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TEKNIIKAN JA LIIKENTEEN ALA

THE IMPACT OF COVID-19 FROM A PERSPECTIVE OF A RECOVERY BOILER MANUFACTURER ON WORKSHOP INSPECTIONS WORLDWIDE

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<p>Vuoden 2019 lopussa ja vuoden 2020 aikana maailmaa järkytti COVID-19-pandemia. Suurin osa maista oli täysin valmistautumaton tällaiseen katastrofiin ja vaikutukset talouteen olivat tuhoisat. Pandemia on vaikuttanut myös ihmisten turvallisuuteen. Globaalissa ympäristössä pandemioita on mahdotonta pitää enää yhdellä alueella. Kaikki maailmassa ovat yhteydessä toisiinsa ja näin tekevät pandemiasta maailmanlaajuisia halusimme sitä tai ei. Pandemiota on tapahtunut ja tulee tapahtumaan. Tästä johtuen työnantajien on varmistettava, että jokaisen työntekijän turvallisuus on taattu riippumatta työtehtävistä. Jokaisella työntekijällä on yhtäläiset säännöt ja oikeudet.</p> <p>Tutkimuksen aiheena oli COVID-19:n vaikutus soodakattilavalmistajan näkökulmasta maailmanlaajuisesti konepajatarkastuksiin. Opinnäytetyön toimeksiantajalla on ollut laatutarkastajien verkosto lähellä konepajoja (maat ja mantereet). Myös ulkomaalaisia asiantuntijoita käytettiin. Toimeksiantajalla on ollut nimettyjä henkilöitä, joiden vastuulla on varmistaa konepajatarkastajat ympäri maailmaa.</p> <p>Aikaisempaa tietoa ei ollut olemassa opinnäytetyön alkaessa ja siitä johtuen tiedot oli kerättävä asiantuntijoilta haastatteluilla. Opinnäytetyö on luonteeltaan laadullinen tutkimus.</p> <p>Opinnäytetyön tarkoituksena oli ensin luoda kuvaus tapahtuneesta ja sen jälkeen ohje, miten reagoida tulevaisuudessa vastaaviin tilanteisiin. Opinnäytetyön tulos on tarkka yleinen ohje toimeksiantajalle, miten toimia tulevaisuudessa vastaavissa odottamattomissa tapahtumissa. Salassapitosopimuksen vuoksi laadunvalvojille tarkoitettu ohje voidaan antaa vain toimeksiantajalle.</p> <p>Voidaan tiivistää, että maailma ei ollut valmis tällaiseen maailmanlaajuiseen katastrofiin. Jo menneisyydestä pitäisi oppia, että ihmiskunta ei ole luonnon yläpuolella. Samanlaisia katastrofeja on tapahtunut ja todennäköisesti tapahtuu uudelleen tulevaisuudessa. Nykyään on mahdotonta pitää niitä vain yhdessä tai muutamassa maassa. Seuraavan mahdolliseen viruksen tai katastrofian leviämiseen meidän tulee olla varautuneita.</p>	
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<p>Abstract</p> <p>The World faced the COVID-19 pandemic that has shocked the whole World. Most of the countries were not prepared for such a pandemic, the impact of which on people's safety and economy was tremendous. Global challenges also effects to us and it is impossible to limit pandemics to one area anymore. People all over the World are in touch with each other and that unfortunately causes pandemics to be Worldwide. Even during the pandemic employers must ensure that the safety of every employee. Each employee has to have the same rules and rights.</p> <p>The aim of the thesis was to study the impact of COVID-19 from the perspective of a recovery boiler manufacturer on workshop inspections worldwide. The client organization has a network of inspectors near the manufacturing locations in different countries and continentals. Specialists from abroad are involved as well. In the client organization, there are nominated persons whose responsibility is to co-ordinate workshop inspectors around the World.</p> <p>The data was gathered from the specialists by interviewing them, because there was no previous information on the topic. First, the description of what had happened was created. After that, instructions were created on how to act in similar situations. Thesis was qualitative study.</p> <p>As a result, accurate instructions on how to act in similar, unexpected events in the future were created for general use in the client organization. Because of the non-disclosure agreement, these instructions for QC Inspectors will be available in the client organization only. In today's world, similar kind of catastrophes will most probably happen again and we need to be prepared for it.</p>			
Keywords client, COVID-19, inspection, instruction, pandemic, QC inspector, workshop			

PREFACE

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CONTENT

1	INTRODUCTION	8
1.1	Scope of Master thesis and structure of the research	9
1.2	Research materials.....	9
2	LITERATURE REVIEW / THEORY	10
2.1	Unexpected threats.....	10
2.2	Occupational safety law.....	11
2.2.1	Occupational disease.....	12
2.2.2	Client guidelines and instructions	12
2.3	Risk Management	13
2.3.1	Project risk management	14
2.3.2	Business risk management	15
2.3.3	How other companies reacted to COVID-19	15
3	EMPIRICAL RESEARCH.....	18
3.1	COVID-19.....	18
3.1.1	Starting	18
3.1.2	Spreading of COVID-19	19
3.1.3	COVID-19, what we know about it now	20
3.1.4	Next possible steps	22
3.2	Interview results.....	22
3.2.1	Presentations and interview about the thesis and briefing why interview was made.	23
3.2.2	Affect of COVID-19	23
3.2.3	Reactions and guidelines	25
3.2.4	Organization reactions and guidelines.....	26
3.2.5	Have you been in contact with workshops (mostly inspectors) during COVID-19?	27
3.2.6	Do you know anyone who has been infected by COVID-19?	27
3.2.7	What kind of an impression you have about the information what you have got from media? 28	
3.2.8	China restrictions	29
3.2.9	Asia area restrictions	30
3.2.10	Finland restrictions	31
3.2.11	European area restrictions	32

3.2.12	India restrictions	33
3.2.13	North- and South American area restrictions	35
3.2.14	What is your opinion about the Finland COVID-19 stand comparing for example to Sweden? 36	
3.2.15	When you think that situation on World is restoring back to normal on workshop manufacturing point of view?	36
3.2.16	What kind of an affects COVID-19 leaves in the future?.....	37
3.2.17	What are the employee right and wrong acts during the COVID-19?	37
3.2.18	General speculation about the COVID-19	38
4	INSTRUCTION FOR CLIENT FOR UPCOMING PANDEMICS	39
4.1	Management	39
4.2	Future risks	39
4.3	Summary.....	40
5	RESULTS AND CONCLUSION	41
5.1	Interview conclusion	41
5.1.1	Companies' reactions.....	44
5.1.2	Media	45
5.1.3	Future	45
5.2	Effects of preventing actions.....	46
5.3	Self-reflection	47
5.4	Proposal for the further research	47
6	DISCUSSION.....	48
7	SUMMARY.....	50
	REFERENCES.....	51
	APPENDIX 1: INTERVIEW QUESTIONS	54

Abbreviations and definitions

CDC = Centers of Disease Control and Prevention

HSE = Health, Safety and Environment

ILO = International Labour Organization

NA = Not Applicable

OSH = Occupational Safety and Health

PQAM = Project Quality Assurance Manager

THL = Terveystieteiden- ja hyvinvoinnin laitos (Finnish institute for health and welfare)

QC = Quality Control

QCM = Quality Control Manager

WHO = World Health Organization

1 INTRODUCTION

World have had COVID-19 pandemic what has shook the whole World. This was totally unprepared by most of the countries and the impact to people safety and economy was devastating. Global environment effects also to us and it is impossible to keep pandemics on one area anymore. Everybody in the World is in touch with everybody and that cause pandemics to be Worldwide wanted that or not. Even pandemics have happened employers must ensure that every employee safety is ensured and everyone no matter what work assignment have same rules and rights.

Topic of the study was the impact of COVID-19 from the perspective of a recovery boiler manufacturer on workshop inspections worldwide. The Client company has had a network of inspectors near the manufacturing locations (countries and continentals). Specialists from outside countries are used as well. In the Client company, there are nominated persons whom responsibility is to ensure workshop inspectors around the world and that was one of the reason where to get great insight of the pandemic situation. One of the reasons why Client decide to pick this to be the topic of the thesis was that instructions of the similar pandemic situations did not exist to inspectors. This topic has touched Client nominated responsible persons lots in last few months. Those nominated persons have been very close to this topic from the day one of the pandemic out burst from China because their work is in closely involving to around the world workshop activities. All the delivery projects are nowadays global, equipment and parts are coming from all over the world, and this requires workshop inspections. Therefore, it can be easily said that this COVID-19 hits hard global deliveries and the impact will be long lasting. Client workshops in China are located in many different provinces and lot of data from all Client inspectors was got before any commands were given. Commands was that all of the inspectors should evacuate from China to their home countries. Situation was many cases very different what it was in Finnish news. Overall, knowledge of these pandemic was partly or mostly different what was told to public. This makes it more interesting to study about the topic especially when pandemic was started at country what has no free news or press.

During the empiric phase of thesis, lot of different insights about the pandemic was got and lots of different stories about evacuations from Asia to Europe before closing of the borders. In addition, it was reason to selected different locations around the world where Client got company representatives or co-operatives for interviews concerning the pandemic. This way realistic insight was got about the pandemic around the world. This was needed because there was not enough confirmed information about the COVID-19 virus available when thesis was started. Information about the COVID-19 pandemic was updated all of the time and there was no official studies what gives perfectly reliable data to thesis. That was one of the reasons why COVID-19 was selected as a topic of this thesis.

Reason for this thesis topic was to get clarification on theoretical point of view and information from empirical point of view of COVID-19 to be able to prepare instructions to inspectors around the

world how to act on similar situations in the future. Because of the non-disclosure agreement, instruction for QC Inspectors cannot be part of this thesis.

1.1 Scope of Master thesis and structure of the research

Scope of thesis is empiric research- and development work which outcome shall be instruction based on available facts. Instruction will be guideline in the future for how to act in similar situations. On thesis, first the purpose is to create description what had happened and after that create the instruction how to react in the future. Outcome of the thesis is accurate general instruction for Client how to act in the future. Same general instruction is valid in all client work locations worldwide. This instruction will be part of the orientation training what every workshop inspector will get before sending them at work around the World.

1.2 Research materials

When the empiric phase of the master thesis started, there was not confirmed research material nearly at all available. Research material what was available was statistics from different countries authorities and health care organizations. On Finland, research material what was used was based on Finnish institute for health and welfare (THL) confirmed data.

During the work of thesis confirmed research material and study of COVID-19 was clarified almost daily and updates were made to thesis. On theory part of the thesis available research material will be observed on following point of views;

1. Occupational safety law (OSL), especially employee provided work conditions and duties.
2. Client risk management process on global supply chain.
 - a. Project risk management
 - b. Client business risk management
3. Other organizations way of act in similar situations (benchmarking).
4. Global unexpected events

2 LITERATURE REVIEW / THEORY

World have faced many different kind of unexpected threats in the history and some of those has been manmade and other are came from the Nature. This has happened for example earlier form of Black Death, which killed almost half of the human population. On wild animals, these pandemics are happening more often and harvesting the weakest individuals. This is the normal life cycle but science and medicines has prevent this kind of natural selection to minimum.

Still even today humankind are vulnerable to new viruses even sometimes humans might forgot that. This kind of illness was much unprepared by humankind and on the modern world it is very difficult or even impossible to keep it in one country or one area if it outburst. This COVID-19 has thought humankind a good lesson that we are still depending of the Mother Nature even we do not dare to say it on loud.

2.1 Unexpected threats

Earlier there have been also different kind of unexpected threats that shook's the world like volcano eruption at Iceland what totally stopped the European flights for several weeks. There was no any systems to avoid that situation and humans just need to adapt to live with it. So humans just cannot line unexpected threats virus and illnesses but also see that topic with the larger point of view.

Earlier there has been at least following global unexpected threats;

- Black Death, devastating global epidemic of bubonic plague effecting on Europe and Asia in mid 1300s. Kills at least one third of European population. Number of deaths is between 20 to 60 million depending of the source. (History 2020.)
- Spanish flue, the 1918 influenza pandemic was the most severe pandemic in recent history. An H1N1 virus with genes of avian origin caused it. It spread worldwide during 1918-1919. It is estimated that about 500 million people or one-third of the world's population became infected with this virus. The number of deaths was estimated to be at least 50 million worldwide. Second wave of the virus after the mutation was the devastating and was the one that kills most of the virus victims. (CBC 2018.)
- Iceland volcano eruption. Under Eyjafjallajökull-glacier volcano erupts and cause European flight in to chaos for few weeks starting from 14th of April 2010. (Yle Elävä arkisto 2020.)
- SARS (Severe Acute Respiratory Syndrome) from animal to human infecting Corona virus. Starting from China effective 2002-2003. Totally infected people was around 8500. Kill percent was around 10%. (Duodecim Terveyskirjasto SARS and MERS 2019.)
- MERS (Middle East Respiratory Syndrome) similar with SARS. Stating from Jordanian 2012 and original animal what infects humans was camel. Totally around 2400 cases and kill percent nearly 40. (Duodecim Terveyskirjasto SARS and MERS 2019.)

- Avian Influenza, A (H7N9) virus had not previously been seen in either animals or people until it was found in March 2013 in China. This was similar with the Spanish flu but most important different was that it was unable to spread from human to human. It was long believe that this will be new pandemic but fortunately, it was not as deadly as Swine Flu. There is also vaccine available but not commonly in use. (WHO 2014.)
- Swine Flu, A (H1N1) v 2009 –influenza was Pandemic what started from Mexico on 2009 and has many similarities with the Spanish flu. Name of Swine flu came because it has many similarities on genes with pig normal influenza. This Pandemic kills in three wave's 40-50 million people worldwide. It is now stopped thanks to vaccine. Unfortunately, vaccine cause Narcolepsy to children. This was very bad side effect of the vaccine and in Finland 230 people get narcolepsy from vaccine. (Duodecim Terveyskirjasto Swine Flu 2019.)

It seems like more and more of the new illnesses or viruses has come on last decades. Pandemics' are with us as long as we get the vaccine or pack immunity. Pack immunity can cause high number of deaths but is effective. With the vaccine, the risk is always that not all the population on the world can have access to that and virus is living and worst cases modifying during its lifetime on between the populations what were not vaccinated.

It can be easily summarize that COVID-19 is just one of the many upcoming viruses what mankind will face in next years and the most important is the way how different countries react on that and communicate with each other how it can be controlled and destroyed. If one country have the threat it will be global problem because people move between the countries nowadays as a common practice and it is possible that within 24 hours starting of spreading of the virus it is already in every corner of the world. In the future humans will see if humankind has learned something but the time will tell what humans have learned.

2.2 Occupational safety law

Occupational safety laws are giving clear instructions about the workers safety at workplace. Every country has their own instructions and laws.

Definition from Finland OSH Act. Summary/citation: The objective of the Occupational Safety and Health Act is to improve the working environment and working conditions in order to ensure and maintain the work ability of employees as well as to prevent occupational accidents and diseases and eliminate other hazards from work and the working environment to the physical and mental health of employees. The Occupational Safety and Health Act provides protection for both physical and mental health. (International Labour Organization 2016.)

2.2.1 Occupational disease

On Finland Summary/citation: Under section 1(1) of the Occupational Safety and Health Act, the objective of the act is to prevent occupational accidents and diseases and eliminate other hazards from work and the working environment to the physical and mental health of employees. (International Labour Organization 2016.)

Under section 26 of the Occupational Accidents, Injuries and Diseases Act (459/2015), an occupational disease means a disease the main cause of which has probably been an exposure of the employee to physical, chemical or biological agents at work, within the place of work or during training. (International Labour Organization 2016.)

List of occupational diseases; Summary/citation: Provisions on the list of occupational diseases are contained in the Government Decree on the List of Occupational Diseases (769/2015). The decree contains the diseases that are considered to have a probable causal link, established through medical research, to physical, chemical or biological agents. Compensation for occupational diseases is provided for these diseases if it is established that the employee has been exposed to an agent referred to in the decree in conditions referred to in section 26 of the Occupational Accidents, Injuries and Diseases Act to such extent that the exposure may have been the main cause of the disease and it has not been clearly established that the disease has any other causes. (Section 27 of the Occupational Accidents, Injuries and Diseases Act). (International Labour Organization 2016.)

The list of occupational diseases only includes diseases caused by physical, chemical and biological agents because only diseases caused by those agents can be considered as occupational diseases under the Occupational Accidents, Injuries and Diseases Act (459/2015). If an agent that has caused a disease cannot be classified as physical, chemical or biological, the disease cannot be defined as an occupational disease referred to in the Act. However, no problems related to this have been noticed in Finland. It has been notified that the restriction mainly means that diseases caused by mental factors cannot be compensated as occupational diseases. There is no list of potential occupational diseases (diseases that could in the future be defined as occupational diseases). (International Labour Organization 2016.)

2.2.2 Client guidelines and instructions

Client organization is following correct occupational laws where ever the works is made but beside of these client has own rules and regulations what every person who works at Client organization is responsible to follow. At construction sites for example there can be fine system if the rules are not followed and if it is not working then client has right to remove worker who is not follow the rules. This is normal system to fulfill basic requirement that everybody can enter and leave from work

safe, no matter where the work is and what kind of a work he or she is doing. Safety is number one priority to client around the world.

Client has every location/continent own safety rules and those are available on local language. In addition, sub-suppliers need to follow same rules what Client own representatives. Person on a different position has different duties and normally if the legislation require that there will be local HSE person to ensure that all needed and Client own rules and regulations are followed. There will be always own HSE person or persons who will be the responsible to ensure HSE. Site will have safety tours made by HSE persons and weekly meetings. HSE findings are reported to management who follows and develop HSE as per need.

On workshop, every inspector is responsible on their own acts and inspectors are agreed to follow Client instructions and rules even if they are sub-suppliers. Same rules are for sub-suppliers than Client own personals. Quality Control Manager (QCM) together with Project Quality Assurance Manager (PQAM) is responsible that all inspectors will follow HSE rules of the Client.

Unfortunately, on Pandemics' like, COVID-19 there was not any clear Client instructions what to follow and either OSL or Client rules do not give guidelines how to workshop inspectors should act. This is like many other "grey areas" on workers manager duty to react and find best possible solution to ensure workers safety and health. Maybe in the future OSL will be added a part to cover for Pandemics' and how to react to ensure the safety and possible prevent pandemic to escalate.

2.3 Risk Management

"Risk management is the process of identifying, assessing and controlling threats to an organization's capital and earnings. These threats, or risks, could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disasters" (Risk Management 2020.)

Risk management is in every country and company strategical way of act. There is many different variations of risk managements. Natural disasters are just one of the many different risks what face the world. COVID-19 show that the whole World was not prepared for Pandemic of this scale and all the preventing actions was not enough to prevent COVID-19 to spread. Even as earlier mentioned worldwide crises humankind has not learned to be prepared on this kind of a risk.

There are also lot of different standards what supports and sets guidelines to risk managements at organizations. Those are for example SFS-ISO 31000:2018. Lot of companies risk management nowadays based on existing risk management standard as normal practice and in case to case these are modified on deeper level to fulfil more deeply companies own requirements.

On Client, organization is also key to identify and estimate in the beginning the risks and what are the changes to prevent those risks. The following is the basic idea to handle risk management;

1. Identify and estimate risks
2. Risk management planning and needed actions
3. How to act if the risks escalades and how to recover from the risks
4. Follow up and learning from the happened risks

Overall, the risk management is huge topic and on this thesis, there is only change to open it shortly to avoid losing the track of the thesis topic. However, if we summary that COVID-19 type of risks on project based or on business model based risks are unable to avoid and the key is to minimize the problem after the risk is happened. Instructions how to act on this similar scenarios in the future is the only option to handle COVID-19 kind of a risks.

2.3.1 Project risk management

The most important factors on project-based work what change on most of the cases are following;

1. Market
2. Technology
3. Commercial
4. Organization

Sources of the risks are result of the unforeseen and unexpected circumstances in the project environment creating uncertainty in the project performance. (Pekkinen 2017.)

On Client organization, most of the project-based risks are well known in earlier experience but there is always lot of variables what can create new problems during the project. There are different kind of a ways to handle the earlier mentioned project risks. Client is handling those on following approaches;

1. Avoiding the risks whenever that is possible. The most used way of acting and always the first option if possible.
2. Decreasing the risks (for example if someone is sick to have someone with similar skills to cover him at project).
3. Transfer the risk (for example hire special sub-supplier to do specific work what is not Client own expertise).
4. Accepting the risk after evaluation. Sometimes there is no change to avoid or handle risk any other way.

On every project, Risk manager will organize the meetings as per need to identify and estimate the risks. This will be made together with project key persons and their role is to handle and monitor own areas risks and report those to project. If the risks escalades then the project organization will

made the solution together how to proceed. If the risks are estimated as big ones and needed earlier acts then the resources are nominated to handle those if needed. All the project risks are evaluated similar methods and using the same system. On the end of the projects, the lessons learned type of meeting is held and these learnings are passed to whole client organization to avoid same problems in the future.

2.3.2 Business risk management

The most important factors on project-based work what change on most of the cases are following;

1. Pure risks
2. Financial risks
3. Business risks
4. Political and country risks

On the Client business risks management is on ideal level the similar than the project-based risks management but are handled on a different way. Business risks are identified and estimated on general level not as deep and specific level than on project-based risks. There are normally no project personals involved on the business level risks management. Risks management is handled together with directors and vice president on this level. In addition, the timeline of the risks management is different. On business risks, management the timeline for the risks can be anything from few months to several years. If we compare this to project based risks those are happening during the project time what is normally between 18 to 24 months.

2.3.3 How other companies reacted to COVID-19

Other companies at the same industry what are generally well known are facing the same problems what the Client is facing. COVID-19 hits hard to all global companies and later to local domestic companies. Even though, it was two months' time to be prepared to COVID-19 at Finland. One of the big reasons was that COVID-19 started from China and it did not hit in the beginning European or American economy.

On this thesis it was most handy to start benchmarking with SWOT analyze by Client representative on same industry of the Client competitors. SWOT analyze is the one of the most commonly used tool on similar situations when there is need to see differences on between companies.

TABLE 1. Client impact of COVID-19 from a perspective of a recovery boiler manufacturer on workshop inspections worldwide SWOT

<p>Strengths;</p> <p>Big leading company at the own industry, huge existing organization around the world. Possibility to acquire information around the World.</p> <p>Local knowhow about the used manufacturing workshops. This makes possible quick reactions and make flexibility to manufacturing concept.</p> <p>Existing network of co-operation companies to support HSE activities.</p> <p>Long lasting co-operation with the suppliers / workshops to ensure safety of the employees</p>	<p>Weaknesses;</p> <p>Big organization decisions may take time</p> <p>Originally planned inspectors stuck on their home countries</p> <p>No availability to react fast and must obey company policy</p> <p>Day-by-day changing COVID-19 situation cause unawareness of the future</p> <p>No possibility to monitor normal way workshops</p> <p>New supporting parties and way of inspections</p> <p>No job for own inspectors</p>
<p>Opportunities;</p> <p>New supporting partners or new way of inspections</p> <p>Lasting travelling restrictions and usage of the local quality inspection</p> <p>Real need of the inspection vs. old habit</p> <p>Costs savings because no long travelling</p> <p>Might get new experienced inspectors from other companies</p>	<p>Threats;</p> <p>Because of the travel restrictions no specialist on right workshops based on their expertise</p> <p>New supporting parts and way of inspections (lots of detail knowhow)</p> <p>No entering to workshops because of COVID-19 for outside supervisors</p> <p>If cannot use normal experienced supervisors might lose those to other companies</p> <p>Inspectors safety</p>

Other companies at same industry have the similar strengths as per table 1. indicates what the Client have. Different can be on organizational level that worldwide organization is different and located on different countries than client. That can be on some cases more effective and wise versa. Client competitors supporting organization is not as mobile that Client have on many cases and organized only from Finland without local support. That has cause lots of contacts from local inspectors to Client responsible persons of inspectors' side after start of the COVID-19.

Competitors' weaknesses as per table 1. indicates was different from Client. Client handled the start of the COVID-19 at China much better than competitors did. Many competitors' inspectors was left alone in the China without change to return. Inspectors was alone in China and they cannot work there because all workshops where closed. This actions cause lots of inspectors to act and apply job from Client because the status of the Client as employer was raised on better level than its competitors. Competitors has not similar kind of local organization on China than Client and that cause big

problems to them because originally planned inspectors were stuck at their home countries or changed the company because of the earlier actions.

Opportunities has happened almost the same in all companies as far as I know. Difference might be that Client has many new QC inspector applicants and did not lose any of the existing ones. It is difficult now during the COVID-19 season to have accurate planning of the upcoming inspections, resources on upcoming projects and keep the key resources. All companies in the same industry are developing new ways of inspections where it is not possible to travel because of the COVID-19. Separate ideas are on the air and this is up to the developer what the approach to new ways of inspections is.

Threats as per table 1. are similar but safety is differently handled at all companies and on Client, it is on an excellent level and also subcontractors' safety is high level and this is a big difference to competitors. Client also as mentioned on opportunities got many new QC candidates and are using some of competitors' earlier key resources. Also in cases where no new persons are allowed to enter the workshops, the long-lasting co-operation has caused some companies to make special arrangements and let Client's local representative in the workshop.

3 EMPIRICAL RESEARCH

On this section, first will be introduced COVID-19 and after that what it is known at COVID-19 at the end of July 2020. Next will be introduced the results of the interviews what is made after COVID-19 from different kind of a persons on a different kind of a duties. All the persons are part of an international business and are aware of the COVID-19 and has faced issues what it caused. People to interviews were chosen from different locations around the World and especially keeping the eye on a workshop manufacturing and inspectors on China but also around the world.

All the persons are willing to give the rights to use their own names but to protect the personal data interview results are put without personal information. Totally, there were 15 interviews and one of those was done simultaneously for two persons. All the other was person-to-person meetings at MS TEAMS. There was totally five different nationalities on five different continents.

3.1 COVID-19

Coronavirus disease COVID-19 (WHO given name) or SARS-CoV-2 (ICTV given name) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. (WHO 2020.)

COVID-19 is not the new virus on animals but it is that for humans, it has first time spread on end of the year 2019. Virus is at least earlier found on cats and bats and it is not causing those to die on it. Now it is unclear why it effects on humans so badly comparing to other animals what has same virus.

Humans react different way to COVID-19 depending on lots of different things like age, gender, other illnesses and overall health level. It is still unclear how it is spreading at the first time to humans. Nevertheless, what can be said for sure now is that no one is safe from COVID-19 and before the vaccine is got, humans need to keep some restrictions to normal behavior to keep virus as much on control as it is possible. WHO has warned that even with the vaccines there is no guarantees that COVID-19 will be get under control.

3.1.1 Starting

COVID-19 Started to spread from Wuhan City at China from Hubei province. Exact start date of the virus spreading no one can say for sure but overall the COVID-19 start to spread to multiple people

at beginning of January 2020. At this point China kept this, as they own information and did not let any news of upcoming pandemic spread to worldwide. (WHO 2020.)

There are many theories what is the real reason and from where COVID-19 first spread to human, but the most reliable / trustworthy theory is that virus break loose from open fish market and spread that way to human population. Hygiene level is not very well controlled (or not at all) on fish markets and those are potential places to start pandemic spreading. This is the theory what is also supported by academic people all over the world. Other well-known theory is that COVID-19 has break loose from high security level laboratory from bats at Hubei where this COVID was under re-search. This theory does not have real evidence behind it but many people still believe this. Most probably because China has earlier keep this kind of actions "under the radar" and western world do not believe all the news from China. Nevertheless, this theory has effect lots to scientist who was doing the research on that laboratory.

Most important thing to notice in the starting of COVID-19 is that Chinese government did not openly inform other countries that there was this kind of break of new virus and this is the real treat to whole world. This lack of information causes a lot of misunderstanding and underestimation of the virus. Even other countries have lots of time to reach this they did not have enough information that virus is so strong and can kill people. News from China were greatly censored with the numbers of infected people and number of dead because of COVID-19.

3.1.2 Spreading of COVID-19

COVID-19 started to spread from Wuhan city from China. Even the Chinese government quick reaction and insulation of Wuhan city to virus could not prevent it from spreading all over the China. This COVID-19 happened on very bad time of the year because end of January there was the biggest holiday of China. This holiday was Chinese New Year when over one billion people are so called on the road visiting their homes and families. People started to move and suddenly in every area of China there where infected persons with the COVID-19. After Chinese holiday, Chinese government started to react more and isolation of different areas started. Depending of the area some people could not return home. At this point 14 days quarantines started if people are crossing providence borders. At this point also, international flights were cancelled and foreigners were forced to make choice to stay at China or start to go home. With these returning people, COVID-19 started to spread from China. In addition, some infected individuals travelled outside of China during their Chinese New Year holiday and spread the virus that way. This was the story of first confirmed COVID-19 case in Finland. Chinese woman travelled to northern part of Finland on skiing resort and possible spread the virus to other people at that location. No confirmed cases but all the person exposure was not tested. (Reuters 2020.)

People from China (local and foreigners) spread the virus on their home countries quite rapidly when entering to their destination. At this point, there was not system to check every individual who arrived from China. On Finland there was not any restrictions to those who arrived from China or anywhere else location to Finland. Same situation was also all over the world. European countries were much unprepared to COVID-19 even it was long know that it is spreading out from China. (Reuters 2020.)

First big findings of COVID-19 in Europe were in Italy and Austria on some skiing resorts. Reason from this was tourists from China who entered those locations for holiday during their Chinese New Year. At that time there were also European tourists enjoying the holidays at the Alps. Those people brought the virus with them to their homecountries without knowing that they were infected. (Reuters 2020.)

Next, the COVID-19 spread to Spain and Germany also within the tourism from Italy and Austria. At this time, COVID-19 also spread to other countries including Finland and Sweden. At this point, it was declared to Pandemic by WHO 11th of March and on many countries emergency meetings with the governments started on every European country and first restriction inside Europe started. (Yle Uutiset 2020.)

From Europe and especially from Spain COVID-19 spread to Southern America countries like Brazil and Chile. In addition, to United States of America and to Canada COVID-19 entered at this point from Europe. Quickly after first confirmed cases on USA, flight from Europa were stopped. COVID-19 spread also to Africa COVID-19 from Europa.

At this point Pandemic was out of control and already spread all over the world. Only positive aspect at this point was that from its original point China situation was getting better and slowly whole Asia started to recover from the COVID-19. At this point China closed the boarders from European arrivals.

After that situation was stabilized and world was trying to get COVID-19 under control and some countries managed to do that quite well. Finland is one of those countries that manage quite well like most of the European countries. Travelling also was once again allowed at this point inside European but with restrictions and some countries are still locked Sweden for example. Peak of the infections are most probably coming on USA, South-America and India. Other locations at least the first wave of COVID-19 infection has already shown it worst.

3.1.3 COVID-19, what we know about it now

COVID-19 is virus which is normally only on animals not humans. This is the first time when it has spread from animal to humans and cause the Pandemic what changed the whole world. Nobody

would have guessed this kind of a situation on last year. COVID-19 is thought to spread mainly through close contact from person-to-person. Some people without symptoms may be able to spread the virus. We are still learning about how the virus spreads and the severity of illness it causes but here is some known facts; (CDC 2020.)

- Between people who are in close contact with one another (within about 2 meters).
- Through respiratory droplets produced when an infected person coughs, sneezes, or talks.
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.
- COVID-19 may be spread by people (to people) who are not showing symptoms.

How easily a virus spreads from person-to-person can vary. Some viruses are highly contagious, like measles, while other viruses do not spread as easily. Another factor is whether the spread is sustained, which means it goes from person-to-person without stopping. (CDC 2020.)

The virus that causes COVID-19 is spreading very easily and sustainably between people. Information from the ongoing COVID-19 pandemic suggests that this virus is spreading more efficiently than influenza, but not as efficiently as measles, which is highly contagious. In general, the more closely a person interacts with others and the longer that interaction, the higher the risk of COVID-19 spread. (CDC 2020.)

It may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching his or her own mouth, nose, or possibly their eyes. This is not thought to be the main way the virus spreads, but we are still learning more about how this virus spreads. (CDC 2020.)

At this time, the risk of COVID-19 spreading from animals to people is considered low. It appears that the virus that causes COVID-19 can spread from people to animals in some situations. CDC is aware of a small number of pets worldwide, including cats and dogs, reported to be infected with the virus that causes COVID-19, mostly after close contact with people with COVID-19. (CDC 2020.)

The best way to prevent illness is to avoid being exposed to this virus. You can take steps to slow the spread;

- Maintain good social distance (about 2 meters). This is very important in preventing the spread of COVID-19.
 - Wash your hands often with soap and water. If soap and water are not available, use a hand sanitizer that contains at least 60% alcohol.
 - Routinely clean and disinfect frequently touched surfaces.
 - Cover your mouth and nose with a cloth face covering when around others.
- (CDC 2020.)

On COVID-19 R0-number (infection number) is between 1.4-3 on Finland on 19.8.2020. This R0-number indicated how many case one infected person cause to other persons. If the R0-number is less than one infected, person will infect less than one person and eventually epidemic will stop. (Uusisuomi 2020, Sundberg 2020.)

At the moment number of the infected people who died worldwide to COVID-19 is not accurate. Infections are reported more than 21 million and deaths caused by COVID-19 is reported over 770 000 on percentages this is close to 3,6% and at Finland the percentage is 4,5%. At Finland, number of death is 19.8.2020 333 persons. 48% are males and 52% females. Median age of the death people are 84 years. Tested persons at Finland is around 500 000. Recovery number of infected people at Finland is 7050 and this is around 90 percent of all infected people. (THL tilannekatsaus koronaviruksesta 2020.)

COVID-19 hits harder to some persons and some needs emergency room at hospital with breathing machines to cure and some persons are totally without symptoms. In the beginning, the testing capacity was very small and there was not possible to do enough testing. Situation is now little bit better and test are made as per need. There is still long line to get to COVID-19 test. This is depending at least on Finland about the location.

3.1.4 Next possible steps

COVID-19 will be under control when the vaccine is invented and gave most of the humans. Before that it is most unlikely that pandemic can be completely stopped and world can return to normal stage what it was before COVID-19 outbreak. Hopefully vaccine is not causing new problems as Swine Flu vaccine cause. Now there is not enough time to learn from the virus and get the best vaccine. It is already started to test vaccine with the humans. Russia is the first country what started to give to vaccine to people but testing was not made according to normal vaccine procedure and the side effects are not know yet. WHO informed that in optimistic scenario end of year 2020 vaccine is out on market (most probably on year 2021) but the effectiveness and how long the vaccine last is not known. Even when the vaccine is ready, there is no guarantees that it will effect on upcoming mutations of COVID-19 if there is any of those. In addition, all of the side effects is not clear. (THL rokotteet ja koronavirus 2020.)

3.2 Interview results

Totally, there was 18 questions what was asked in every interview. Questions can be found on appendix 1. on this thesis. Not every interviewee can answer to all of the questions and on those cases, question was skipped or modified to be more accurate to answer on the point of view of the

interviewee. That was needed to handle questions that way because of the Finland situation for example was not aware to everybody in China.

Interviews was made between 18th of May and 22nd of June. Due the COVID-19 all the interviews was MS Teams meetings and all the meetings was recorded. Records are available only to Thesis supervisors that they can check the sources to empirical research.

3.2.1 Presentations and interview about the thesis and briefing why interview was made.

Persons selected on this interview for this thesis was taken to get as large scale as possible on different positions, nationalities and locations. Following positions were part of the interview;

- Vice President, Global Operations, Finland
- Director, Engineering and Project Execution, Finland
- Project Director, Finland
- Notified Body / Authorized Inspector, Finland
- Senior Project Manager, Chile and Finland
- Supplier Quality Control Manager, Croatia and China
- Category Procurement Manager, Finland
- Quality Manager, India and Finland
- Project Quality Manager, Austria and China
- Quality Assurance Manager, Finland
- HSE Engineer, Finland

Overall, first question was answered quite briefly and most of the interviewee was thinking the same way the Client instructions to QC inspectors will be urgently needed to secure their safety at working abroad.

3.2.2 Affect of COVID-19

This was the first question on thesis empiric research. On this question, there was surprisingly many different answers and some of the interviewee was affected quite late. There was understandable different of affection to work and to personal life depending of the area where interviewee persons were when whole COVID-19 started.

People located at China was affected immediately on January after the outbreak of the COVID-19. President of People Republic of China inform its citizens at 22th of January how to behave with COVID-19 and that Wuhan is under restrictions starting from 23th of January 10 AM. Restrictions on

China was from the beginning strong and effected to all the people at China personal life as well as work. People were not allowed to move freely back from the Chinese New Year. This was stunning hit for whole China manufacturing because most of the people where seeing their families at their hometowns. Also factories and workshops which got approval from government to continue their work were not allowed to use more than 20 to 50 persons at once on work. This was destroying the original schedules of the manufacturing and also effecting that only the most needed persons as per manufacturing was allowed at workshops and inspectors were not allowed to be participating at workshops. During the February and March, people got change to go back to their homes and they get "green card" so they can move between the different domestic locations if they were tested and approved to be COVID-19 free. For foreigners at China this was difficult because they do not have "green card" available before end of April. Therefore, foreigners could not move domestic at China nevertheless flights, buses, and trains very under strict control and move between providences was not allowed.

Interviewee who was doing close co-operation with people located at China was facing first problems at same time with Chinese. After Chinese New Year holiday, COVID-19 problem was in hand of everyone who do international business.

Interviewee located in middle Europe was affected by COVID-19 in the end of February and in the beginning of the March. Restrictions on travelling started immediately. Shops were closed and restrictions for moving freely outside was given. Usage of the face masks was given by the government and work from home was mandatory for half of the worktime. All the interviewee persons at middle-Europe was affected by China situation because of the close co-operation with Chinese suppliers. This cause lots of extra work and clarifications to management. At this force majeure was opened because of the unknown delays of the manufacturing. Inspectors were thrown back to home from China and this caused empty spot at inspections on workshops.

Interviewee at Southern-America informed that first COVID-19 meetings at Chile started 1st of March and all personnel from Europe who wanted was evacuated at the end of March back to their homes. Situation with the restrictions at Chile was escalated earlier than in Finland, schools, bars, restaurants and shops were closed by the government of Chile. At the end of March, all possible persons needed to be at home doing work from there. To Chile COVID-19 came from Spain with the tourists. At the April Chile government, give order to stay home and avoid movement outside. Especially Santiago was in total lockdown because there was the most of the Chile COVID-19 cases. In addition, the rule to use the facemask came effective all-around Chile.

On India COVID-19 started to effect on interviewee immediately after the end of January. All the Indian inspectors from China were evacuated back to India and they were forced to COVID-19 tests and after that home quarantine. Totally 10 QC persons were evacuated because of the COVID-19. COVID-19 came to India in the end of the March. Offices were closed and domestic travelling was not allowed. India was under total lockdown by end of the March including the curfew. Still beginning of the June lockdown (nro 5) was in place. All the workshops was closed from March until April

and after those restrictions of workforce were on and limitation were 50 persons at one place. No visitors were allowed at the workshops. Persons outside of India were partly forced to return to India with the evacuation flights arranged by Indian government from worst COVID-19 areas. On mid-May, E-pass was required to domestic travel and domestic flights and trains started to operate. Public transportation inside the cities was closed until end of May. Worst COVID-19 place in India was Mumbai.

Most of the interviewee in Finland face the problem after the Chinese New Year. After that and latest on beginning of the March all interviewee was forced to take some actions because of the COVID-19. Some of them were even under restriction of Uusimaa area and were unable to travel anywhere from their homes. The all interviewee stopped international travelling and started to work at least partly from their homes during the March. Participation at the workshops was not allowed on all of the suppliers locations. One thing that cause a lot of extra work was clarification about the situation and reporting to management and to customers of the effects what COVID-19 caused. At the first, this was only more or less like a lucky guess but later on situation clarified and recovery plans were prepared.

Client QC team was one of the first persons at Finland whom to face the COVID-19 problem because that team was every day in touch with team located at China. To the QC team first step was to give order to return home to all of the Client QC team personals from China. After that, the QC team were waiting what comes after the Chinese New Year and after that affect to work was daily extra job to arrange other solutions to keep up the monitoring at workshops without normal personals. In addition, clarifications to management started at this point and continued until end of May.

3.2.3 Reactions and guidelines

Most of the interviewed persons at Finland informed that the first reactions of the organization were taken place on March even the all the marks from China for upcoming outbreak was available much earlier. Organization reacted on Finland quite conservatively comparing to China for example. COVID-19 task forces was established and information shared in the beginning to team leaders and supervisors who has big role to spread the information on their own organizations. No clear restrictions in Finland at this point. On companies, travelling was put on hold in many cases and if someone wanted to return home from abroad, it was organized and in some cases, it was even recommended depending from the destination country. Other reactions at all organizations was healthcare system clarifications and insurance checking's. Self-guarantees effect to all who return from abroad to Finland. At this time, it was not mandatory but recommended self-guarantee by government and length was two weeks. In addition, QC inspectors had chance to choose by themselves are they willing to go abroad for work.

On Austria, the situation was similar than in the Finland. It was first reacted at the beginning of March but it was surprise to government the scale how it started at Austria. Situation was not coordinated well and inspectors for example were totally left alone without company management support. Team leaders had big role on supporting their own QC people and organizing their return to home. First company reactions was in mid-March to split people on two groups and send other group to work from home. After two weeks, they changed the group which was working from home back to office and vice versa. In addition, facemask was mandatory and face to face meeting where forbidden as well as travelling abroad. Later also travelling inside Austria was forbidden and it was recommended to avoid working at the office.

On India first reactions where end of February and in the beginning of the March. Emergency teams where established and information where shared. All the persons returning from abroad were tested for COVID-19. On March, offices were closed and travelling was forbidden. In addition, workshops started to close their doors as per COVID-19 cases required doing that. Indian government set very hard restrictions to all the citizens and country was on lockdown for few weeks.

On China organization first reactions were to put in use facemasks and travel restrictions. After Chinese holiday, the "holiday" continue 10 more days and it was impossible to go to work or leave from home. After these 10 days, the work continued from home. Workshops where closed and people where stuck at their holiday locations on some cases. Travelling was slowly returning to normal with the e-pass what shows that person is COVID-19 free.

On South-America the reactions were similar than in Austria and the personnel was split in two groups and emergency teams where established. These actions started at 12th of March. All the persons were given change to return home if they liked to do so. Facemask and restrictions on travel followed quickly after the emergency team was established.

3.2.4 Organization reactions and guidelines.

This question was on many cases already answered on earlier question. Shortlisted the following reactions and guidelines were done on all of the locations;

- Establishing the emergency team on destination country
- Travel restrictions
- Work from home
- No Face to Face meetings
- Informing the company policy to all employees
- Returning from abroad to home

3.2.5 Have you been in contact with workshops (mostly inspectors) during COVID-19?

Almost all of the interviewees were in touch directly or via someone to inspectors at workshops around the world. Biggest difference was that half of the interviewees were not in touch with inspectors at China. All of the interviewees were deeply worried about the outburst of the COVID-19 and the co-workers safety.

Situation at Europe and Southern-America continued without any bigger issues at workshops outside China until March and after that COVID-19 situation started to effect also to outside China manufacturing.

Client company QC responsible persons were daily in touch with inspectors in China and around the world and this was one of the key practices what helped them and Client during the hardest time of COVID-19 outburst to receive accurate and reliable information. News and rumors where not trustful in the beginning and there was some sort of a political game ongoing. Information got from inspectors or their supervisors was the key to the planning of the upcoming inspections worldwide and ensure that the manufacturing quality inspection will be carried out as good as possible on that hard time.

3.2.6 Do you know anyone who has been infected by COVID-19?

When the interviews were done during May 18th until 22th of June situation of infected people informed by the interviewees was as per Table 2. Table 2. shows the interviewee nationality and area on the knowledge of the infected people of COVID-19.

TABLE 2. Interviewee answer to question six. Do you know anyone who has been infected by COVID-19?

Interviewee Loca- tion of the nation- aity infected people	Finnish	European	Chinese	Indian	South-America
Finland	8	1	0	0	0
Europe	1	3	0	0	0
China	0	1	0	0	0
India	0	0	0	0	0
South-America	0	0	0	0	0

It can be seen from the Table 2. that from Finland, there was most of the confirmed cases but this was because most of the interviewed persons were Finns. Every interviewee at Europe (outside Finland) knew at least one or more infected persons. All of these cases were at Austria. Some of them were confirmedly got from Italy. This supports the timeline and the outburst of the Europe COVID-19 situation-entering route to Europe. Similar situation was with one of the Finnish interviewee knowledge of one of the infected person at Finland. Italy and Spain was the biggest COVID-19 routes to Europe.

Other location than Italy and Spain in Europe did not has that bad COVID-19 position during the interviews timing. That is probably the main reason why there is not so much of awareness the infected people.

3.2.7 What kind of an impression you have about the information what you have got from media?

This question was answered similar way between by all of the interviewee. Every interviewee shared the same impression that the information what is got from media was not reliable and could not be used as it was without any criticism. Especially western world was criticizing quite hard information which was got for China. On the most problematic point of view was that the information was changing on all the Medias and even the normally reliable sources were not immune to the fake news at this COVID-19 time.

Also interviewee who was in contact with the Chinese works at the beginning informed that the numbers what was on the media did not match with the number given on the Chinese national news. At the western media the numbers where quite reliable but the panic was caused on because the test results were not reliable on cases of the positive COVID-19 test result. Media did not inform this point of view at all but just wanted the get as big number and big news as possible without the true result and clarification of the facts.

On Austria, there was lots of news about the COVID-19 and later on Counselor admitted that the situation was make worse than it really was because people needed to be scared to follow the restrictions. Lots of over reactions has happened on all the western world.

Southern America situation is mentioned on media that the Chile is the worst place on COVID-19 point of view but the true is that the Chile is giving the true numbers of infected people and Brazil is giving unreliable information and the true situation is that the Brazil is much worse than Chile. Health care system at Chile and Brazil is on maximum level and cannot survive long like this. Only the rich people can have hospital services available immediately and poor people do not have change to visit any hospitals they like without insurance. Mostly for poor people problem is dense population and chance to maintain hygiene.

Summary was on this question that the COVID-19 was too much on media and it cause people not to read even real news and because there was lots of information on the media people did not know what to trust. Governments did not give enough information to people and if those gave, it was over reacted.

3.2.8 China restrictions

Restrictions in China as indicated on Table 3. was that China government did hard and similar restrictions to all population inside China. Total lockdown of the country was set up and all the visas were frozen and no entering to the China from outside unless you have Chinese passport. Area restrictions started from Wuhan at 23th of January at 10 am. President of China gave first official information at 22th of January. Chinese holiday started at 23th of January and that caused virus to spread among the citizens. 25 of January, it was spread outside Wuhan province and Hubei was next on to be restricted from other provinces. After this Hubei restrictions all other provinces and biggest cities got the own restrictions and gathering of the people was limited to 50 people and domestic flight has been limited. Chinese New Year holiday continued extra ten days for all people and no one was allowed to leave their homes. Workplaces was closed, facemasks where mandatory and no entering without permit outside.

On 10th of February, life started to return the new normal and all the workshops opened their doors at latest mid of March with limited personals. Work from home started at this point and no any inspector was able to go his or her workplaces. After March inspectors, where allowed to return to workshops and work continued with the normal personals. Personal protective equipment was still on use and government gave earlier guidance of usage of those. Entering to China was still restricted and no new visas were given at this point. E-pass was taken on use and area checking was started.

TABLE 3. China restrictions

Restriction	Started	Ended
Lockdown	22 th of January	10 th of February
State of emergency	22 th of January	10 th of February
Visas frozen (Finnish point of view)	23 th of January	Still in use
Public health care availability	No official information	NA
14/7 days guarantee when entering the country	23 th of January (mandatory)	Still in use
Workplaces / shops closed	25 th of January	15 th of March
Limitation 50 of people gathering (also work)	25 th of January	1 st of April

Inspectors at workshops	22 th of January	1 st of April
Inspectors free domestic travel	22 th of January	1 st of May
Flight limitation, domestic	25 th of January	Different limitations as per location
Domestic transportation between provinces	25 th of January	Different limitations as per location
Flight limitations, international	22 th of January	still in use
Facemasks	23 th of January	still in use
E-pass or similar software	1 st of April	Still in use

3.2.9 Asia area restrictions

Overall, the restrictions in Asia were started immediately after the Chinese New Year. There were many different variations of restrictions and it was depending of the country. Every country have their own restrictions. During the interviews, Chinese restrictions were quite well known but other area restrictions were not known or was very limitedly known. Unfortunate there was no any interviewee at on Asia other areas than China.

On the QC inspectors point of view none of them was at other locations than China in Asia during the COVID-19 outbreak. Some Indian QC inspectors were at Indonesia just before Chinese New Year and those were returned to India for holiday just before outbreak.

In Japan there was during the COVID-19 outbreak time own restrictions see Table 4. what was quite light and movement between Europe and Japan was still allowed. One site installation inspector from Finland was at construction site at Japan but restrictions was minimal and COVID-19 situation was well under the control.

TABLE 4. Asia area (Japan) restrictions

Restriction	Started	Ended
Lockdown	-	-
State of emergency	7 th of April	25 th of May
Visas frozen (Finnish point of view)	8 th of March	Still in use partly
Public health care availability	No restrictions	NA
14 days guarantee when entering the country	8 th of March (not mandatory)	Still in use
Workplaces / shops closed	-	-
Limitation 50 of people gathering (also work)	-	-

Inspectors at workshops	-	-
Inspectors free domestic travel	-	-
Flight limitation, domestic	-	-
Domestic transportation between provinces	-	-
Flight limitations, international	8 th of March	Partly still in use
Facemasks	-	-
E-pass or similar software	-	-

3.2.10 Finland restrictions

On Finland the restrictions were the most well-known to interviewee persons see Table 5. Restrictions started at middle of the March when the business trips and face-to-face meetings were cancelled. All of the travelling documentation and visa applications were cancelled and the existing visas were frozen. Finland restrictions caused to use local inspectors instead of Finnish inspections abroad. This action cause many problems in the beginning because the need for local inspectors was on every company on the Client business area. Later on thanks to big local organizations around the world Client QC organization managed to keep manufacturing supervised and quality on high level on those workshops which kept their doors open during COVID-19.

Finnish national health care as well as the private sector health care were declining to do in the beginning the COVID-19 testing for those who was coming back to Finland from abroad. Normal Finnish habit to keep distance to each other was one off the big advance to keep COVID-19 away and very high hygiene level of the almost every individual. In the beginning of the COVID-19 spreading at Finland Finnish people where adapting the rules quite well and followed the restrictions. Self-guarantee when returning from abroad was suggested and the length was at that time 14 days.

First government big action was to limit the movement inside Finland and the worst COVID-19 area what was the Capital of Finland city of Helsinki and near cities like Espoo and Vantaa. Province of the Uusimaa was isolated from the other Finland by police and army. Government made this possible by using the stand-by law article 118. Isolation started at 27th of March and the warning was given at Wednesday 25th of March. Isolation lasted three weeks. Same time also came restrictions to restaurants, mass meetings and public transportation. Together these actions caused the QC inspections to be frozen for few weeks at Uusimaa province. On the other provinces the works continued with caution and inspections were still allowed with facemasks and safety distance.

Client big customers cancelled immediately when COVID-19 spread to Finland all the upcoming summer shutdowns and postpone those until autumn. This cause lots of replanning and on worst case also the temporary dismissals of subcontractors.

Overall Finland restrictions was not at same level than the middle European restrictions but thanks to location, culture of behaving and people obeying the Finland managed very well at the first wave of the COVID-19.

TABLE 5. Restriction on Finland

Restriction	Started	Ended
Lockdown	27 th of March Partly (Uusimaa)	19 th of April
State of emergency	27 th of March	19 th of April
Visas frozen (Finnish point of view)	Not applicable (NA)	NA
Public health care availability		
14/7 days guarantee when entering the country	18 th of March (not mandatory)	Still partly in use
Workplaces / shops closed	-	-
Limitation 50/20 of people gathering (also work)	27 th of March Depending of the area	19 th of April / still in use Depending of the area
Inspectors access at workshops	-	-
Inspectors free domestic travel	27 th of March	19 th of April
Flight limitation, domestic	27 th of March	19 th of April
Domestic transportation between provinces	27 th of March	19 th of April
Flight limitations, international	18 th of March	still in use
Facemasks	27 th of March (not mandatory)	Still in use (not mandatory)
E-pass or similar software	31 th of August (not mandatory)	Still in use (not mandatory)

3.2.11 European area restrictions

Based on the interviews results the restrictions on Europe see Table 6. started mostly at the same time than in Finland. Difference was that restriction was much tougher than in Finland. People were not allowed to go their work and even most of the shops were closed. It was not allowed to gather on more than 10 persons groups. Generally speaking European restrictions were at between Finland restrictions and Indian restrictions.

Health care systems at the Europe was at their limits and even with the travel restrictions was set up there was shortage of the breathing machines on many countries. Especially the Mediterranean countries has the worst situation and from there COVID-19 spread to more north and to South America. After this COVID-19 was a global treat.

At the Sweden COVID-19 approaching, strategy was very different from any other European country. Sweden did not take almost any actions to prevent COVID-19 spreading among the population. This cause lots bigger death toll and infection wave than any other country has seen based on the population.

TABLE 6. European (Austria) Restrictions

Restriction	Started	Ended
Lockdown	1 st 16 th of March 2 nd 17 th of November	1 st 20 th of April 2 nd 7 th of December
State of emergency	16 th of March 17 th of November	20 th of April 7 th of December
Visas frozen (Finnish point of view)	NA	NA
Public health care availability	Public health care was not allowing all the persons to come hospital at worst peak	Still in limits
14/7 days guarantee when entering the country	16 th of March	Still in use
Workplaces / shops closed	16 th of March	14 th of April
Limitation 50/20 of people gathering (also work)	15 th of March	Still in use
Inspectors at workshops	1 st of March	20 th of April
Inspectors free domestic travel	NA	NA
Flight limitation, domestic	NA	NA
Domestic transportation between provinces	NA	NA
Flight limitations, international	17 th of March	Still in use
Facemasks	6 th of April (mandatory)	Still in use
E-pass or similar software	4 th of September	Still in use

3.2.12 India restrictions

Overall this question was not very well know but luckily one of the interviewee was at India and responsible about the inspectors on that area. From India situation started quite similar than in China but difference was timing. India COVID-19 situation started to escalate after Chinese New Year. At this point all Client Indian inspectors was returned to India because the Chinese New Year is for holiday season. All Client personals was available to do work from home after the Chinese holiday at India.

In India there has been before the interview 5th of June different stages of the restrictions see Table 7. In the beginning, there was complete lockdown of India and there was not availability to travel and continue normal life as earlier. Only thing what was allowed was pharmacy and grocery shop visits. This stage was in use two weeks. After that stage some restrictions was taken down and modified. Workshops where opened with the limited workers. Still the movement outside from Indian was not allowed and domestic movement was restricted to moving inside provinces.

On third and fourth stage of Indian lockdown, there was more openings at workshops and people were allowed to return to work. At this point also, QC inspectors were allowed to enter the workshops in India. E-pass was put in use and with that domestic travelling, was allowed.

On fifth stage of Indian lockdown, travelling outside of India was not yet allowed and no entering to India was possible. On-time monitoring was set-up and information and alarm system to citizens was put-in use.

From the other interviewee outside from India there was not that clear picture about the Indian restrictions. It was generally well known that India was in lockdown but not that much other information was not shared.

TABLE 7. Indian restrictions

Restriction	Started	Ended
Lockdown	25 th of March	31 th of December (estimation)
State of emergency	24 th of March	still in use
Visas frozen (Finnish point of view)	5 th of May	Still in use
Public health care availability	Risk that no availability. No official information	Different area different restriction periods
14/7 days guarantee when entering the country	13 th of March (Mandatory)	Still in use
Workplaces / shops closed	22 th of March	21 th of April
Limitation 50/20 of people gathering (also work)	22 th of March	8 th of June partly
Inspectors at workshops	22 th of March	25 th of May
Inspectors free domestic travel	22 th of March	25 th of May
Flight limitation, domestic	22 th of March	25 th of May
Domestic transportation between provinces	22 th of March	25 th of May
Flight limitations, international	22 th of March	Still in use
Facemasks	25 th of March	Still in use (Mandatory)
E-pass or similar software	25 th of May (Mandatory)	Still in use

3.2.13 North- and South American area restrictions

North- and South America restrictions were different on every country and Client employees at North America were stuck at USA without change to leave the country. Inspectors was still able to move inside USA on their own provinces.

South America at Chile see Table 8. there was one of the interviewee persons and via that person, it was got good and accurate COVID-19 situation. This interview was taken place at 16th of June. To Chile COVID-19 come from Spain with the tourist and it was reacted by government one week before Finland. Schools, restaurants and shops were closed at that time. In addition, domestic movement was not allowed anymore without license. Chile was from beginning of the April in lock-down and that continued until interview was taken place. On capital Santiago the situation was worst and completely health care system was about to collapse. In Chile, the situation was the worst on entire South America in the beginning. Number of infected people per day was in the beginning 3500-7000 persons and number of deaths was over 200. Client representatives' established emergency team and start to organize actions to make safety at COVID-19 time as high level as it can be. Teams where split in half and all the persons how want to return their home countries was given change to return without any doubts. Everyday there was same teams at work and HSE officer takes fever measurements as daily practice. Usage of the facemasks was mandatory. At construction site when the interview was taken place from 7000 people 50 has infection.

At the Brazil situation was turn worst at Southern America countries after the highest peak of Chile. All the interviewee know that situation at Brazil is not good but the accurate data from Brazil was very hard to get and one of the reasons for that was corruption at Brazil and freedom of speech is not at same level than in Europe. Still until now, the situation at Brazil is the worst at Southern America. Situation at restrictions at construction sites are different on different locations at Brazil and there is not clear government guidelines for COVID-19.

TABLE 8. North- and South-American area (Chile) restrictions

Restriction	Started	Ended
Lockdown	18 th of March	19 th of August
State of emergency	18 th of March	17 th of June
Visas frozen (Finnish point of view)	NA	NA
Public health care availability	Public health care was on the maximum limit on many locations. On point on worst peak there was only three breathing	Still in the limits at certain areas.

	machines available on whole country	
14/7 days guarantee when entering the country	14 th of March (Mandatory)	Still in use
Workplaces / shops closed	18 th of March	19 th of April
Limitation 50/20 of people gathering (also work)	18 th of March	Still in use
Inspectors at workshops	NA	NA
Inspectors free domestic travel	20 th of March	Still in use partly (Santiago)
Flight limitation, domestic	20 th of March	Still in use partly (Santiago)
Domestic transportation between provinces	20 th of March	Still in use partly (Santiago)
Flight limitations, international	18 th of March	Still in use partly
Facemasks	18 th of March (not mandatory)	Still in use
E-pass or similar software	30 th of April, Safety certificates	Still in use

3.2.14 What is your opinion about the Finland COVID-19 stand comparing for example to Sweden?

All of the European interviewee has the same opinion that Finland more carefully strategy was better than Swedish open and careless policy. On Finland there was right actions made compared to Sweden and the number are proving that. Numbers of infections and death are almost ten times higher at Sweden than in Finland and on Sweden, there was not pack immunity gained even the Sweden really hopes to get that.

Sweden policy was better to economy but health care system over run and deaths are not acceptable at any case. Sweden was more or less playing with their people lives. Sweden also later admit that Finland COVID-19 policy was much better than their own. Swedish people also got restrictions to enter other countries when people from Finland was able to travel between some countries. Hopefully Sweden will learn in the future that the money cannot be more important than human lives if similar crisis happened in the future.

3.2.15 When you think that situation on World is restoring back to normal on workshop manufacturing point of view?

During the interviews, there was quite large range of the answers. Many answers was indicating that manufacturing would return to the normal after the vaccine is brought to the markets. Second most usual answer was that after summer holidays manufacturing return to normal. Third most common answer was that world is restoring back to normal on manufacturing point of view on end

of year 2020. Few interviewee answered that restrictions would be on use until end of year 2022. Few answered also that if the is not second wave manufacturing can be returned back to normal in few months.

3.2.16 What kind of an affects COVID-19 leaves in the future?

This was interesting questions and many interviewee points out interesting point of views on overall and on point of the quality control inspectors. During the interviews following key points was generally raised up between all of the interviewee persons.

- Remote office working will be happening much more in the future.
- No need for face-to-face meeting so often in the future.
- Quality inspectors can be local inspectors instead of bringing the inspectors from other countries.
- Workshops own quality control must be development in the future.
- Safety of the employees will be raised higher in the future. Back up plans on similar situation how and when to evacuate own persons will be rethink.
- Travelling can be reduced comparing what it was before COVID-19.
- More critical thinking of the viruses and infections. No one is at safe for global pandemic.
- Economical COVID-19 mixed the World trade and it will take long time before World can return same economic situation what it was before COVID-19.

3.2.17 What are the employee right and wrong acts during the COVID-19?

This answer is easier to open as table 2 show below. Table 2 shows the answer divided on right and wrong acts but it is not showing the employee. In addition, number indicates how many different interviewee answered the same answer on the interview.

TABLE 9. Interviewee's answers to question; What are the employer's right and wrong acts during the COVID-19?

Right actions	Wrong actions
Team leaders actions with the work from home quickly 5	No clear COVID-19 line on company level in the beginning 9
Employee act like it care of every employee. Safety and equality is the priority number one 5	In the beginning no clear line when and who to do work from home 7
QC inspectors had a change to return home if they liked to do so 4	Overall unawareness 4

No need to travel unless it is ok for individual 2	Unclear how to act if no possibility to enter the workshops 3
Temporary dismissal is not done immediately when COVID-19 spread to Finland	No clear clarification what and how to handle Force Majours
COVID-19 line together made with the inspectors	

Interviewee answered similar way and it is easy to see that all the companies have some issues in the beginning to inform how to act on COVID-19 crisis. Too much responsibility has been given to individual team leaders to act.

3.2.18 General speculation about the COVID-19

This question gave many interesting answers. One of the most common comment was that all the persons around the World are in same situation and we need to respect and do own part to protect each other from COVID-19. Team spirit had been raised during the COVID-19 time. People should be more critical for media facts. It has been seen that humankind is not above of the nature and it cannot avoid these type of risks in the future.

It was indicated on the answers that instructions for COVID-19 on point of view inspector was really needed and safety of every individual is important and it does not depend on location. Western countries cannot rely only on China manufacturing. Finland need to reserve some self-sufficiency level just like every other country. This counts also on knowledge not just manufacturing. COVID-19 cause too much reporting requirements.

4 INSTRUCTION FOR CLIENT FOR UPCOMING PANDEMICS

The second target of this thesis is to create usable up-to-date instruction what can be used in the future for QC inspectors around the World on similar situations if there is new pandemics arriving. Like there was a mention in the beginning of the thesis, instruction is missing how to act and when QC inspector can act as per situation needs.

Client has already similar instructions what are in use for different office persons / locations and for site people but there is clear blind spot existing at QC inspectors' point of view. After interviews, it is possible to prepare similar kind of instruction to QC purposes.

Because the Covid-19 pandemic may persist for long period of time. Depending on the Covid-19 situation in a specific country where QC inspector is located, governments will adopt/review/change countermeasures that may lead to travel restrictions, limitations on medical treatment and quarantine. The Covid-19 situation may result in a deterioration in the overall travel security environment. Based on earlier mentioned the purpose of Client guideline to QC inspectors is to assist with the decision-making process to ensure every QC inspectors health on every location of the World.

4.1 Management

In order to control instruction proper way to needed person, the responsible to hand over the instruction is on new QC inspectors' closest supervisor. Supervisor will add the QC instruction as part of the normal training routine before sending QC inspectors to work at workshop. No matter is the QC inspector permanently at workshop or doing spot check inspection. Instruction will also be part of the contract appendices when signing the contract with the new sub-contractor and in this case sub-contracted QC inspector.

Responsibility to understand and to follow the instruction given guidelines and recommendations is on every QC inspector but it can and will be supervised by QC inspectors' closes supervisor. If there is any unclear points while at doing inspections at workshops the correct person to answer those is QC inspectors' closes supervisor. Same person is also the one who can give command to return home.

4.2 Future risks

Humankind is living on global World and there is always a change for new pandemic. Like mentioned on chapter 2.1 there has been lot of devastating treats at close pass. Humankind must be

prepared to act on next crisis whatever kind that is. Humankind need to have common understanding what must be done and what are the right preventing actions. Most probably, the next risks in the future on point of Client view are following;

- Natural disaster (like volcano eruption etc.)
- Virus (like Covid-19)
- Civil war, war or world war
- Economic crash

None of the above mentioned risks can't be completely avoided. That is the reason why Client want to be prepared, Learn from previous cases and harmonize procedures for all personnel, and remember that safety is the number one priority and it is no matter what kind risk is possibly facing the humankind.

4.3 Summary

Instruction for QC inspectors' actions if similar pandemic situation happened again will be available for Client personals. Because of the non-disclosure agreement, instruction cannot be part of this thesis completely.

5 RESULTS AND CONCLUSION

Results from the empirical phase as per questions on appendix 1 were giving good and detailed COVID-19 information what was not got from any theoretical source at that time. From the interview it was received great insight from around the World and accurate situation from totally five different Country on four different continents.

5.1 Interview conclusion

On interview, there were totally 18 questions as appendix 1 shows. Table 10 combines all of the interview results of the restrictions. More analyzed answers are written below. On Table 10. There is first and the last dates indicated.

TABLE 10. Interview results for the restriction.

Restriction	Started	Ended
Lockdown	22 th of January	31 th of December (estimation)
State of emergency	22 th of January	Still in use
Visas frozen (Finnish point of view)	23 th of January	Still in use
Public health care availability	Risk that no availability. No official information	Different area different restriction periods
14/7 days guarantee when entering the country	23 th of January	Still in use
Workplaces / shops closed	25 th of January	21 th of April
Limitation 50/20 of people gathering (also work)	25 th of January	Still in use
Inspectors at workshops	22 th of January	25 th of May
Inspectors free domestic travel	22 th of January	25 th of May / Still in use partly (Santiago)
Flight limitation, domestic	25 th of January	25 th of May / Still party in use
Domestic transportation between provinces	25 th of January	25 th of May / Still party in use
Flight limitations, international	22 th of January	Still in use
Facemasks	23 th of January	Still in use (Mandatory)
E-pass or similar software	1 st of April	Still in use

Lockdown was set up first in China where the COVID-19 started to spread. Lockdown of China started 22th of January. Even China has no longer the lockdown there was some locations around

the World like India lockdown until end of the year 2020. India and the Austria just like some other European countries has lockdown ongoing on December but most of the countries has make before December some release to their lockdowns. Some countries like Finland there was not official lockdown at all only partial lockdown was set.

State of emergency was set up on every country what was at interviewed. China was first one to place the lockdown on first 22th of January. Some locations state of emergency is still in use but mostly state of emergency is already taken away on most locations. What was interested to see on interview results was that Japan was the last one to place state of emergency. Japan did that on April all other (China ruled out) was placing the state of emergency at March. Finland was the last one to place it from interviewed locations (Japan ruled out). Most on the locations state of emergency last around one month. India and South American countries make difference having longer state of emergency. Austria was the only country what has set up on COVID-19 second wave the second state of emergency.

Many of the locations visas was never frozen or cancelled but situation was different on China, Japan and India (from the interview locations). This question was done on point of Finnish citizens and that is why it was not usable on Finland and European Union area. Nevertheless, wherever visas was frozen or cancelled those are still but it is possible to apply new visa to China starting from June but the procedure is very different from normally. Visas are not given easily and that is making QC inspections movement very hard. Visas to South America can still be applied normally even COVID-19 situation is not good on those countries. On these countries, visas were not cancelled or frozen.

Public health care availability was not well known and accurate information was not available. Many countries has public health care on limit but as per information available, all infected people got health care as per country strategy. Some countries forbid older citizens to leave their homes and go to hospitals. Many countries like Finland did arrangements and cancel non-urgent operations to ensure public health care to be enough to all COVID-19 patients. Problem with this question was that all of the countries did not inform their hospitals capability realistic and did not shared accurate information about the infected people.

Quarantine when entering the destination country question answers was clear. All of the interviewed locations were using guarantee at some period. First country which set the guarantee was China and after that Japan. Most of the countries set mandatory guarantee but Finland and Japan set self-guarantee what was not mandatory. On many countries, breaking the mandatory quarantine causes possible fines. Finland and Japan Covid-19 situation was not that bad and people are as normal practice following rules of the government so that was one of the reasons why mandatory guarantee was not needed. Many countries still use guarantee when entering to country and that is one of the best way to prevent COVID-19 infections to spread.

Shops and workplaces were closed on many countries by government regulation. Exceptions to this was Finland and Japan were workplaces and shops were open all the time. Some of the services has

limitations or these were closed (mostly restaurants and hotels) but point of QC inspectors view those countries were working as normally. In the first wave, shops and workplaces were closed around one month. Some countries are still having rule to close the shops or workplaces if the new infections raised on that area.

Limitation 50/20 of people gathering was set up in all of the interview locations except Japan. This was one of the most effective method to prevent COVID-19 spreading. Outside from China this method was put in use on March immediately after COVID-19 spreading. In China, government did this restriction 3 days from Wuhan restriction after COVID-19 break loose. Different countries use different kind of restriction limit on people gatherings. In addition, differences was that on some European countries like in Finland there were not limitations on work (QC point of view) but on other countries also workshops limitations was in use. On workplaces, limitation was maximum 50 persons but on sports events and on social situation there were also ten people limits on some countries in use. This restriction was temporary killing blow for sports events, art gatherings, social events and for music events. Many different professionals lost their normal income and normal life was impossible for those groups of people.

COVID-19 cause in some countries restrictions to inspectors entering at workshops. These restrictions started at China first on 22th of January but this was because the Chinese New Year started at that time. Whole China was closed as normal practices during the Chinese New Year time but because of the COVID-19 "holiday" period last whole February and part of March. Therefore, this was not surprise that QC inspectors was not able to enter the workshops because the workshops was not working normally. Finland, South America and Japan did not set up any restrictions to enter to workshops. Other interview locations workshops were closed for QC inspectors. Restrictions were taken down on most locations before end of April. India will keep the restriction of entering the workshop longest and Indian government have a plan to release those at end of May.

Domestic travelling for the QC inspectors were restricted on many countries. Restrictions started at China on January and on other interview locations on mid or end of March. On South-America Santiago area was still restrictions on free travelling in use. Other interview locations were released restriction of domestic movement already. Last one was India and they released domestic movement on 25th of May. All the other locations restrictions were taken down on April.

Domestic flight limitations was set up in China 25th of January other interview locations started restrictions on March after COVID-19 break loose from China. Domestic flight limitations was in use around one month but differences was about the areas of flights. Some countries like Chile still have restrictions on domestic flights on Santiago. India was the last one what take restrictions down on domestic flights on end of May. COVID-19 caused most of the domestic flights to be cancelled and domestic flights have not recovered to normal level after restrictions relief on any country. Japan and Austria was the only countries from interviews what has not set up any restrictions on domestic flights.

Domestic transportation between provinces has same situation with the domestic flights. Only Austria and Japan did not set up any restrictions to domestic movement. Finland use to restrict its Capital Helsinki and Uusimaa province the state of emergency. Restrictions was around one month in use most of the countries.

Stopping of the international flights was first action to prevent COVID-19 for spreading on the entire interview locations. China was the first one to cancel the international flights starting on 22th of January and still use restrictions from some countries with high COVID-19 risk. Other countries started restrictions on March and most countries still use restrictions at least partly from those countries what are high-risk countries. Most of the flight companies has gone near to bankruptcy during the COVID-19 time and lot of their employees are at temporary dismissal.

Usage of the facemasks is good way to prevent other people to get COVID-19 but it is not giving 100 % protection against the COVID-19. Interview countries has different kind of approach to usage of the facemasks. Some countries like Austria, China and India set mandatory usage of facemasks but other countries use voluntary usage of the facemasks. Facemasks cause lot of negative news in the beginning because every country try to acquire those almost at any cost. Facemasks are still in use most of the country and most probably remain until end of COVID-19. Usage of the facemasks (mandatory or not) started when COVID-19 spread to country or little after that.

E-pass or similar software was taken to use to follow already happened infections. Every country has the own system. China was the first what taken that kind of software in use. This happened first of April. Other country has taken similar software's in use during the summer. Even with these kind of software's not all of the infections could be traced as needed and new infections cannot be prevented. These are excellent tools to minimize COVID-19 preventing but not the only option.

Restrictions are summarized on TABLE 10. and other experts interview outcomes can be summarized as followed;

5.1.1 Companies' reactions

Companies' reactions were interviewed on questions three, four and five. Overall results on questions three can be summarized as following;

- Countries and Companies what work on at European area and South-America area did the first reactions after COVID-19 spread outside from China at beginning of the March.
 - Many companies and countries did not react enough even it was possible that COVID-19 will be spread from China.
- Companies what was operating at China did the reactions immediately when China government reacted on January. Guidelines and restrictions at China were hard but very

effective and western countries should learn from those but they were hoping that COVID-19 would stay inside China and not cause problems to western world.

- Restrictions worked and situation turn upside down on March when COVID-19 spread to Europe. After that situation at China have been better than in outside China.
- In all of the locations around the World companies started as the first action to use work from home if that was possible and try to secure work as normal as possible. Face-to-face meetings were forbidden and travelling stopped immediately. Work and meetings continued by using computer software's like MS TEAMS. COVID-19 was huge boost from digitalization around the World.
- Interviewee's were not commonly in touch with the inspectors in the beginning of the COVID-19 because the workshops at China was closed and rest of the World few exception (like Finland) were following same example later. Inspectors were set to isolation on abroad and were not able to practice their normal work.
- Interviewees thought that the most important act what every employee made during the COVID-19 was to react fast and think about the safety of the employees. One way to secure safety was to start work from home partly or totally.

5.1.2 Media

All of the interviewees have the same opinion on this question. Media did not give right and accurate information. The WHO and every country local "WHO" (like THL) did not have enough information to make big decision and give real guidelines to governments. Many interviewed persons also thought that some of the big countries did not gave real numbers of the COVID-19 infections and that way keeps the situation inside the country more satisfied. There was not enough testing capacity in the beginning to get the accurate numbers. Because of these actions, other countries cannot get the right picture about the upcoming situation and that cause other problems later when not all of the countries was prepared for COVID-19.

Other point of view all of the COVID-19 information at the media all the time cause people to be ignoring the important information also. Media should have keep COVID-19 news as important and not like to dramatize every news. People have had enough of COVID-19 news and did not paid at attention anymore to news from media.

5.1.3 Future

Interviewees thought that the new normal started after the COVID-19 vaccine is in use and effective. Time when this happened was most guess between the interviewee to be summer of 2020 or

end of year 2020. Nevertheless it can be summarized that interviewees were waiting for the vaccine to solve this COVID-19 situation.

It was thought that following changes can happen in future because of COVID-19;

- Work from home comes common practice.
- Work travelling will be reduced.
- New supporting software's and methods comes to aid at workshop inspections.
- Countries self-sufficiency will be raised.
- Nature will be recovered partly because the flight are restricted and in the future travelling will be limited

5.2 Effects of preventing actions

Table 11. indicates deaths on interview locations. The restrictions showed on Tables 3-8 on chapter 3. can be compared with Table 11. to get good overall picture how effective restrictions were to prevent COVID-19 spreading on interview countries. This would not give the whole picture because there is other factors what effects to deaths and infection numbers. Nevertheless, comparison between the tables will give good data what can be used on QC instruction as baseline.

TABLE 11. Deaths on interview locations, situation 7th of January 2021. (Statista 2021.)

	Confirmed Deaths	Population (in millions)	Deaths per million people	Deaths in last 7 days
Austria	6 525	8,88	735,04	303
*Brazil	198 974	211,05	942,78	4 025
Chile	16 816	18,95	887,29	208
China	4 788	1 397,72	3,43	6
Finland	576	5,52	104,34	15
India	150 336	1 366,42	110,02	1 598
Japan	3 609	126,26	28,58	317
*Sweden	8 985	10,29	873,56	258
*USA	359 559	328,24	1 095,42	4 012

*marked countries are mentioned on interview but do not have own interview table for restrictions.

It can be summarized that countries what have harder restrictions and they have taken those actions sooner have lower death number per million people. Restrictions worked but it is good to keep on mind that not only the restrictions cause those numbers to remain low. Other behaviors, population structure, population density and cultural actions was also major reasons to prevent COVID-19 for spreading.

Chile is good example that even with the hard restrictions situation will not necessarily be under control. Situation there is the same than in Sweden even in Sweden there is no restrictions in the beginning. Japan and Finland are good examples that even without hard restrictions COVID-19 can be kept under control. This is most probably worked on because people on those countries have high will to follow the rules and have high education level. Understanding that rules need to be followed to achieve higher benefit.

On some cases the number are not realistic and cannot be trusted. Like China statistically there is way too less infections according to information what is known about the COVID-19 spreading. On this and some other countries, the truth is not told to public or maybe not even known on governmental level.

5.3 Self-reflection

It was quite challenging to study and analyze topic what was not clear and understandable to anyone on the World. It cause problems that information around the World was not reliable and true. Also continuously changing facts cause problems.

Interview was excellent way to gather information around the World but those are opinions and not always correct information. Writer's own attitude to media was also changed and picture of the own Client has raised after realization that Client did the right acts even it was not completely clear what it is facing. Even there was purpose to cover the scope fully with the selected interviewee there is possibility that all the data some important information might be missing.

In addition, the schedule caused many problems because this thesis was done beside of the normal work. COVID-19 cause lots of extra work, time for the thesis was quite limited, and this cause work to be longer that it was considered in the beginning. Some topics of the thesis were changed some times during the work. It would be easier and straightforwardness to reserve time in the beginning to do the thesis straight to the end.

5.4 Proposal for the further research

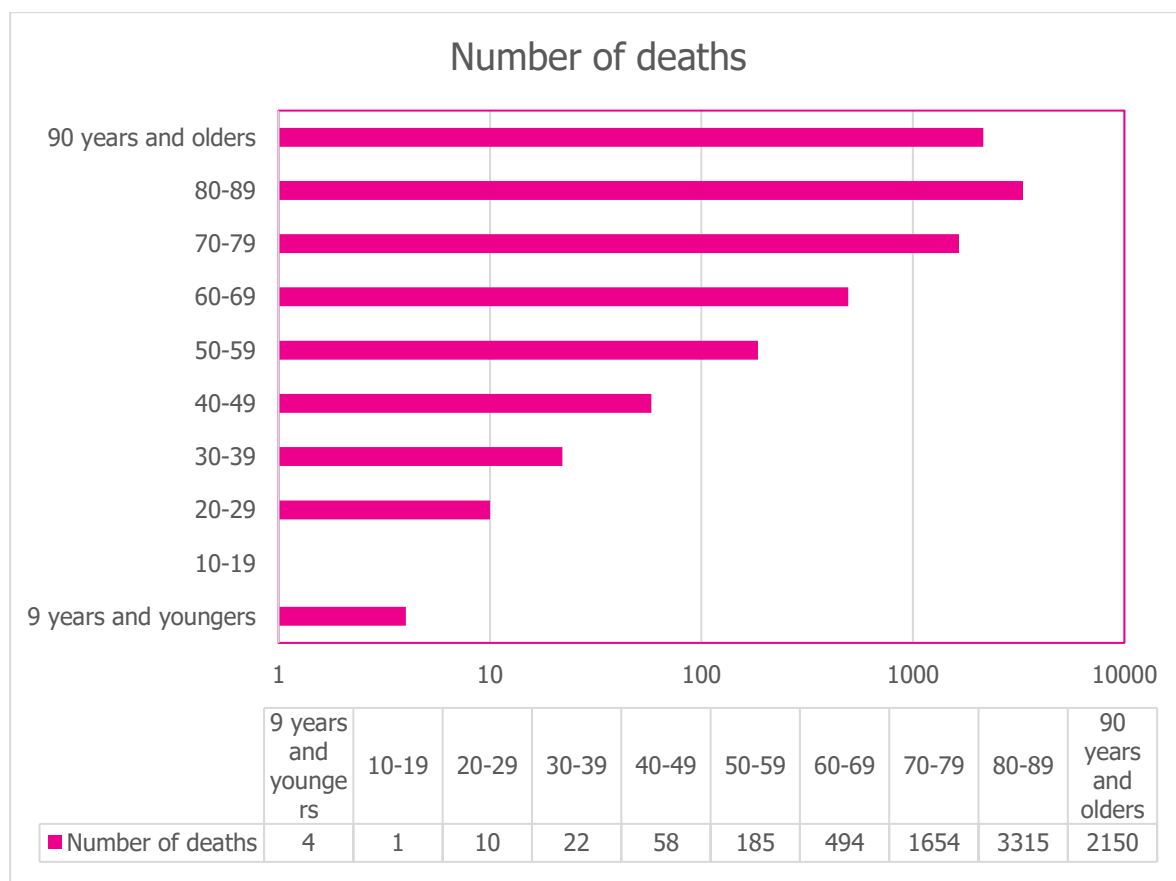
Proposal for the future research is to continue research for the QC inspection software's or methods to avoid COVID-19 or similar situations in the future. HoloLens's and other similar software's or gadgets need more development and data before those can be totally replace expert QC inspectors at the workshops and minimize the travelling on QC purposes.

6 DISCUSSION

It can be summarized that World was not ready for this kind of worldwide catastrophe. It should be learned from the past already that humankind is not above the nature. Similar kind of catastrophes has happened and most probably will happen again. Nowadays it is impossible to keep these only on one or few countries problems. Now after the World opens again for travelling the next possible similar virus or catastrophe will spread if every country do not follow the rules and inform each other honestly.

Chart 1 indicates that the most vulnerable for the COVID-19 was old people and people who had some other diseases. Chart 1 do not indicate does those how died on COVID-19 have some other diseases or illnesses what may cause them to die. This is also on line that every country set more restrictions to older population to protect them more that the younger ones. Without those protection actions, COVID-19 numbers can be more unpleasant.

CHART 1. Number of COVID-19 deaths in Sweden in 2020 by age groups. (Statista 2020.)



Every country should learn in the future to protect those who are vulnerable position because of the age or some other medical reason. Most countries are already taken this in count on their vaccine schedules. Every country the health care personals are first one to get vaccines and after that the other groups what are in most need of the vaccine. According to numbers of deaths, this is the correct way to do population vaccinations.

In the future, it should be clear how to act in similar situation around the World on QC workshop inspections. We are vulnerable if governments / countries set up restrictions and same time must be ensured that all the QC inspectors are facing similar rights and regulations not depending about the situation where they are and what they are doing there. Safety is the priority number one for all the people. Instruction will cover that part and help QC inspectors to make decisions and act as Client wants.

Unfortunately, COVID-19 is already mutated to new virus disease. It is not clear now how effective the new vaccines are for the mutated COVID-19 virus. We will see that in the near future after all the population is vaccinated. In the official information about the vaccine schedule all people should be have vaccinated by the end of year 2021 depending of a country. However, time has already shown that almost all of the countries are already late of their vaccination schedule. Most probably, COVID-19 is part of our "normal" life until all the people have been vaccinated against the COVID-19 virus.

7 SUMMARY

On thesis, first the purpose is to create description what had happened and after that create the instruction how to react in the future. Outcome of the thesis is accurate general instruction for Client how to act in the future. Because of the non-disclosure agreement, instruction for QC Inspectors cannot be part of this thesis.

Thesis empirical phase and the interviews can give good point of view about the real COVID-19 situation on different experts' point of view. From the answers got on interview it is possible to Client to see and if needed deeper analyze what are the most critical errors what had happened on COVID-19 crisis.

On thesis, there are two parts. Empirical part was first important part because there was not any reliable information available at the theory part. All the available information was changing in the beginning continuously and even the WHO and similar government organization did not have clear point of view. Handling of the COVID-19 and COVID-19 information shows how vulnerable the World was at COVID-19 situation. Second important part is general instruction what was based on empirical part.

It was surprise to see that almost all of the interviewee has faced the same problems or similar type of the problems and common understanding that there was blind spot on their companies how to handle these kind of unexpected threats.

Instruction is the outcome of the thesis and will be put in use on Client organization at least on local level. Instruction will be checked always together with new QC inspectors before sending them to different locations around the World.

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APPENDIX 1: INTERVIEW QUESTIONS

COVID-19 vaikutus soodakattilan valmistajan näkökulmasta maailmanlaajuisesti konepajatar- kastuksiin

Haastateltava:

Tehtävänimike:

Päiväys: XX.XX.2020

Työnantaja:

Haastattelija: Tuomas Lappalainen

Paikka: Microsoft Teams, Varkaus

1. Esittelyt ja kertomus opparista ja miksi ollaan käymässä tätä haastattelua.
 - a. Yleisesti Koronasta (alkuaika, alkupaikka)
 - b. Leviäminen
 - c. Matkustusrajoitukset
 - d. Lentojen rajoitukset
2. Milloin COVID-19 alkoi vaikuttaa omaan työhön ja elämään ja kuinka on vaikuttanut.
3. Milloin oman organisaation ensimmäiset reagoinnit ja linjanvedot.
4. Organisaation reagoitien ja linjanvetojen vaikutus omaan työhön.
5. Oletteko olleet yhteydessä konepajoille COVID-19 aikaan (lähinnä tarkastajiin).
6. Tunnetko ketään COVID-19 sairastunutta.
7. Minkälainen käsitys mediasta saatuun tietoon.
8. Kiinan rajoitukset
 - a. Vaikutus omaan työhön
 - b. Miten rajoitukset vaikuttivat alussa
 - c. Miten rajoitukset vaikuttivat aikana
 - d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)
9. Aasian rajoitukset
 - a. Vaikutus omaan työhön
 - b. Miten rajoitukset vaikuttivat alussa
 - c. Miten rajoitukset vaikuttivat aikana
 - d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)
10. Suomen rajoitukset
 - a. Vaikutus omaan työhön
 - b. Miten rajoitukset vaikuttivat alussa
 - c. Miten rajoitukset vaikuttivat aikana
 - d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)

11. Euroopan rajoitukset

- a. Vaikutus omaan työhön
- b. Miten rajoitukset vaikuttivat alussa
- c. Miten rajoitukset vaikuttivat aikana
- d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)

12. Intian rajoitukset

- a. Vaikutus omaan työhön
- b. Miten rajoitukset vaikuttivat alussa
- c. Miten rajoitukset vaikuttivat aikana
- d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)

13. Pohjois- ja Etelä-Amerikan rajoitukset

- a. Vaikutus omaan työhön
- b. Miten rajoitukset vaikuttivat alussa
- c. Miten rajoitukset vaikuttivat aikana
- d. Miten rajoitukset vaikuttivat, kun tilanne alkoi palautua normaaliin (Karanteenit huomioiden)

14. Mitä mieltä olet Suomen COVID-19 linja (vertaa esim. Ruotsiin).

15. Milloin arvelet, että maailmalla konepajavalmistus palaa "normaaliin"

16. Mielestäsi jättääkö COVID-19 minkälaisia vaikutuksia tulevaan.

17. Mitkä mielestäsi olivat työnantajan oikeat ja väärät ratkaisut COVID-19 aikana.

18. Yleinen pohdinta COVID-19.