is no innovation. As these qualities emerge in the pathological organisations, it creates a great deal of anxiety and threat, and as a result, employees prefer to hoard or retain information for their own protection or hide it for political purposes. (Westrum, 2004; Westrum, 2014).

Rule orientation, according to Westrum (2004) is a characteristic of bureaucratic organisation, and it results in the following qualities: *modest cooperation*; refers to teams with little teamwork and cooperation among members, and *messengers neglection*; refers to failing to notice any messengers who bring forth any information. *Narrow responsibilities*; refer to having a small number of responsibilities in the organisation, *bridging toleration*; refers to having moderate tolerance for behaviours and beliefs that differ from one's own beliefs, and *failures leading to justice*; refers to when failures occur, justice is brought up against the one who failed. As so forth, *novelty leading to problems*; refers to the fact that whenever a new idea is explored, innovated, or created, it appears to be a slowing factor for the organisation.

Overall, bureaucratic typology leads the organisational culture down a path where own rules, positions, and departmental turf takes priority. By turf, Herrera, and others (2017) mean that there is a situation where organisations are in a competition over business of area and organisations perceive themselves to be in competition with one another over resources, promotions, or publicity. Bureaucratic organisations often follow the rules, and in the end, the organisations mostly serve to protect themselves. (Westrum, 2004; Westrum, 2014).

Last typology, according to Westrum's table of typologies (2004), is generative organisation, where performance-oriented type occurs. This results in following characteristics such as strong cooperation, messenger training, risk sharing, bridging encouraged, failures leading to enquiry, and novelty being implemented. When teams cooperate well and cross-functional teams share duties evenly, this is referred to as high cooperation.

Messenger training is a scenario in which there is no blame or finger pointing at the messenger who brings forth bad or good information, and the environment is designed in such a way that risks and failures are supported. Risk sharing refers to the sharing of cooperation and duties, which decreases risks and errors - more collaboration and shared commitments on the process, more error avoidance. Bridge encouraged refers to the breaking down of silos across teams and units; as this is achieved, better understanding of one another is strengthened. Failures leading to an inquiry happen when individuals are not held accountable for failings. Instead, when failures occur, questions regarding what caused the failures and how to keep those failures from occurring again in the future are considered. As in the end implementing novelty refers to encouraged experimentation in an environment where new ideas are continually pursued, and innovation is constantly improved. These characteristics produce an organisational culture that encourages proactive effort and focuses on its objective. (Westrum, 2004; Westrum, 2014). Westrum (2004) mentions that generative organisations have a sense of ownership and an overall sense of caring and trust among members.

3.2.2 Area of focus of Westrum's organisational culture theory

As previously mentioned, Westrum's theory of organisational culture is gaining importance in this study since it is concerned with information flow among members, safety, trust, and learning. (Westrum, 2004). Because Westrum's (2004; 2014) research focuses on communication and safety patterns within an organisation, which is a key factor in determining the quality of work that is provided forward, Westrum's theory and research on typologies can be applied to SWE organisations, as is the case in this study. Westrum theory can be a useful tool in identifying opportunities for change within an organisation and its culture because it can assist organisations in recognising specific patterns that can affect organisational outcomes and performances.

Westrum's theory provides a methodical approach that can aid in the development of working organisational cultures, particularly in technologically oriented organisational cultures. Aspects that are mentioned in the chapter 3.1. are related to the typologies

mentioned by Westrum as they inform about safety culture and the aspects that bind to it. Westrum (2004; 2014) states that in order for an organisation to get good performance, it must embrace its culture, which promotes high information flow, messenger training, risk sharing, bridging, failures, and innovative approaches. According to Westrum (2004), it is possible to have a well-performing organisation with these aspects. There are also aspects that are highlighted in modern digitalised organisations that are very similar to Westrum's points of view. Information flow and processing capabilities, information awareness, effective communication, and information exchange between different levels are all important issues in modern organisations (Tappura et al., 2022; Gupta et al., 2022; Bisbey et al., 2021), as are psychological safety, learning acceptance, and knowledge and risk sharing (Yli-Kaitala & Toivanen, 2021; Bisbey et al., 2021; Pupulidy, 2020).

3.2.3 Research utilising Westrum's framework

The DevOps Research & Assessment (DORA) conducts research on capabilities that drive software delivery and operational performance and has published reports from 2014 to 2022. According to the 2022 report (DORA & Google Cloud), previous reports and research are studying software delivery -, operational -, and organisational -performance. According to the State of DevOps report (2022), over 30 000 IT professionals have been taken part in the research.

According to Accelerate, State of DevOps 2021 (pp. 31-32), reports use in their research Westrum's organisational culture framework in order to recognize organisational cultures. When figuring out the organisational culture, reports study the outcomes of software delivery and operations performance and check whether a specific culture typology correlates with software delivery-, and operations -performance. The report states that the organisational cultural understanding evolves, and that the definition of culture includes important factors such as psychological safety. According to Accelerate, State of DevOps 2022 (pp. 10-11), organisations with generative cultures are more likely to meet their metrics that are linked with software delivery and operational performance. The

metrics are deployment frequency, lead time for changes, time to restore service, and change failure rate, and as these metrics are being reviewed, report states that these are linked to modern high-functioning organisations that deals with SWE and IT.

3.3 Edgar Schein's model of organisational culture

Professor and psychologist Edgar Schein has studied how culture influences the performance of organisations. (MIT, 2023). Schein has written a book “Organisational Culture and Leadership”, (2010) where he attempts to clarify the idea of organisational culture. As mentioned above, in the chapter 2.2., Schein (2010, pp. 24-33) mentions that organisational culture exists on three layers within the organisation, which are basic assumptions, values, and artefacts. As organisation would follow this theoretical framework of organisational culture that Schein has presented, Schein (2010, p. 127) states that organisation has the opportunity to learn or acquire great deal of information regarding to various methods. The framework itself enables and gives the possibilities for organisation to stand still and concentrate on determining the significance of the three layers of culture.

The theoretical framework according to Schein (2010, pp. 24-33) can assist and help organisations to gain better understanding of what constitutes a positive work culture and how it should be portrayed. It can help organisation to strategize how to find problems and how to solve those problems at the same time when organisational culture develops over and over. Organisations needs to be aware of the importance of preserving a positive work culture because there is a possibility and ease with which a healthy work environment can turn into a toxic one. Aspects and factors such as employees and members, the external and internal environment, leadership, reorganisation, and possibly other factors might be affected by the changes. Therefore, organisational culture encompasses not only the way in which employees and management react to the issues that arise in the workplace but encompasses on how the company itself handles such issues. (Schein, 2010, pp. 73-93, 155).

The framework developed by Schein provides a solid understanding of the organisational culture as well as points of cultural change that can be implemented in any organisation. Understanding this model demonstrates that cultural change is a process and that behaviours need to be unlearned before new behaviours can replace the behaviours that have been learned in the past (Schein, 2010, p. 127). This framework encompasses a process that allows cultural interventions for management to use when new challenges arise as well as a solid approach to a positive work culture. Additionally, this framework also includes a set of guidelines for how a positive work culture should be maintained. (Schein, 2010, pp. 73-74).

3.3.1 Area of focus of Schein's model of organisational culture

Schein's theoretical framework includes an organisational process, and the culture is able to meet new challenges and approaches, and it can help organisations gain a better understanding of what creates a positive work culture and how it should be implemented. The theoretical framework can guide organisational culture in learning or acquiring a large amount of information about its history or various ways of doing things. It also helps organisations learn and gain a lot of information about their past cultures as it can be useful for organisations that want to go through cultural transformation and changes. (Schein, 2010, pp. 73-93, 127). Schein states (2010, pp. 73-93) that the theoretical framework is appropriate for organisational cultures that want to analyse and comprehend underlying beliefs, values, and assumptions. It can also be appropriate for organisations that are undergoing cultural transformation or change, and it can help implement specific methods and concepts that the theoretical framework recommends.

3.4 Cameron and Quinn's competing values framework

Professors Kim Cameron and Robert Quinn have elevated their theory of organisational culture, which is based on a theoretical model called "Competing Values Framework,"

which lays out a theoretical framework as its goal is to create an organisational culture profile and help organisations determine whether or not the organisational culture is effective. (Cameron & Quinn, 2011, p. 35). The original theoretical model was developed by Robert Quinn and John Rohrbaugh (1983) to understand whether or not organisations can operate effectively. According to Cameron and Quinn (2011, p. 31), there are many theoretical frameworks that can describe organisational cultures in their own meaningful way; therefore, they intended to design their own theoretical framework based on the original one, that can identify and assist change in organisational culture.

The purpose of this framework is to determine if an organisation's major focus is internal or external, and whether it strives for flexibility and individuality or stability and control, and the dimensions of the framework include inner concepts such as clan, adhocracy, market, and hierarchy. (Cameron & Quinn, 2011, pp. 37-45). These concepts each have their own meaning, with clan culture being an environment where loyalty and tradition bond individuals together and openness and personal level caring occur. Individual initiative, freedom, and risk-taking are fostered in an adhocracy culture. Market culture is fostering an environment in which achievement and reputation are valued, therefore embracing competitiveness and high goal setting is encouraged. Hierarchical culture fosters an environment in which stability, productivity, and tasks are valued, as well as a highly formalised and structured working environment (Cameron & Quinn, 2011, pp. 37-45). Organisations can use this framework to help members make choices, recognise and work with aspects that are valuable and beneficial for the organisation and its culture. (Cameron & Quinn 2011, pp. 31-36). Overall, the Competing Values Framework is one of the most significant frameworks in the field of organisational culture research because it examines the value aspects associated with organisational culture effectiveness (Tianyuan & Nengquan, 2009).

3.4.1 Area of focus of competing values framework

Since the aim of Cameron and Quinn's Competing Values Framework places a focus on clan, adhocracy, market, and hierarchy, it may be used to look deeply into an

organisation's current culture and the factors that set it apart. It also helps organisations to steer in the right path. (Cameron & Quinn, 2011, p. 31). Furthermore, the Competing Values Framework is useful when determining what core values and beliefs exist within the organisation and seeking changes to the culture if necessary. Cameron and Quinn (2011, pp. 37-45) mentions that the framework can help organisational leaders make better decisions by improving value, beliefs, and effectiveness. Cameron and Quinn also mention (2011, pp. 16-18, 46-49) that the Competing Values Framework is appropriate for organisations to assess their culture and identify dominant culture characteristics, as well as useful for the organisation to achieve its objectives and contribute business strategies and desired outcomes.

3.5 Hofstede's cultural dimensions theory

Professor Geert Hofstede examined organisational theories and developed his own perspective on organisational culture and the theory that best fits it. (Hofstede, 1984). Hofstede mentions in his study (1984) that he has been studying cultural systems, especially those that have strong influence on behaviours. He states that culture is a pattern of thought that for example, leaders pass to on to their followers, followers pass on to their leaders, and friends pass on to their friends. He states also that management is a symbolic activity that relies on the receiver's interpretations.

After his research into environmental factors and occurrences, Hofstede turned his attention to the cultural systems within which they occur, namely the behaviours that have a significant impact on the workplace. As a result, Hofstede developed Cultural Dimensions Theory, which is aimed to be a framework for cross-cultural communication. (Hofstede, 1984). Its goal is to demonstrate the effects of a society's culture on its members' values and how these values relate to behaviour. It is also intended to be a framework for assisting organisations in learning how to overcome cultural and geographical differences in order to achieve a harmonious environment. (Hofstede, 1984; Escandon-Barbosa et al., 2022).

According to Hofstede (1984) the framework is used to differentiate between different national cultures, cultural dimensions, and their impact on a business setting. Later on, Hofstede recognised four dimensions: power distance, individuality vs. collectivism, masculinity vs. femininity, and uncertainty avoidance. Power distance refers to the extent to which a society accepts unequal power distribution in institutions and organisations. Individualism means that people are expected to work alone or with their closest families, whereas collectivism means that people work together loyally with relatives, clans, or other groups. Masculinity takes the form of achievement, heroism, assertiveness, and material success, whereas femininity takes the form of relationships, modesty, caring for the weak, and quality of life. When members of a society or a collective group are uncomfortable with uncertainty and ambiguity, they avoid it. (Hofstede, 1984; Escandon-Barbosa et al., 2022).

3.5.1 Area of focus of Hofstede's cultural dimension

As Hofstede's cultural dimension is focusing on cross-cultural communication, which then explores further into the impacts of it, such as how a society's culture on the values of its members, and how those values are bound with particular behaviour (Hofstede, 1984). The cultural dimensions proposed by Hofstede provide a useful framework for analysing the different perspectives taken by various organisations. The framework helps with understanding by allowing one to identify the underlying reasons of a behaviour, such as power distance, individualism vs. collectivism, masculinity vs. femininity, or the avoidance of uncertainty (Hofstede, 1984). On the other hand, it is noticeable to be aware that Hofstede's cultural dimension approaches theory from accounting, sales, and marketing dimensions, as the theory itself was conducted by surveying accounting scholars and is based on inconclusive research, as demonstrated by Baskerville's study (2003). Once the research was done, Hofstede based his hypothesis replies on data from just one corporation, IBM, which introduces bias onto the results. (Baskerville, 2003).

3.6 Recap of theories

As moving forward to next chapter, methodologies chapter, here is a recap of theories as the goal is to remind what were the core concepts of theoretical frameworks and focuses of the theories.

Organisational theories	Theoretical framework	Focus of the theory
Westrum's organisational culture theory.	Westrum's organisational culture theory framework offers typologies of culture, which are formed from certain culture types: pathological, bureaucratic, generative. (Westrum, 2004).	This theory focuses on identifying certain organisational culture characteristics that can occur in organisations and it focuses on finding the reason why the culture act as it is. Theory aims to find the certain aspects that might have an effect on the culture and aims to help organisations noticing what aspects are creating the certain type of culture and how it can be improved. (Westrum, 2004).
Edgar Schein's model of organisational culture.	Edgar Schein's model of organisational culture provides a framework that can help organisation to gain better understanding of what constitutes and creates a positive work culture and how it	This theory focuses on analysing and comprehending underlying beliefs, values, and assumptions, and it focuses on helping organisations implement

	should be portrayed. (2010, pp. 24-33, 127).	specific methods and concepts if necessary. (Schein, 2010, pp. 73-93, 127).
Cameron and Quinn's Competing Values Framework.	Competing Values Framework is the theoretical framework which helps creating an organisational culture profile by looking into inner concepts such as clan, adhocracy, market, and hierarchy. (Cameron & Quinn, 2011, p. 31).	This theory helps creating an organisational culture profile and help organisations determine if or not the organisational culture is effective. The framework itself is useful for organisations to assess their culture and identify dominant culture characteristics. (Cameron & Quinn, 2011, pp. 16-18, 46-49).
Hofstede's cultural dimensions.	Cross-cultural dimensions theory, which identifies four dimensions: power distance, individualism vs. collectivism, masculinity vs. femininity, and uncertainty avoidance. (Hofstede, 1984).	These dimensions are used to differentiate between different national cultures, cultural dimensions, and their impact on a business setting. The framework helps with understanding by allowing one to identify the underlying reasons of a behaviour. (Hofstede, 1984).

Table 2. Recap of theoretical frameworks.

4 Methodology

Certain methodologies will be introduced at the beginning of the methodology chapter because methodologies itself will be useful in analysing the data that will be collected throughout the research. The methodology chapter will explain the survey method and statistical analysis used to demonstrate the following hypothesis: *It is possible to collect data by using designed survey based on Westrum's theory in order to demonstrate Unit A organisational culture through statistical analysis.* The chapter's structure consists of an explanation of quantitative analysis, the creation of the survey, and the statistical methods selected. These will explain why the study specifically chose these techniques.

4.1 Quantitative analysis

When deciding between quantitative and qualitative approaches, this study prefers quantitative methods since quantitative data is obtained and measured using statistical, mathematical, or numerical analysis, which includes polls, questionnaires, and surveys. The goal of quantitative research is to discover the relationship between two variables within a specific population. (Quantitative Techniques Research Guides, 2023). According to Statistics Finland (n.d.), quantitative approach and research defines and covers social phenomena in accordance with general scientific logic by creating as precise measuring methods as possible – based on representative samples, and applying statistical methods to the gathered data and samples enables the proper conclusion to be drawn.

The goal of this research is to conduct a survey from which data will be collected and analysed. The quantitative approach is structured as follows: defining quantitative research, determining the certain population group, determining whether the population group is suitable for quantitative research, defining and designing methods for acquiring representative samples, defining survey methods which provides the needed support, defining statistical analysis methods based on hypothesis and data, and drawing conclusions based on the outcomes.

The survey is being sent to 815 members of Unit A, in Finland's level, and the number of responses is X. As previously stated, surveys are quantitative methods, so approaching this study quantitatively is the preferred method. (Quantitative Techniques Research Guides, 2023).

In the following table (2), there is a clarification of the quantitative research structure and parts that includes to it. In the table, objective / purpose, sample, data collecting method, and data analysis will be clarified.

	Quantitative research
Objective / purpose	Objective is to determine Unit A' perceptions in organisational culture by using survey designed and based on Westrum's organisational culture theory and analysing data by using statistical analysis. Purpose of the study is to prove that in Unit A perceptions of the organisational culture can be measured effectively by using survey based on Westrum's organisational theory.
Sample	Unit A's employees, which consists of 815 employees.
Data collecting method	Survey, Likert-scaling, Random sampling method
Data analysis	Statistical data will be measured. Statistical methods will be used as the methods are descriptive statistical analysis, t-test, and correlation analysis.

Table 3. Quantitative research structure.

4.2 Designing the survey

Analysing organisational culture using surveys is believed to be the starting point for larger cultural transformation programmes, and overall survey use is believed to be with representative sampling, which can be important for generalisation (Ghafoori et al., 2022; Krosnick, 1999). In this research, survey will be used as a method tool to collect data from sample population, which is employees of Unit A. There are approximately over 800 employees in the Unit A Finland's level and the survey is being sent to 815 employees through email list. The survey will consist of set of questions directed to Unit A and questions can be answered through Likert-scaling, from 1-7, whereas 1 equal to strongly disagree, 4 equal neutral, and 7 equals to strongly agree.

The survey is based on Westrum's typologies which are pathological, bureaucratic, and generative (Westrum, 2004) and as with the typologies, there were descriptions of the aspects that connect with the specific typologies, and the questions themselves had to be designed in such a way that the aspects fit to the questions. Google Cloud Architecture centre website (2023) and Humble and others (2018, pp. 32-39) both mentions about Westrum's organisational culture and survey questions to be asked if wanting to measure organisational culture by certain metrics provided by Westrum. According to the information, survey questions can be modified in a way that it fit to the certain context. The questions that Google Cloud Architecture centre website (2023) and Humble and others (2018, p. 33) provided are following; on my team, information is actively sought; messengers are not punished when they deliver news of failures or other bad news; on my team, responsibilities are shared; on my team, cross-functional collaboration is encouraged and rewarded; on my team, failure causes inquiry; on my team, new ideas are welcomed; failures are treated primarily as opportunities to improve the system. Answering to these questions works with Likert-scaling, from 1 to 7.

Following to the designing of survey questions, a slight modification has been made so that they serve both the thesis research and Case Company X. Unlike usual, the purpose of the survey questions is to assist and provide informatic data for Unit A's goals;

therefore, questions were designed from Westrum's organisational culture theory aspects so that they correspond with the goals and provide useful answers that can be beneficial for further research in Unit A, as well as bring forth unique aspects that are relevant to the research objective and purpose.

As the Case Company X is an international SWE and IT organisation and the Unit A Finland's level is roughly employing over 800 IT professionals, providing set of well thought survey questions is important. Below the text, there is table 4 where is the set of questions, that have been asked from employees. As can be seen from the table 4, there are 10 questions that are designed based on the questions that Google Cloud Architecture website (2023) and Accelerate (2018, pp. 31-39) provided.

To be noted, in the table 4, questions does not show Case Company X's real name. Instead, name has been changed due to the confidentiality to *Case Company X*.

	Survey questions
1	Your team in Case Company X prioritizes achieving its mission or goal over the concerns of other departments that are part of our Case Company X's unit
2	Your team in Case Company X prioritizes good performance and doing what is supposed to be done
3	Your team in Case Company X punish or blame people or other teams and departments for mistakes or failures
4	Your team in Case Company X place equal importance on treating people fairly and being efficient in administrative tasks and processes
5	Your team in Case Company X foster a learning and growth culture in which mistakes are viewed as opportunities for improvement rather than sources of blame or punishment
6	Your team in Case Company X encourage communication and decision-making that are open and honest
7	Case Company X encourages collaboration and trust across departments and hierarchy
8	Case Company X's teams and departments support and encourage the flow of information that helps people get answers to their questions quickly and in a helpful way
9	The teams and departments at Case Company X hoard, hide or lie about information for internal political reasons
10	Case Company X's teams and departments support one another and solve issues quickly

Table 4. Set of survey questions.

Questions 1 and 7 are designed based on the question "*cross-functional collaboration is encouraged and rewarded*", questions 2 and 10 are based on question "*responsibilities are shared*", question 3 is based on question "*messengers are not punished when they deliver news*", question 4 is based on question "*new ideas are welcomed*", question 5 is based on question "*Failures are treated primarily as opportunities to improve the system*", and questions 6, 8 and 9 are based on question "*information is actively sought*". There are questions that have same theme twice or three times, and this is because there was a goal and purpose for having deeper information in the Unit A.

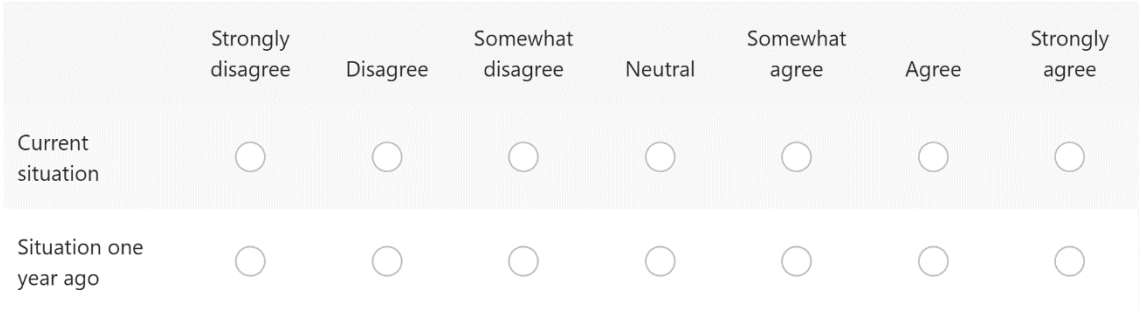
It is worth mentioning that questions 3 and 9 are "negative variable" questions that must be reverse-coded. The negative variable implies that the question is the inverse of the positive variable. Question 3 is a "negative variable", and it states, "*Your team in Case Company X punish or blame people or other teams and departments for mistakes or failures*", whereas for example, question 4 is a positive variable, and it states, "*Your team in Case Company X place equal importance on treating people fairly and being efficient in administrative tasks and processes*". It is important to notice that reverse-coding must be taken into consideration while analysing negative question results statistically. Reverse-coding is the process of combing data from negatively worded items with data from positively worded items in order to combine and statistically analyse all data (Seung et al., 2018). In this Likert-scale, where 1 is strongly disagree and 7 is strongly agree, reverse-coding results in 1 being strongly agree and 7 being strongly disagree. This way, the negative and positive variables are in harmony, and there are logical interpretations in statistical analysis, therefore the sum variable can be understood. (Tietoarkisto, n.d.)

4.3 Initiating survey

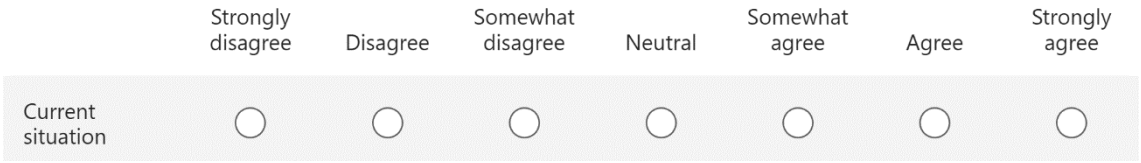
The survey is conducted by using Microsoft Forms and before sending the survey forward officially, survey has to be tested by certain population of employees. Testing can ensure that questions were understandable and survey fatigue did not occur when answering. Survey was sent on 15.3.2023 and it closed 3.4.2023. Reminders were sent weekly. There

was around 3 weeks for employees to answer to the survey and as the survey closed, results were gathered from the Microsoft Forms.

Case Company X sought a wish where it would be possible to question about a situation a year ago as well while conducting the survey. As then conducting the survey there was two possible options for employee to take when answering the survey. First option in the survey was for employees who had worked for Case Company X for more than a year, and the second option was for the employees who had worked for Case Company X for less than a year. Both options had same set of 10 questions, but the first option asks from employee about the situation year ago as well. Below this text, there can be seen two pictures, 2 and 3, and there are the options choices that employees see when answering the survey.



Picture 2. Microsoft Forms, current situation & situation one year ago -options.



Picture 3. Microsoft Forms, current situation -option

In the survey, employees can choose from Likert-scale, and the options are followings: *strongly disagree; disagree; somewhat disagree; neutral; somewhat agree; agree; strongly agree*. In the survey, there can be only one response per person.

4.3.1 Sampling method

Because this study sends surveys to employees at the Unit A level in Finland, the valid sample method for sending the surveys is simple random sampling. Simple random sampling is a self-weighting sampling design in which all items in a population have an equal chance of being included in the sample. In this sampling method, a random number is chosen and assigned to a certain population. This method is widely used in surveys that are distributed. (Alsuhail et al., 2007, p. 62). It is appropriate for this research because it involves sending survey to 815 employees and waiting for a random number of responses.

Email that was being sent to employees can be found from appendix 1.

4.4 Statistical analysis

The survey is being sent to an email list which consist of 815 SWE and IT professional at the Unit A level in Finland. As the answers are obtained from 815 number of respondents, the goal of the research is to analyse the outcomes of the answers and check if data outcomes can validate the hypothesis of the research. Data from Microsoft Forms is turned into quantitative data, which is then analysed mainly by using IBM SPSS statistics software, version 28.0.1.1 (15) and Microsoft Excel version 2302 for some of the data.

By analysing survey data with descriptive statistics, it is possible to determine how well evidence supports the research hypothesis. After the conclusion of the hypothesis, it is important to examine the descriptive statistics to see how well the data supports Westrum's organisational culture theory and where the data corresponds with Unit A's

organisational culture situation based on Westrum's typologies. The descriptive statistics will be analysed with IBM SPSS's "descriptive statistics" and "custom tables" functions. Means and medians are analysed with Microsoft Excel's average and median -formulas, and those are visualised by using the "bar chart" function.

The tables in descriptive statistics, there can be seen 10 questions, N number of respondents, minimum and maximum scaling point, mean, standard deviation, and median. In addition to descriptive statistics, research sets quantitative research questions based on data when statistical analysis is applied to gathered data. Determine whether there are significant differences in the means of the two groups, "over a year employee" and "under a year employee"; whether there are significant statistical differences between the questions; whether there is correlation between questions that deal with the same aspects; and whether there is correlation between questions from different years.

When examining whether there are significant statistical differences between the means of the two groups, the "independent samples T test" function is used. The test is done with the normal distribution assumption, and it was validated with the Levene's test. To determine whether there are significant statistical differences between the questions, the two-tailed function is used. Overall, values that can be seen from the independent samples T test are Levene's Test for Equality of Variances, t-test for Equality of Means, and 95% Confidence Interval of the Difference. Paired Samples test will be used as well. In all tests, $p<0,05$ was used as a threshold value for statistical difference.

The "Spearman's correlation" function will be used to analyse the correlations. As part of the correlation analysis, the paired samples T test will be utilised to examine if there are any variations between the data from a year ago and the data from today. Spearman's correlation is a non-parametric test, and because the data from the survey is sequential, non-parametric test is the appropriate statistical analysis.

5 Results

This chapter presents the results of the research which includes analyses such as descriptive statistics and any other analyses mentioned in methodology chapter. As the survey was completed and responses were gathered, there were 165 responses out of 815 employees. With 165 respondents, the response rate was *20,25%*.

When analysing the data, it is important to check how the population divides. 130 of the 165 (*78,79%)* respondents indicated that they have worked at the Case Company X, Unit A for more than a year. 35 respondents (*21,21%*) indicated that they have worked for Case Company X, Unit A for less than a year. It is worth noticing that both options have the same set of questions, and both options respond to the "current situation". Respondents who chose the option "situation one year ago" also answered to the questions where they have been working in Case Company X over a year.

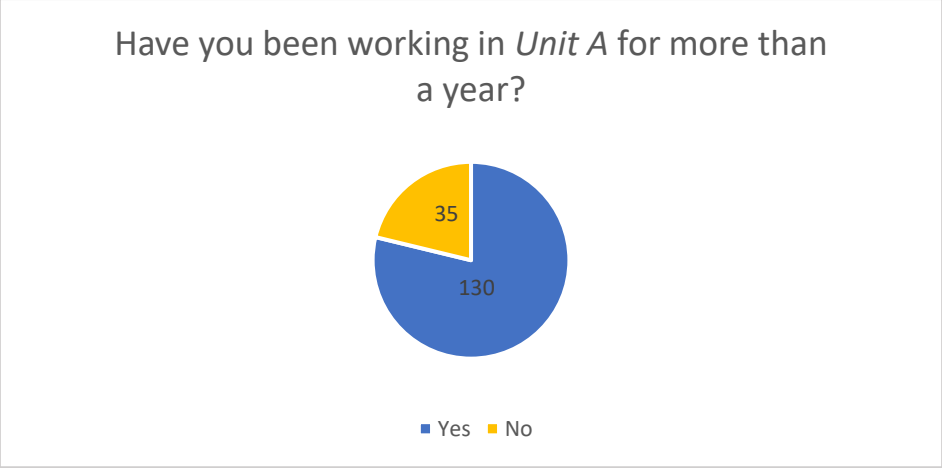


Figure 1. Distribution of respondents' employment time.

5.1 Descriptive statistics

As descriptive statistics can be used to organise data by describing the connection between variables or populations, it will provide the first results from the data. (Woodrow,

2014, pp. 49-50). Below the text, there are tables of data, which are analysed by using IBM SPSS's "descriptive statistics" and "custom tables" functions.

	N	Minimum	Maximum	Mean	Std. Deviation	Median
Q1	130	1	7	4,80	1,383	5
Q2	130	2	7	5,78	,980	6
Q3	130	1	7	5,91	1,372	6
Q4	130	1	7	5,50	1,377	6
Q5	130	1	7	5,44	1,093	6
Q6	130	1	7	5,68	1,196	6
Q7	130	1	7	4,90	1,488	5
Q8	130	1	7	4,91	1,285	5
Q9	130	1	7	5,48	1,453	6
Q10	130	2	7	5,00	1,181	5

Table 5. Descriptive statistics of current situations -answers from employees who have been working over a year.

Table 5 offers descriptive statistics of current situation -answers, and which are from employees who have been working over a year. It makes total 130 answers for each question. The total mean of these answers is *5,34*. The average of the answers, depending on the question, varied between *4,80* and *5,91*. The range of variation was quite wide in all questions, with the lowest answer being 1 and the highest being 8, excluding questions 2 and 10, where the minimum is 2. The median of the answers in questions 2-6 and 9 was 6, questions 1, 7-8 and 10 is 5.

	N	Minimum	Maximum	Mean	Std. Deviation	Median
Q1	35	2	7	4,51	1,292	4
Q2	35	3	7	5,49	1,040	6
Q3	35	2	7	6,03	1,524	7
Q4	35	2	7	5,51	1,222	6
Q5	35	3	7	5,54	1,094	6
Q6	35	2	7	5,54	1,197	6
Q7	35	3	7	5,23	1,190	5
Q8	35	2	7	5,09	1,442	5
Q9	35	2	7	5,51	1,269	6
Q10	35	2	7	5,14	1,141	5

Table 6. Descriptive statistics of current situations -answers from employees who have been working under a year.

In the table 6 there are descriptive statistics of current situation -answers, which are given by employees who have been working under a year. It makes 35 answers per question and the total mean of all these answers is *5,35*. The average of the answers, depending on the question, varied between *4,51* and *6,03*. The variation range was quite wide in all questions, but narrower compared to the previous tables. For questions 1, 3-4, 6, and 8-10, the lowest score that was given was 2, and for questions 2, 5, and 7, the lowest score was 3. The highest score in this for each question was 7. As When comparing median of the answers to the previous questions, it can be seen that there is more dispersion within the medians as the number of respondents were smaller. As can be seen from the table, question 1 median is 4; questions 7-8, and 10 median is 5; questions 2, 4-6, and 9 median is 6; and question 3 median is 7.

	N	Minimum	Maximum	Mean	Std. Deviation	Median
Q1	130	1	7	4,57	1,408	5
Q2	130	2	7	5,58	1,126	6
Q3	130	1	7	5,88	1,384	6
Q4	130	1	7	5,36	1,414	6
Q5	130	2	7	5,35	1,160	6
Q6	130	2	7	5,48	1,170	6
Q7	130	1	7	4,72	1,443	5
Q8	130	2	7	4,72	1,360	5
Q9	130	1	7	5,46	1,437	6
Q10	130	1	7	4,68	1,294	5

Table 7. Descriptive statistics of situation one year ago -answers.

In the table 7, there are descriptive statistics from answers regarding situation one year ago, which consists of total 130 answers. As checking the total mean of all answers, the mean is *5,18*. The mean of the answers varied between *4,57* and *5,88*, depending on the questions. The range in the means is quite wide in all questions, and as can be seen that the lowest score given is 1 and highest score given is 7. In the questions 2, 5-6, and 8, the lowest score is 2. When it comes to medians, questions 2-6 and 9 median is 6, and questions 1, 7-8, and 10, median is 5.

	N	Minimum	Maximum	Mean	Std. Deviation	Median
Q1	165	1	7	4,74	1,366	5
Q2	165	2	7	5,72	,997	6
Q3	165	1	7	5,93	1,402	6
Q4	165	1	7	5,50	1,342	6
Q5	165	1	7	5,46	1,090	6
Q6	165	1	7	5,65	1,194	6
Q7	165	1	7	4,97	1,433	5
Q8	165	1	7	4,95	1,317	5
Q9	165	1	7	5,48	1,413	6
Q10	165	2	7	5,03	1,171	5

Table 8. Descriptive statistics of all current situation -answers.

In the table 8, there are descriptive statistics from all current situation -answers, which makes in total 165 answers. The means between questions varied between *4,74* and *5,93*, depending on the questions. As can be seen, the range of variation within the questions is quite wide whereas lowest score is 1 and the highest is 7. In the questions 2 and 10, the lowest score is 2. The median of the answers in questions 2-6 and 9 was 6, questions 1, 7-8 and 10 had 5. When checking the total mean of all answers, mean is *5,34*.

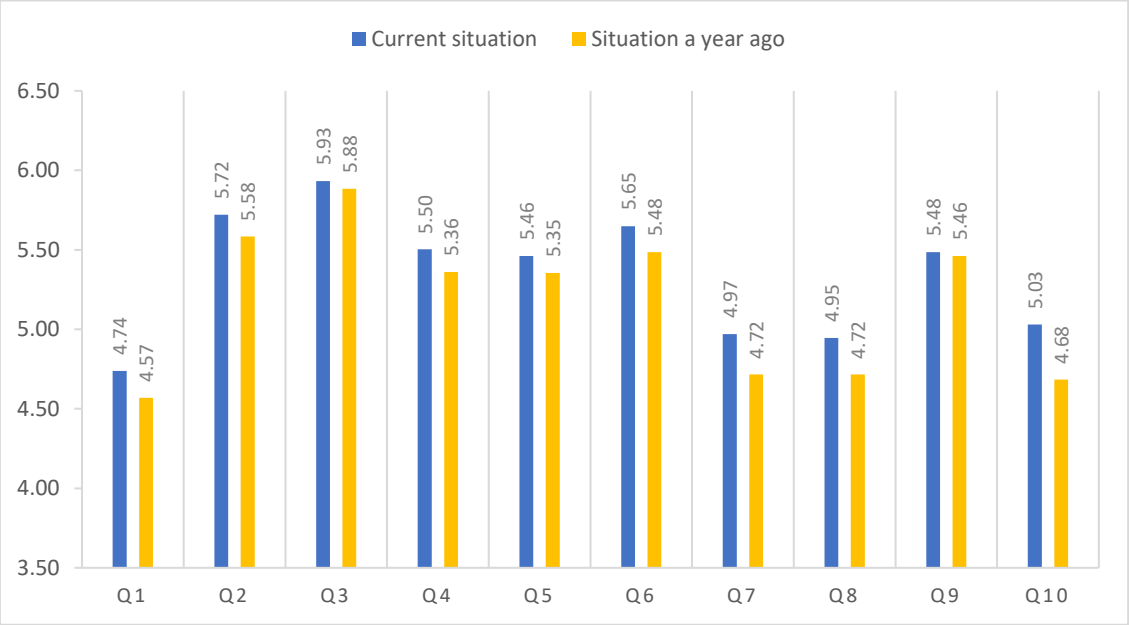


Figure 2. Means of the answers in current situation and situation year ago.

This bar chart is intended to visualise the means of current situation (n=165) and situation one year ago (n=130). This bar chart intends to help visualise the change of the means and clarify the direction of typologies. As a clarification, current situation means are from the table 8 and situation a year ago means are from the table 7.

5.2 Comparison of the answers between the groups

As comparing if there is significant statistical difference between the means of the two groups. Below the text there are tables, 9 and 10, which results' will be stated. The table 9 answers to the quantitative research question that is there statistically significant difference between the answers provided by employees who have been working over a year versus under a year. The table 10 on the other hand answers to the quantitative research question that is there statistically significant difference between the answers from current situation and situation a year ago from the employees who have been working over a year.

	Levene's Test for Equality of Variances		t-test for Equality of Means							
					Significance				95% Confidence Interval of the Difference	
	F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Q1	,226	,635	1,099	163	,137	,273	,286	,260	-,227	,799
Q2	1,020	,314	1,581	163	,058	,116	,299	,189	-,074	,672
Q3	,862	,355	-,452	163	,326	,652	-,121	,268	-,649	,408
Q4	,242	,623	-,056	163	,478	,956	-,014	,256	-,520	,492
Q5	,130	,719	-,502	163	,308	,617	-,104	,208	-,515	,307
Q6	,115	,735	,589	163	,278	,557	,134	,228	-,316	,584
Q7	1,163	,282	-1,206	163	,115	,230	-,329	,273	-,867	,210
Q8	,980	,324	-,709	163	,240	,480	-,178	,251	-,674	,318
Q9	,407	,524	-,138	163	,445	,890	-,037	,270	-,570	,495
Q10	,060	,807	-,640	163	,262	,523	-,143	,223	-,584	,298

Table 9. Differences in the answers between employees who have been working over a year versus under a year.

The analyses in the difference between the answers provided by employees who have been working over a year versus under a year are provided in the table 9. The table shows the results of Levene's test, which was done to verify the normal distribution assumption, and as the table shows, the p-values (two-sided p) varied between 0.116 (question 2) and 0,956 (question 4). For any question, there is no statistically significant difference in the values between the answers of employees who have worked for more than a year and less than a year.

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Q1 Current situation - Q1 One year ago	,231	,993	,087	,059	,403	2,651	129	,005	,009
Pair 2	Q2 Current situation - Q2 One year ago	,200	,720	,063	,075	,325	3,169	129	<,001	,002
Pair 3	Q3 Current situation - Q3 One year ago	,023	,577	,051	-,077	,123	,456	129	,325	,649
Pair 4	Q4 Current situation - Q4 One year ago	,138	,913	,080	-,020	,297	1,729	129	,043	,086
Pair 5	Q5 Current situation - Q5 One year ago	,085	,747	,066	-,045	,214	1,291	129	,100	,199
Pair 6	Q6 Current situation - Q6 One year ago	,192	,933	,082	,030	,354	2,351	129	,010	,020
Pair 7	Q7 Current situation - Q7 One year ago	,185	,987	,087	,013	,356	2,134	129	,017	,035
Pair 8	Q8 Current situation - Q8 One year ago	,192	,788	,069	,055	,329	2,781	129	,003	,006
Pair 9	Q9 Current situation - Q9 One year ago	,015	,597	,052	-,088	,119	,294	129	,385	,769
Pair 10	Q10 Current situation - Q10 One year ago	,315	,726	,064	,189	,441	4,950	129	<,001	<,001

Table 10. Differences between answers from current situation and a year ago from the employees who have been working over a year.

In the table 10, there are values for each pair, and each pair consists of two questions, which are “current situation” and “situation one year ago”. The quantitative research

question was to find out whether there are differences between answers from current situation and situation year ago – these answers are from employees who have been working over a year.

In this analysis, it is important to notice most right sided column, which is “Two-Sided p”. In the pairs 2 and 10, there was a statistical difference between the analysed answers (*0,02 and <0,01*, respectively). The answers were better in both now compared to the table 5 (*current situations -answers from employees who have been working over year*) questions’ 2 and 10, which means were 5,58 and 5,00 and table 7 (*situation one year ago -answers*) questions’ 2 and 10, which means were 5,58 and 4,68. In other questions, there was no statistically significant difference between the answers.

5.3 Correlation tests

This part analyses the correlations of the results. As there were two quantitative research questions, which were that is there any correlation between the same questions now and a year ago and are there any correlations between the same themed questions. Table 11 consist of pairs, and each pair contains two questions.

		Spearman's correlation
Pair 1	Q1 Current situation & Q1 Situation one year ago	,739
Pair 2	Q2 Current situation & Q2 Situation one year ago	,860
Pair 3	Q3 Current situation & Q3 Situation one year ago	,964
Pair 4	Q4 Current situation & Q4 Situation one year ago	,850
Pair 5	Q5 Current situation & Q5 Situation one year ago	,879
Pair 6	Q6 Current situation & Q6 Situation one year ago	,728
Pair 7	Q7 Current situation & Q7 Situation one year ago	,746
Pair 8	Q8 Current situation & Q8 Situation one year ago	,863
Pair 9	Q9 Current situation & Q9 Situation one year ago	,968
Pair 10	Q10 Current situation & Q10 Situation one year ago	,842

Table 11. Correlations between answers from current situation and situation one year ago.

In the table 11, there are 10 pairs, which contains two set of question each. In this correlation analysis, goal was to find out, whether "current situation" and "situation year ago" have some correlation between. The values from Spearman's correlation analysis can be seen in the right-side column. For interpretate and understand the set of Spearman's values and meanings of it, this research uses following values meanings to clarify

the differences: *0 – 0,19* means “very weak”, *0,20-0,39* means “weak”, *0,40-0,59* means “moderate”, *0,60-0,79* means “strong”, and *0,80-1* means “very strong”. Noticeable is that pairs 1, 6, and 7 are strongly correlated, and rest of the pairs are according to the values very strong correlated.

Next following tables underneath, 12, 13, and 14, gives the results of that is there any correlations between current situation -answers. Table 12 consists of questions 2 and 10; table 13 consists of questions 6, 8 and 9; and table 14 consists of questions 1 and 7.

		Q2 Current situation	Q10 Current situation
Spearman's rho	Q2 Current situation	1,000	,363**
	Q10 Current situation	,363**	1,000

**. Correlation is significant at the 0.01 level (2-tailed).

Table 12. Correlations between question 2 and 10.

In the table 12, the correlation value is 0,363, which means that the correlation is weak between the answers.

		Q6 Current situation	Q8 Current situation	Q9 Current situation
Spearman's rho	Q6 Current situation	1,000	,355**	,277**
	Q8 Current situation	,355**	1,000	,346**
	Q9 Current situation	,277**	,346**	1,000

**. Correlation is significant at the 0.01 level (2-tailed).

Table 13. Correlations between questions 6, 8, and 9.

In the table 13, there are correlation values for Q6, Q8, and Q9. As can be seen, all the correlation values are in between *0,20-0,39*, which means that the correlation is weak within the answers.

		Q1 Current situation	Q7 Current situation
Spearman's rho	Q1 Current situation	1,000	,136
	Q7 Current situation	,136	1,000

**. Correlation is significant at the 0.01 level (2-tailed).

Table 14. Correlations between questions 1 and 7.

In the table 14, there are correlation values for Q1 and Q7. Correlation value is 0,136, which means that the correlation between these two questions is very weak.

6 Discussion

This chapter will be making a brief recap of the key results, explanation of the results and why the results matter in this research. Further in this chapter, limitations of the results will be covered and future recommendations.

6.1 Findings and interpretations

Proceeding from the quantitative analysis, it is important to restate the research problem at first. As the research plan was to find out whether survey, based on Westrum's theory, can work in a way that it can give enough statistical data to enable viewing organisational culture in Unit A. During the research, there was designed survey that was sent to employees. Answering to survey worked with Likert-scaling, which means 1 to 7 scaling. Overall, there was 165 respondents out of 815 employees, which equals to *20,25 %*.

6.1.1 Key results

In the descriptive statistics, the data was reviewed that showed how many respondents were given by a certain group: a group that worked over a year and a group that worked less than a year. There were means in each reviewed table, and as can be seen, from the current situation -answer mean for 165 respondents was *5,34*, while the situation year ago -answer mean for 130 respondents was *5,18*, and the current situation -answer mean was *5,34*. The mean of 35 respondents who only answered about their current situation was *5,35*. Worth noticing was that the minimum value of 35 respondents as lowest answer was 2, whereas the minimum value in other tables was 1. The deviation of the medians was also higher among the 35 respondents.

The Independent samples T-test allowed for a comparison of statistical differences between groups. There is no statistically significant difference among the questions

because the reviewed p-values were above *>0,05*. The values varied between *0,116* (question 2) and *0,956* (question 4).

The paired samples T-test showed that the pairs 2 and 10 had statistically significant difference, whereas for pair 2, the two-sided p. value is *0,02* and for pair 10, the two-sided p. value is *<0,01*. When comparing these descriptive statistics means values in the tables 5 and 7, it is possible to see that means were better compared to the values in paired samples T test. Means in questions 2 and 10, in the table 5 were *5,78* and *5,00* respectively. Means in questions 2 and 10, in the table 7 were *5,58* and *4,68* respectively. Within other pairs, there was no statistically significant difference. Interpretation for this difference can mean that survey respondents gave a statistically significantly lower rating on these questions a year ago compared to current situation.

Spearman's correlation provided a result for two quantitative research questions in the correlation test. The first reviewed correlation test, table 11, held values that stated the correlation level of the question pairs. Each pair had a very strong correlation. In the second reviewed correlation test, tables 12, 13, and 14 were created to determine whether or not there was any correlation with the same set of themed questions, and as the values shows, there were no correlation between them.

6.1.2 Interpretations and implications

The study's interpretations and implications can be reviewed as the results are presented. To begin, when reviewing the tables 7 and 8 means, it is possible to bind means with Westrum's typologies and determine what typological situation occurred in Unit A. The data can inform what typological aspects is concluded from the means because the survey was designed based on Westrum's theory and typologies: pathological, bureaucratic, and generative. Because the survey was based on Likert-scaling, from 1 to 7, it is possible to draw conclusions about how the typologies are divided based on the scaling. As there are three typologies, the cutting points for each are *2,33*, *4,66*, and *6,99*, as the pathological aspect occurs between *0-2,33*, the bureaucratic occurs between *2,34-4,66*, and

the generative aspect occurs between *4,66-6,99*. As seen in the table 8, which contains data from the current situation -answers from 165 respondents, the total mean was *5,34*, implying that the current situation in Unit A demonstrates a generative organisational culture. Because the total mean in the table 7 was *5,18*, it can imply that the previous year also demonstrated a generative organisational culture. According to the table 6, the total mean for 35 respondents was *5,35*, demonstrating generative culture. Overall, when the culture typologies are projected onto the total means, Unit A can be concluded to be generative. Overall, when checking the figure 2, there is visualisation of the means, and it can provide indicative statistical guidance of which direction the culture is going.

In independent Samples test, values varied between *0,116* (question 2) and *0,956* (question 4), and there was no statistically significant difference between two groups because all p-values were above *>0,05*. As having no statistically significant difference within other questions, it can imply that the Unit A treat employees overall equally and fair. As with the Paired Samples T-test, table 10, there was statistically significant difference only between pairs 2 (*0,02*) and 10 (*<0,01*), but no statistically significant difference amongst the other pairs. As results have gotten better compared to previous year answers, it can possibly imply that the work environment has improved.

When reviewing the table 11 correlations, it can be seen that the correlation values were strong and it can imply possibly that overall, the set of questions were understandable for both groups, group that worked for over a year and group that worked under a year. Understandable in a way that both groups knew possibly what the motive of the question was. In the other tables 12, 13 and 13, were also used the correlation test, and there was no strong correlation between the same themed questions. This can imply that the same themed questions do not support one another, and as a result, Unit A is more likely to notice that those specific aspects are not the root cause of the other aspect.

Overall, this quantitative research provided the fact that it was possible to collect the views and perceptions from the employees, as the certain statistical analyses provided

certain outcomes, demonstrating, and supporting the hypothesis that using a survey based on Westrum's theory to view the organisational culture of the Unit A would be possible.

6.2 Limitations of the research

Reviewing the limitations of the research can help highlighting aspects that can be improved regarding to next research or studies. As first, when designing the set of survey questions based on Westrum's theory, the survey questions were not standardised, and for noticing, questions were designed in a way that they support the Unit A's goals and objectives. This study is limited to this Unit A only and it is not possible to apply the findings of this study to other units or to other companies in general. The gap between the number of under a year -respondents was 35, which compared to 130 answers from over year ago -respondents was quite high. The more answers from employees who had been less than a year in Unit A, the better there would have been perspectives in the answers. Overall, more answers would have led to statistically better conclusions and with this it would be possible to see greater variation. In the survey, respondents' roles within Unit A were not specified in the survey responses. This can raise the possibility of biased result because of the certain roles, for example managemental roles. Although there was a statement in the survey that no answers would be saved and everyone would remain anonymous, this does not guarantee that the results would be completely free of biases.

As for getting results from a year ago, it is not possible to rely on that data only. As a limitation, there should be more years of data that it would be possible to draw conclusion of which direction the overall culture is heading based on the typologies. As an example, there could be a situation that two years ago overall situation would be better than the last year. This is unknown data and therefore more study needs to be conducted, for example repeating the research in a yearly basis.

6.3 Directions for future research

Because the limitations were discussed and reviewed, it can aid in recognising the limitations that may affect future research on this subject. Based on Westrum's theoretical framework, if there is a continuum for this research in Case Company X, in Unit A, this research can help study the Unit A's organisational cultural aspects further. This study and survey can be repeated in upcoming years, and it could help visualising and helping to determine how is the culture is managing and how the situation could be improved. Overall, this can provide starting points that enable more informed decisions to be made.

According to the Accelerate: State of DevOps report (2021), report research used Westrum's theoretical framework to identify which typology aspect occurs in certain organisations and then reviewed the software delivery and operational performance metrics, which are critical, according to report, in presenting how SWE and IT organisations can function better. The report's research determined whether certain typologies could correlate with software delivery and operational performance. This aspect of the report could be the focus of next future research within the Unit A. As the next research within software delivery and operational performance would be conducted, it could be possible to begin measuring if there is any correlation between certain typological culture and software delivery and operational performance.

7 Conclusion

This research provided a quantitative study, which presented that the findings from survey, based on Westrum's theory, can provide a quantitative data to be analysed forward. Data that was analysed with statistical analyses methods, provided a result that could describe the Unit A's organisational culture as it is. With the information, it was possible to notice that organisational culture in Unit A follows generative typological aspects and that based on the T-tests and correlation tests, it was noticeable that there was not statistically significant difference between the answers in different years, and the correlations between the question pairs were strong and between same themed question correlation was weak. This information from this research can help Unit A to recognise its organisational culture as it is currently and work towards making better improvements in the upcoming future.

Next step should be starting to recognise the software delivery and operational performance metrics and conduct quantitative study on how to analyse the metrics and outcomes. As this would be important to be measured especially in SWE and IT sector. Conducting this study would encourage on studying how the organisational culture in Unit A and software delivery and operational performance correlates with each other's and would there be cause-effect relationship that if the culture is generative, software delivery, and operational performance would be effective among employees. Unit A could have the possibility to improve its situation towards better as taking new and important aspects into consideration.

Organisational culture understanding evolves, and therefore organisations should evolve as well. As mentioned in the introduction, concentrating more on organisational culture creates a more supportive environment for improving overall performance, safety, and performance inside the organisation, as well as better information flow, which allows for more accurate forecasting of how organisations will respond to developing indications. Therefore, starting from designed surveys and understanding the cultural aspects are the first steppingstone for greater forecasting of performance and better environment.

References

Abdulgalimov, D., Kirkham, R., Nicholson, J., Vlachokyriakos, V., Briggs, P., & Olivier, P. (2020, April 23). Designing for Employee Voice. CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–13. https://doi.org/10.1145/3313831.3376284

Alsuhail, F., Djerf, K., Hellman-Ketola, S., Huttunen, M., Kaisio, R., Konnu, J., Kuusela, V., Laiho, J., Laukkanen, T., Lehtonen, R., Melkas, J., Mertanen, S., Mikkelä, H., Muur imäki, P., Myrskylä, P., Pasanen, A., Pietilä, P., Poukka, R., Reinikainen, A., . . . Viit aharju, T. (2007). Quality Guidelines for Official Statistics – 2nd Revised Edition (2nd ed.). (p. 62). Statistics Finland. https://urn.fi/URN:ISBN:978-952-467-743-1

Bagis, F., Kusumo, U. I., & Hidayah, A. (2021, March 28). Job Satisfaction as Mediation Variables on the Effect of Organizational Culture and Organizational Commitment to Employee Performance. International Journal of Economics, Business and Accounting Research (IJEBAR), 5(2), 424–434. https://jurnal.stie-aas.ac.id/index.php/IJEBAR/article/view/2495

Baptista, J., Stein, M. K., Klein, S., Watson-Manheim, M. B., & Jungwoo, L. (2020, June). Digital work and organisational transformation: Emergent Digital/Human work configurations in modern organisations. The Journal of Strategic Information Systems, 29(2), 1–10. https://doi.org/10.1016/j.jsis.2020.101618

Bisbey, T. M., Kilcullen, M. P., Salas, E., Thomas, E. J., Ottosen, M. J., & Tsao, K. (2021, February). Safety Culture: An Integration of Existing Models and a Framework for Understanding Its Development. Human Factors, 63(1), 88–110. https://doi.org/10.1177/0018720819868878

Cameron, K. S., & Quinn, R. E. (2011, March 14). Diagnosing and Changing Organizational Culture. In Based on the Competing Values Framework. Jossey-Bass, 16-18, 31-36, 35, 37-45, 46-49.

Causadias, J. M. (2020, July 20). What is culture? Systems of people, places, and practices. Applied Developmental Science, 24(4), 310–322. https://doi.org/10.1080/10888691.2020.1789360

Chen, F. H., Cheng, P., Wang, C., & Rattasurabhisa, P. (2022, March 14). The Relationship between Employer Brand and Organizational Attraction. ICETM'21: 2021 4th International Conference on Education Technology Management, 302–308. https://doi.org/10.1145/3510309.3510356

Google Cloud. (2023, April 5). DevOps culture: Westrum organizational culture. Retrieved April 6, 2023, from https://cloud.google.com/architecture/devops/devops-culture-westrum-organizational-culture

DORA & Google Cloud. (2021). Accelerate: State of DevOps 2021. In DORA. DORA. (pp. 31-32). Retrieved April 16, 2023, from https://dora.dev/publications/pdf/state-of-devops- 2021.pdf

DORA & Google Cloud. (2022, September 28). 2022 State of DevOps. In DevOps Research and Assessment. Google Cloud. (pp. 10-11). Retrieved April 16, 2023, from https://serv ices.google.com/fh/files/misc/2022_state_of_devops_report.pdf

Dobre, O. I. (2013). Employee motivation and organizational performance. Review of App lied Socio- Economic Research , 5(1), 53–60. http://reaser.eu/RePec/rse/wpaper/R5_5_DobreOvidiuIliuta_p53_60.pdf

Escandon-Barbosa, D., Ramirez, A., & Salas-Paramo, J. (2022, May 12). The Effect of Cultural Orientations on Country Innovation Performance: Hofstede Cultural Dimensions Revisited? Sustainability, 14(10), 5851. https://doi.org/10.3390/su14105851

Gajda, D., & Zbierowski, P. (2022, September 21). Exploring the consequences of mindfulness at work: the impact of mindful organizing on employee attitudes and behavior toward work and organization. Personnel Review. https://doi.org/10.1108/pr-05-2020-0385

Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021, February 17). Virtual Teams in Times of Pandemic: Factors That Influence Performance. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.624637

Ghafoori, E., Mata, F., Lauren, N., Faulkner, N., & Tear, M. J. (2022, November 22). Measuring risk culture in finance: Development of a comprehensive measure. Journal of Banking and Finance, 148, 2–11. https://doi.org/10.1016/j.jbankfin.2022.106720

Gupta, S., Tuunanen, T., Kumar Kar, A., & Modgil, S. (2022, February 8). Managing Digital Knowledge for Ensuring Business Efficiency and Continuity. Journal of Knowledge Management, 27(2), 245–263. https://doi.org/10.1108/jkm-09-2021-0703

Hartnell, C. A., Ou, A. Y., & Kinicki, A. (2011). Organizational culture and organizational effectiveness: A meta-analytic investigation of the competing values framework's theoretical suppositions. Journal of Applied Psychology, 96(4), 677–694. https://doi.org/10.1037/a0021987

Herrera, H., Reuben, E., & Ting, M. M. (2017, July 4). Turf wars. Journal of Public Economics, 152, 143–153. https://doi.org/10.1016/j.jpubeco.2017.06.002

Hofstede, G. (1984, January). Cultural dimensions in management and planning. Asia Pacific Journal of Management, 1(2), 81–99. https://doi.org/10.1007/bf01733682

Hogan, J., & Coote, V. (2013, September 1). Organizational culture, innovation, and perf ormance: A test of Schein's model. Retrieved January 27, 2023, from https://doi.org/10.1016/j.jbusres.2013.09.007

Humble, J., Forsgren, N., & Kim, G. (2018, March 27). Accelerate: The Science Behind DevOps: Building and Scaling High Performing Technology Organizations, 31-39.

IBM. (n.d.). SPSS Software. IBM SPSS Software. Retrieved April 12, 2023, from https://www.ibm.com/spss

IBM SPSS Statistics. (2021, December 7). Independent-samples t test. IBM. Retrieved April 16, 2023, from https://www.ibm.com/docs/en/spss-statist ics/beta?topic=tests-independent-samples-t-test

IBM SPSS Statistics. (2021, December 7). Paired-samples t test. IBM. Retrieved April 16, 2023, from https://www.ibm.com/docs/en/spss-statistics/beta?topic=tests-paired-samples-t-test

Ivanova, I. A., Pulyaeva, V. N., Vlasenko, L. V., Gibadullin, A. A., & Sadriddinov, M. I. (2019, December 1). Digitalization of organizations: current issues, managerial chall enges and socio-economic risks. Journal of Physics: Conference Series, 1399(3), 033038. https://doi.org/10.1088/1742-6596/1399/3/033038

Jasimuddin, S. M., & Zhang, Z. J. (2014, October). Knowledge management strategy and organizational culture. The Journal of the Operational Research Society, 65(10), 1490–1500. http://www.jstor.org/stable/24505010

Jigjiddorj, S., Zanabazar, A., Jambal, T., & Semjid, B. (2021). Relationship Between Organizational Culture, Employee Satisfaction and Organizational Commitment. SHS Web of Conferences, 90, 02004. https://doi.org/10.1051/shsconf/20219002004

Jääskeläinen, A., & Tappura, S. (2022, July). Future development areas for safety performance measurement. Proceedings of 13th AHFE International Conference on Safety Management and Human Factors, 64, 198–205. https://doi.org/10.54941/ahfe1002646

Kestilä-Kekkonen, E. (2018). Kovarianssi ja korrelaatio. In Tietoarkisto. Tietoarkisto. Retrieved April 16, 2023, from https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvanti/korrelaatio/korrelaatio/

Khan, R. A., Khan, S. U., Khan, H. U., & Ilyas, M. (2022, January 5). Systematic Literature Review on Security Risks and its Practices in Secure Software Development. IEEE Access, 10, 5456–5481. https://doi.org/10.1109/ACCESS.2022.3140181

Magill, M. S., Yost, P. R., Chighizola, B., & Stark, A. (2020). Organizational climate for climate sustainablity. Consulting Psychology Journal: Practice and Research, 72(3), 198–222. https://doi.org/10.1037/cpb0000163

Martinez, E. A., Beaulieu, N., Gibbons, R., Pronovost, P., & Wang, T. (2015, May 1). Organizational Culture and Performance. American Economic Review, 105(5), 331–335. https://doi.org/10.1257/aer.p20151001

Matsumoto, D., & Hwang, H. C. (Eds.). (2019, June 19). The Handbook of Culture and Psychology (2nd ed., pp. 123–161).

Matthews, J., Love, P. E., Ika, L. A., & Fang, W. (2022, May). Error aversion or management? Exploring the impact of culture at the sharp-end of production in a mega-project.

Developments in the Built Environment, 10, 100074. https://doi.org/10.1016/j.dibe.2022.100074

Menezes, J., Gusmão, C., & Moura, H. (2018, November 7). Risk factors in software development projects: a systematic literature review. Software Quality Journal, 27(3), 1149–1174. https://doi.org/10.1007/s11219-018-9427-5

Muscalu, E., & Halmaghi, E. (2015). Change in organizational culture. Scientific Bulletin "Mircea Cel Batran" Naval Academy, 18(2), 348–351. https://www.proquest.com/scholarly-journals/change-organizational-culture/docview/1761438399/se-2

Naranjo-Valencia, J. C., Jiménez-Jiménez, D., & Sanz-Valle, R. (2016, January). Studying the links between organizational culture, innovation, and performance in Spanish companies. Revista Latinoamericana De Psicología, 48(1), 30–41. https://doi.org/10.1016/j.rlp.2015.09.009

Kegan, R., & Lahey, L. L. (2016, March 22). An Everyone Culture. In Becoming a Deliberately Developmental Organization (pp. 55–56).

Laforet, S. (2014, September 16). Effects of organisational culture on brand portfolio performance. Journal of Marketing Communications, 23(1), 92–110. https://doi.org/10.1080/13527266.2014.956230

Lee, J. S. (2016, August 1). Organizational Change Theory. In This Man's Military (pp. 9–24). Air University Press. https://www.jstor.org/stable/resrep13889.8

Paais, & Pattiruhu, R. (2020, June 7). Effect of Motivation, Leadership, and Organizational Culture on Satisfaction and Employee Performance. Journal of Asian Finance, Economics and Business, 7(8), 577–588. https://doi.org/10.13106/jafeb.2020.vol7.no8.577

Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2022, February 1). Tackling the Digitalisation Challenge: How to Benefit from Digitalisation in Practice. International Journal of Information Systems and Project Management, 5(1), 63–77. https://doi.org/10.12821/ijispm050104

Pupulidy, I. (2020, January). Self-Designing Safety Culture: A Case Study in Adaptive Approaches to Creating a Safety Culture. Journal of Chemical Health and Safety, 27(1), 24–33. https://doi.org/10.1021/acs.chas.0c00005

Quinn, R. E., & Rohrbaugh, J. (1983, March). A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis. Management Science, 29(3), 363–377. https://doi.org/10.1287/mnsc.29.3.363

Rabelo, J., Oliveira, E., Viana, D., Braga, L., Steinmacher, I., & Conte, T. (2015, July 25). Knowledge Management and Organizational Culture in a Software Organization – a Case Study. 2015 IEEE/ACM 8th International Workshop on Cooperative and Human Aspects of Software Engineering, 89–92. https://doi.org/10.1109/CHASE.2015.27.

ResearchGate. (2023). ResearchGate. Retrieved March 6, 2023, from https://www.researchgate.net/profile/Ron-Westrum-2

Research Guides: Organizing Your Social Sciences Research Paper: Quantitative Methods. (2023, March 10). Quantitative Methods - Organizing Your Social Sciences Research Paper - Research Guides at University of Southern California. https://libguides.usc.edu/writingguide/quantitative

Sampson, A. J., Fianko, S. K., Amoah, N., & Dzogbewu, T. C. (2022, December 9). The Effect of Organizational Culture on Employee Work Engagement in a Higher Education Institution. Organizational Cultures: An International Journal, 22(2). https://doi.org/10.18848/2327-8013/CGP/v22i02/89-104

Seung, Y. C., Barkin, J. R., & Shamsy, J. A. (2018, March 25). Evidence-Based Survey Design: The Use of Negatively Worded Items in Surveys. Performance Improvement, 57(3), 16–25. https://doi.org/10.1002/pfi.21749

Schein, E. H. (2010, July 15). Organizational Culture and Leadership (4th ed., Vol. 4). Jossey-Bass, 24-33, 73-74, 73-93, 127, 155.

Soomro, Bahadur Ali, and Naimatullah Shah. "Determining the Impact of Entrepreneurial Orientation and Organizational Culture on Job Satisfaction, Organizational Comm itment, and Employee's Performance." South Asian Journal of Business Studies, vol. 8, no. 3, Emerald, Oct. 2019, pp. 266–82. Crossref, https://doi.org/10.1108/sajbs-12-2018-0142.

Stemn, E., Bofinger, C., Cliff, D., & Hassall, M. E. (2019, March). Examining the relations hip between safety culture maturity and safety performance of the mining indust ry. Safety Science, 113, 345–355. https://doi.org/10.1016/j.ssci.2018.12.008

Tappura, S., Jääskeläinen, A., & Pirhonen, J. (2022, October). Creation of satisfactory safety culture by developing its key dimensions. Safety Science, 154, 105849. https://doi.org/10.1016/j.ssci.2022.105849

Tianyuan, Y., & Nengquan, W. (2009, July). A Review of Study on the Competing Values Framework . International Journal of Business and Management, 4(7), 37–42. https://doi.org/10.5539/ijbm.v4n7p37

Tietoarkisto. (n.d.). Summamuuttuja. Retrieved April 12, 2023, from https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvanti/summamuuttujat/summamuuttuja/

Tietoarkisto. (n.d.). Tilastollinen päättely. Retrieved April 14, 2023, from https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvanti/paattely/paattely/

Tilastokeskus. (n.d.). Tilastokeskus. Kvantitatiivinen Tutkimus | Käsitteet | Tilastokeskus. Retrieved April 3, 2023, from https://www.stat.fi/meta/kas/kvanti_tutkimus.html

Westrum, R. "A Typology of Organisational Cultures." Quality and Safety in Health Care, vol. 13, no. suppl_2, BMJ, Dec. 2004, pp. ii22–27. Crossref, https://doi.org/10.1136/qshc.2003.009522.

White, A. (1959, April). The Concept of Culture. American Anthropologist, 61(2), 227–251. https://www.jstor.org/stable/665095

World Economic Forum. (2020, October 20). The Future of Jobs Report 2020. In World Economic Forum. Retrieved March 19, 2023, from https://www.weforum.org/reports/the-future-of-jobs-report-2020/

Woodrow, L. (2014, September 28). Presenting Descriptive Statistics (2014th edition) (pp. 49-50). Palgrave Macmillan. https://doi.org/10.1057/9780230369955

Yang, J. (2016, August 29). Thriving Organizational Sustainability through Innovation: Incivility Climate and Teamwork. Sustainability, 8(9), 860. https://doi.org/10.3390/su8090860

Yli-Kaitala, K., & Toivanen, M. (2021, January). Psykologinen turvallisuus vapauttaa työyhteisön potentiaalin. Työn Tuuli, 29–36. https://www.henry.fi/ajankohtaista/tyon-tuuli/2021/tyon-tuuli-12021.html

Yu, Y. X., & Li, Z. Y. (2022, December 8). The Influence of High Involvement Work System on Organizational Commitment of New Generation Employees: The Roles of The Sense of Work Gain and Family Support. IMMS 2022, 224–232. https://doi.org/10.1145/3564858.3564894

Zimmermann, Thomas, and Caitlin Sadowski, editors. Rethinking Productivity in Software Engineering. 2019, pp. 109–10. https://doi.org/10.1007/978-1-4842-4221-6.

Appendices

Appendix 1. Email for employees about the survey

Hello,
I am conducting a master's thesis about organisational culture, and I'd like to ask you to take part in a survey regarding to the *Case Company X's* organisational culture. The survey will take about 5 minutes to finish, and the goal is to find out how *Unit A's* employees feel about the working culture.

The survey is based on Ron Westrum's organisational culture theory, which classifies organisations as pathological, bureaucratic, or generative. You will provide valuable insights into how our organisation prioritizes its mission, encourages learning and growth, supports information flow, and more by responding to the survey questions. More details about the theoretical framework can be found at https://cloud.google.com/architecture/devops/devops-culture-westrum-organizational-culture.

Participation of yours is greatly valued and will assist research process in better understanding how to improve *Unit A*'s organisational culture. Once the data has been analysed, I will let you know and when thesis is done, you all are able to read it.

A reminder that participation in this survey is voluntary and that it is preferred that it be done in one's free time rather than during work hours. No personal information is saved, and all the responses will remain anonymous and confidential. Please click on the following link to get to the survey: ___
This survey closes 3/4/2023 11:45 pm.

Thank you!
Best regards,

Pak To