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CONCEPT OF INTERNATIONAL LABOUR SOURCING IN INDUSTRIAL MAINTENANCE AND INSTALLATIONS

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Abstract		
<p>In the industrial companies, the outsourcing of maintenance, repair and overhaul resources are increasing, while the companies are focusing on their core functions. The purpose of this research was to find a long-term profitable international business concept for this discovered business opportunity. The focus of the study was in hourly based resources, not, e.g. fixed price total outsourcing services or investment projects. For the success of the study, two objectives were selected. Firstly, in what way the service should function to add value to the international customer. Secondly, what is included in the business solution proposal between parties to benefit all participants in the transaction.</p> <p>The research was executed as action research, where the commissioning company was actively present. The conceptual basis was approached via the customer perspective because the business concept created needed to be long-term beneficial also for the customer. The primary data collection included three sources; secondary data from the commissioning company, a questionnaire for maintenance experts and theme interviews for selected five professionals, mainly the current customers of the commissioning company. These data were analysed individually with qualitative methods, steered with the research question and limitations of the research. Consequently, the analysed data were integrated into a single business concept proposal constructed from the customer point of view.</p> <p>The key findings were combined with a single business concept proposal for the research question. This result was a tangible concept, which can be tested and utilised in the Nordic industrial market areas. Surprisingly, the supplier role should be a tactical partnership and closer to strategic than operational, where the status would be a key supplier to the customer. Therefore, the concept requires a frame agreement to achieve its purpose. Besides, the findings indicated that a web-based tool for offering external MRO resources is a wanted solution for current needs. The created business concept was evaluated to apply to the commissioning company and others working in a similar field of business.</p>		
Keywords		
External MRO, outsourcing, business concept		

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1 INTRODUCTION

The market field of this research is international industrial maintenance services. In specifics, the research focuses on developing a business concept of offering external labour to industrial maintenance related projects or services. Introduction to research is divided into six subchapters. The first section is providing basic background information on the study and selection of the subject. The second section addresses the aim, objectives and the research question of the research, and is providing information about what the research is focusing on. Following that, the structure of the thesis is illustrated and explained to help the reader comprehend the idea of the structure. The research structure is followed by research methods, which opens the methods selected in this research. The last section of the introduction chapter is providing basic information from the commissioning company and the existing web-based tool designed for the offering concept's platform.

1.1 Research background

In this research maintenance, repair and overhaul is regarded shortly as MRO. Cambridge Dictionary (2020a, 2020b, 2020c) considers all these three verbs to be very similar to each other and in industry these all mean some sort of repairing or maintaining production process equipment. All these verbs have a distinguish meaning, however, in this research there is no need to go deeper into semantics, nonetheless an overall understanding about MRO is required.

In MRO and industrial installation service field, a change of increasing outsourcing is happening (Putkiranta 2014). Companies are outsourcing their maintenance and project coordination tasks increasingly to focus on their core processes and to release capital to productive activities (Putkiranta 2014). Other reasons for external labour usage are, according to Elomaa (2011, 15-16), the temporary nature of the work and the work require special skills like pressurized pipe welding. This change, along with the rise of salaries and inflexibility of local labour has resulted in a state where demand for external MRO employees is rising (Okkonen 2019). At the same time, Finnish maintenance workers are getting older and simultaneously young people in Finland are interested in office worker positions and commonly less interested

in works outside the comfortable office (Vesanen et al. 2013). Also, the average age in Finland is rising concurrently (Tilastokeskus 2019). Therefore, demand has caused a situation where labour is searched abroad, mainly from lower salary level countries in Europe (Okkonen 2019). Likewise, a similar change has been active in other developed countries, for example, in Sweden and Germany (Taylor & Greenlaw no date).

The acknowledged opportunity in the field of maintenance is providing a business opportunity for companies to efficiently offer a lower cost, adequate skilled maintenance labour to industrial companies and installation projects (Okkonen 2019). Usually, these described workers come from Eastern Europe to Nordic and Western Europe countries (Okkonen 2019). When there is a method of bringing industrial companies and available skilled workers together, and there is a need for extra labour, a provider of this service can benefit drastically. A provider for this service is needed because the demand is rarely full-time in one place.

The idea in this research is to find a concept to fill the acknowledged business opportunity with a web-based service to be offered mainly to commissioning the company's existing customers, especially in Nordic countries at the first stage. A platform for this service exists. Thus, that matter will not be included in the research. Rather, the objective is to figure out how to bring labour providers and highly developed countries' industrial and OEM companies together. The targeted labour is in the first instance from Eastern EU countries because it is less effortful to move labour from an EU country to another (Berkut 2020). Besides, workers from EU countries are more likely to have needed EN standard approvals regarding required skills, in welding for example. Another objective is to explore what is the suitable business model for this type of service and how to make it profitable for the provider in the long run. The target is to offer labour, not supervision or take responsibility for the outsourced maintenance area, also, whether lean methods can be utilised to make the model efficiently attractive. In addition, marketing actions are not in focus; however, contractual matters are considered to some extent. The reason is that the business concept is confidently highly dependable on solid agreements.

Described service will be offered for preventive maintenance and investment project installation duties. The service is supposedly mainly hourly based transactions, and no fixed price project works with materials and broader responsibilities are in the preliminary scope. The main reason for market scope limitation is that foreign labour cannot easily be tied to long contracts. Additionally, the commissioning company rather uses internal employees to longer-term services to keep the expertise inside the company and be able to serve the customers with shorted lead times. Regarding the scale of professionals offered, expert professional services are limited from the scope. The reason is that demands are different for that type of labour and specific by an industry field. Also, when the offering scope is limited, it should be easier to comprehend and utilise at the first stage.

1.2 Aim, objectives and research question

The aim of this research is to find a long-term profitable international business concept for offering external labour to customers. For this reason, the two objectives are needed. Firstly, in what way the service should function to add value to the international customer. Secondly, what is included in the business solution proposal between parties to benefit all participants in the transaction. The second objective is the processes in an international scale; therefore, national jurisdiction is not considered.

The main question for guiding the thesis process is *“how the business concept needs to be constructed to add value for the customer acquiring external maintenance resources from abroad via the web-based tool”*. The key purpose is to add value for the customer with a business model linked with a web-based tool that is financially beneficial for the provider of the service. This question is particularly the baseline for literary reviews, questionnaire templates, interviews and result evaluations. The conclusion of the thesis is thereafter providing responses if the question is answered during the research, or should there be other researches to be conducted.

1.3 Structure of the research

Ghuri et al. (1995, 54) state that research design provide a framework for research for collecting, analysing and prioritising the data. The framework and

design, along with the structure of this research, is illustrated in Figure 1. The theoretical framework is used to limit the scope and to simplify the structure and design of the thesis, and it is not something that can be found readily available (Sacred Heart University Library 2020).

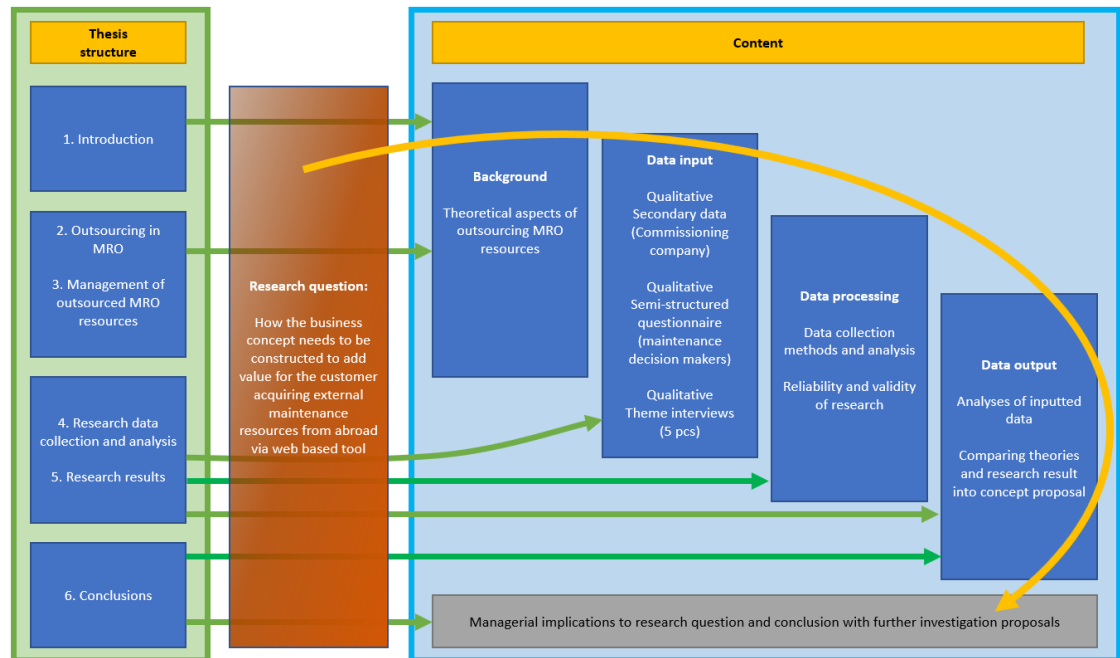


Figure 1. Structure and theoretical framework of the research

In Figure 1 is shown the structure of the thesis that is divided into six chapters: introduction, outsourcing in MRO, management of the outsourced MRO resources, research methodology, research results, and conclusions. The content of the study is steered with the research question. The content includes four main sections: background, data input, data processing and data output.

Additionally, no researches from a similar subject are to be found in the aspect of Nordic countries. Therefore, the background information is gathered from various sources and is processed through guiding elements (e.g. scope and question) of this research. The most related researched aspect is about outsourcing in maintenance functions in general. An hourly priced external resource and offering these services is a new concept for research; however, according to Räisänen (2019) as a service, it has existed for decades.

The background section is about the theoretical aspects of the research subject and the used web-based tool together with the review of the

commissioning company. The literature review in Chapter 2. is from the customer point of view. It is mainly focusing on the background and to find out whether there exists a demand for outsourced MRO resources and from what aspects the business concept should be constructed. The aspect is dealt with from strategical and financial points of view. The theoretical information from Chapter 3 is also strongly from the customer perspective because of the research question. It is partly the background information, but it is mostly exploited in the data input section.

The data input section includes data from the secondary sources, the research questionnaire and the interviews. In the data collection, the learnings of Chapter 3 are used to specify the data need. In data processing, the results formed and presented with reliability and validity evaluation. The last section is the data output, where inputted data is analysed and compared with conceptual basis reviews. This section is followed in the conclusion chapter, where key findings are presented, answers to research question are evaluated together with managerial implications and further investigation proposals.

1.4 Research methods

The fundamental principle in all academic researches is that the researcher is aiming for logical and objective argumentation by founding it on data analysis and findings over subjective preferences (Alasuutari 2011, 32). This research is action research, which utilises qualitative methods. This means that analysis methods are more complex than only statistical analysis (Alasuutari 2011, 33). Data collection methods in qualitative research are commonly interviews, observations and questionnaires (Kananen 2009, 60-61). These methods are also conventional in action-based research (Kananen 2009, 60-61). In action-based research, according to Alasuutari (2011, 32–33), there can exist both qualitative and quantitative analysis. In many cases, quantitative analysis can be interpreted as the continuum of qualitative analysis, not the opposite (Alasuutari 2011, 32). The basic principle in qualitative analysis is absolute of the observations: rules that are invariably valid for all the data must be formed out from single findings (Alasuutari 2011, 191). In opposite, a quantitative analysis can be used to find a representative

group from the basic group that can be applicable to the findings (Alasuutari 2011, 37).

The action research method, or action-based research method, is a pragmatic approach to research question targeting to find a tangible solution particular to a business case by exploring theory concerning practice. The process behind the action research method is explained in Figure 2. (Eden & Ackerman 2018.)

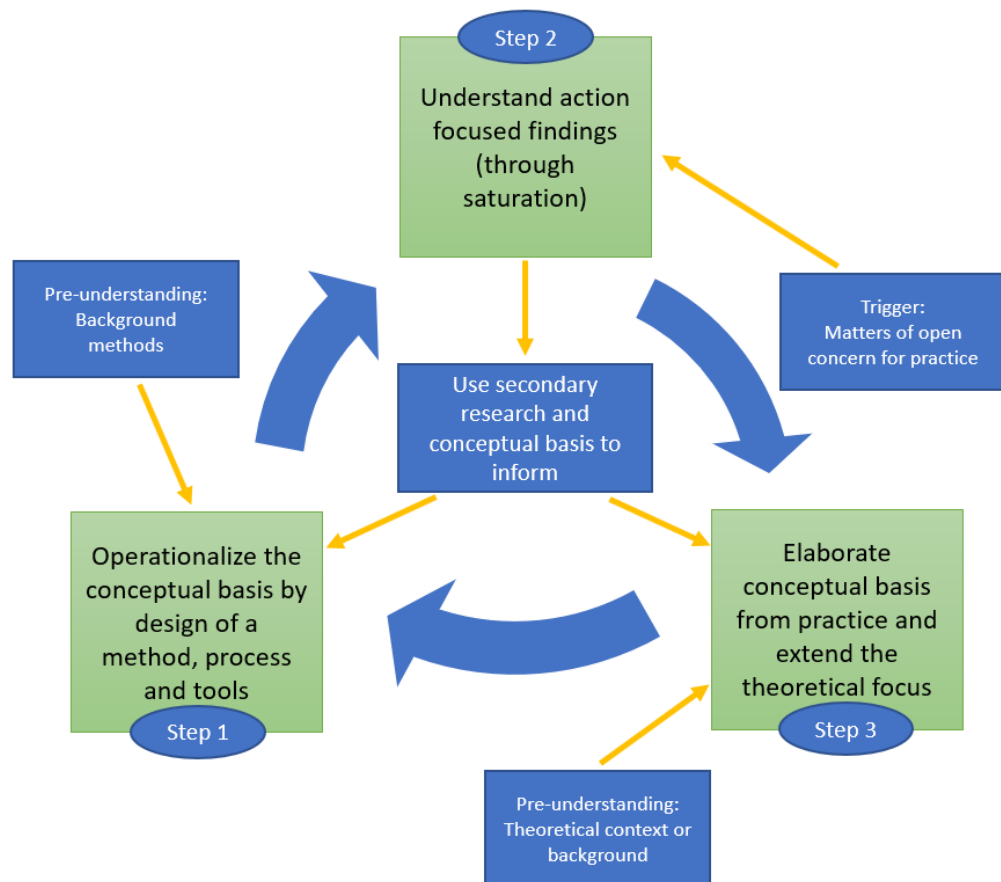


Figure 2. Action research cycle process (Adaptation of Eden & Ackerman 2018)

Action research starts from pre-understanding the subject which is triggered from the practical needs of an organisation. This trigger influenced the on-going process when understanding about action-focused findings expands. Figure 2 is illustrating this process and in the figure exists three main steps that are applied to some extent in this research. The first step is to operationalise the conceptual basis by the design of method, process and tool. The second step is to understand action focused on findings from data collection and literature reviews. Besides, the third step is to develop a

conceptual basis, which is in this research the concrete business concept proposal for the commissioning company.

Theme interview is often the selected data collection method when the subject is sensitive, or the ambition is to increase knowledge about less familiar and known matters (Metsämuuronen 2005, 226). Moreover, the theme interview is a suitable method when it is unknown what answers are resulting, or when the answer is based entirely on respondents' subjective experience or like in this research; there is a need to deepen the knowledge from the subject (Hirsjärvi & Hurme 2000, 35). The interview also generates a clear benefit compared with, for example, the questionnaire to be certain who is providing the desired information (LoBiondo et al. 2002, 303).

In this research, a questionnaire for subject market field experts is executed to gain more profound knowledge about the research question. Subsequently, this information is utilised to form themes for interviews. Afterwards, theme interviews are executed to commissioning the company's existing customers in Finland and Sweden and complimented with existing data from the commissioning company's annual overhaul questionnaires to maintenance decisionmakers from two previous years. This method limits the generalisability of the research findings because of the context-dependency of the researched subject (Tuomi & Sarajärvi 2018, 28-30). Also, the number of interviews is limited to five people because according to Kylmä et al. (2003, 610) in action research too many people interviewed may damage the possibility to gain meaningful from the subject. At the end of the study, the action research method is utilised to form a tangible concept proposition from the earlier findings compared with the research question.

1.5 Commissioning company

The presentation of the commissioning company of this research is made to comprehend the triggering matters and the background of the research for the action research cycle process illustrated in Figure 2. The presentation is formed by interviewing two long term key members of the company. Contents of these interviews are presented in Appendix 1 and Appendix 2. Besides, the

interviews are complemented with other relative information gained from the company and other reliable sources.

Elcoline Group is a Finnish limited company founded in 2002, and its market field is industrial installations and maintenance. Its customers are international industrial companies that act in industry fields like marine, petrochemicals, chemistry, forest, energy, nuclear power plants, construction and traffic. The company employs around 300 installation and maintenance professionals in its contractual locations globally, mainly in Finland. Elcoline Group differentiates from its competitors via extensive service offering, a functional customer-focused service and business supporting digital solutions. (Räisänen 2019).

Räisänen (2019) states that the company has currently five operational subsidiaries; Elcoline Oy (electrical), Elcoline Plant Service Oy (mechanical and projects), Elcoline Construction Oy (electrical, HVAC and design), Elcoline Piping Oy (piping and welding) and SVS Supervise Service Oy (boilers and piping installations and manufacturing). The company has seven permanent office locations in Finland and one in Sweden (Räisänen 2019).

Elcoline Group Oy's accounting periods have been profitable, and the company has been awarded many acknowledgements for its progress. For example, nationwide entrepreneur award in 2018 and Nuclear safety award in 2011 as the first Finnish company to receive it. According to Räisänen (2019), the company has analysed the global market field it is functioning in and concludes that a service provider needs to be able to offer higher service volumes and in the industry-wide offering. Elcoline Group's progressive vision is illustrated in Figure 3, which was made in 2018.

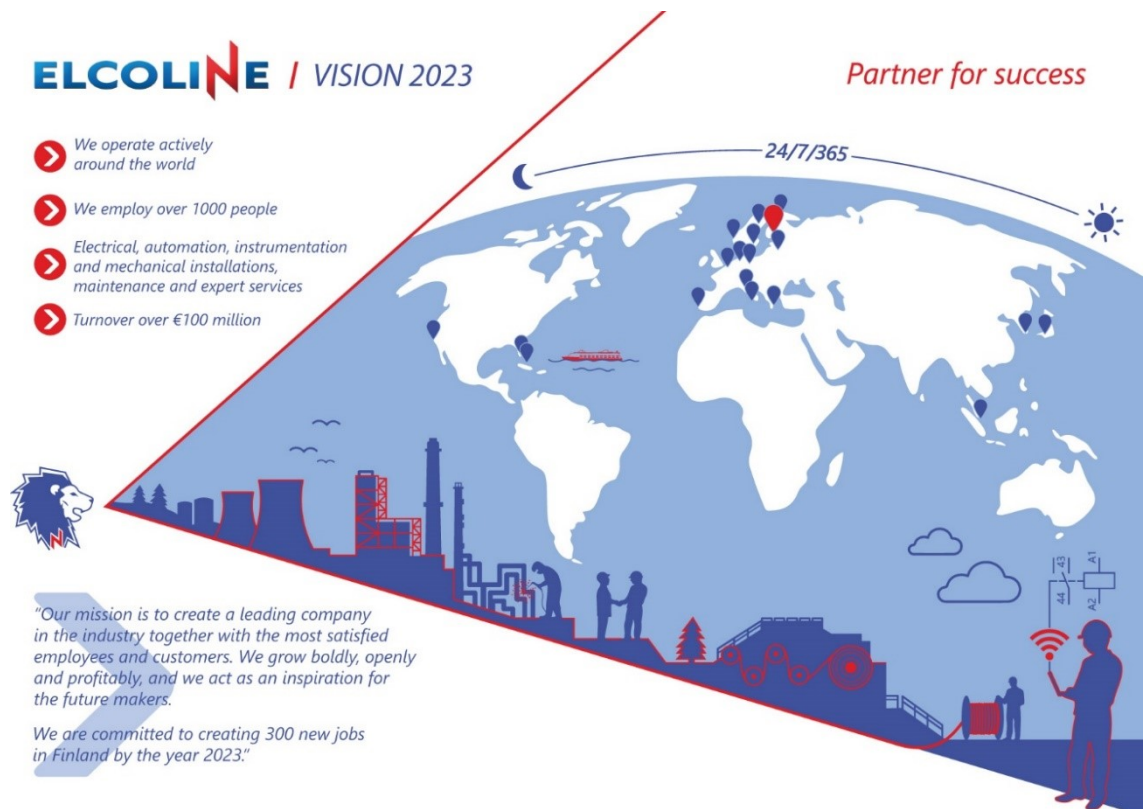


Figure 3. Elcoline vision 2013 (Räsänen 2019)

According to Elcoline Group Oy's progressive vision presented in Figure 3, the industry-wide service model will revolutionise the market field, and long-term thriving companies must progress as forerunners in this development. This can be stated to be a key driver of the vision and strategical process and in an academic sense to be the central hypothesis. Part of the company's vision 2013 is to be a forerunner and developer of its market field and act as a role model for many competitors. Thus, Elcoline Group Oy has already launched projects toward this vision, and first customer signals are confirming this hypothesis made in the strategic process. (Räsänen 2019)

Elcoline Group Oy is implementing its new strategy and growing rapidly. For example, the company's CFO estimates that turnover for 2019 will be over 30 million euro, which means around 50 per cent growth in one year (Räsänen 2019). Budgeted turnover for 2020 is over 40 million euro (Räsänen 2019). Demonstrated by Räsänen (2019) and Peltonen (2019), the strategy was developed by analysing customer researches, industry change trends and megatrends. Furthermore, the growth potential is to be generated from the customers' needs (Peltonen 2019). The focus is on their procurement in industrial installation and maintenance works to larger and industry-wide

service providers (Peltonen 2019). As the size of a company grows, it can place significant efforts to improve and develop its existing and new services and, to continuous training of its employees (Peltonen 2019). One focus area for this strategy is to develop digital services for the customers, and, therefore, this thesis is commissioned.

As Räisänen (2019) emphasises, especially OEM manufacturers (original equipment manufacturer) and service providers are using heavily outsourced MRO resources in energy field industry, mostly in installations, but also in their workshops. These resources are mostly used in situations where internal capacity is not enough to fulfil market demands (Räisänen 2019). Räisänen (2019) listed a few of these global OEM companies, like Valmet, Sumitomo and Andritz. Therefore, these companies' decision-makers are a target group for the research data collection.


Existing web-based tool. The commissioning company, Elcoline Group Oy, has an existing web-based tool developed earlier to be utilised in this research. The tool is called ReFlow, and it was tailored to Elcoline by Gambit Group Oy in 2017. The tool has been tested to be functioning in most used web browsers, as in Firefox, Chrome and Edge. The basic layout of the tool is presented in Figure 4. The tool was not launched for commercial use, because the feeling was that customers might not be ready for the technology, and Elcoline Group Oy had several acquisitions on-going, consuming available time resources. (Räisänen 2019.)

ReFlow
A search and booking system for human resources in industrial projects

🔍 Employee search

📅 My bookings

🚪 Logout



Find the most suitable service technician for your project by filling out the search criteria below.

Work field
Mechanical Maintenance / Installation

Type of project
☐ New Build ☒ Maintenance

Work area
Pipe welder

Work experience
3 years

Language skills
English, Swedish

Courses
Työturvallisuuskurssi, Tulityöturvallisuus kurssi, EA1

Project duration

Start date

📅 Invalid date

Invalid date

📅 Invalid date

SEARCH

Figure 4. ReFlow - web-based tool demonstration

The basic information about the tool is presented in Figure 4. The tool is easy to use and simple to navigate. On the left side is Employee search, which opens a view on the right side of the window that is visible in Figure 4. There is also an option to go through orderings already made and to modify those. The logout option is the third one. In the employee search window, a customer can specify the kind of labour needed, the competencies, the timeline and the kind of project. Afterwards, as the labour search specifications are done, the tool proposes available workers suitable for the demanded task. Because of customer demands, language and courses are mandatory fields. Preliminary customer feedback from 2017 was highly positive to have a tool like this available. (Räisänen 2019.)

1.6 Limitations

This research concerns outsourcing, however, inside outsourcing there occur several levels of outsourcing from strategical partnership to one-time purchase for an explicit choir (Kiiskinen et al. 2002, 121-129). To clarify the situation the focus of the research is between tactical and operative outsourcing and one

background aim of the research is to figure out how close to tactical outsourcing partnership is possible to get with this business concept. The outsourcing partnership four-field is presented in Figure 5.

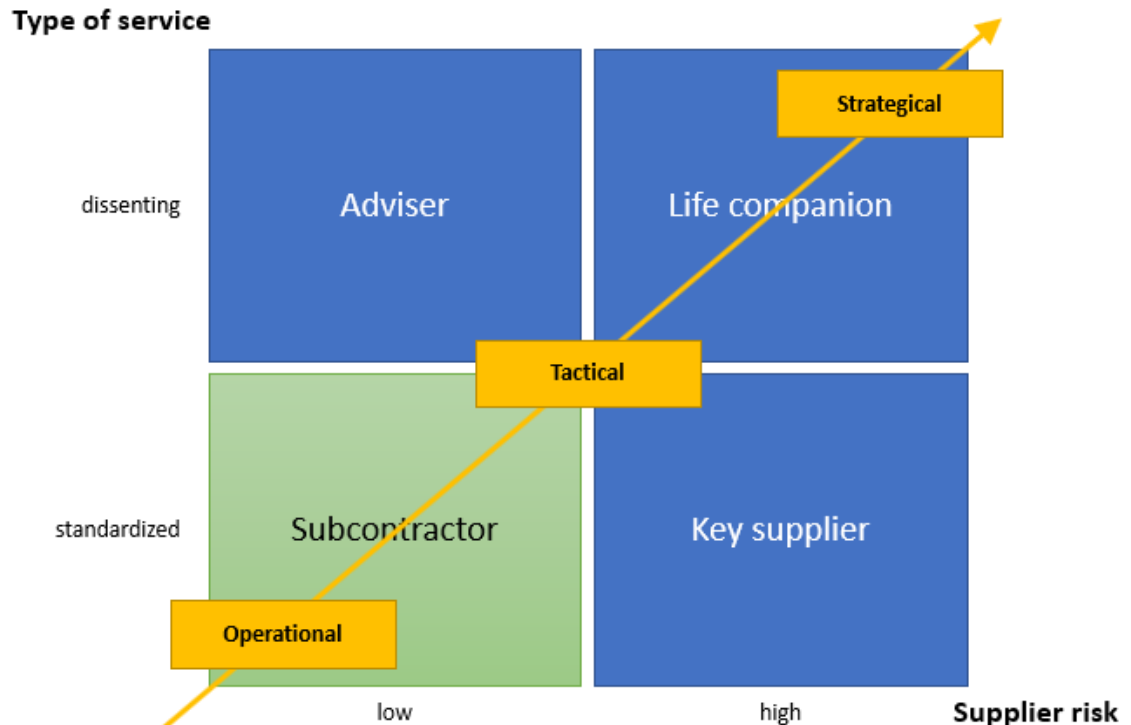


Figure 5. Type of outsourcing partnership (Adaption to Kiiskinen et al. 2002, 122)

Figure 5 illustrates how an outsourcing partnership moves from operational to strategical. In an operational partnership, there is a low level of supplier risk, and the service model is highly standardised. In strategical partnership, the supplier risk is high, and the type of service is highly dissenting. A tactical partnership is between these two. The zone between tactical and operational partnership is painted green to clarify that it is limited to be the target zone of the research.

Outsourcing is a procurement process for a company, and according to Benton's (2010, 138) definitions, the procurement of MRO activities is categorised to be indirect procurement. Benton (2010, 138) explains indirect procurement means that procured materials or services are indirectly affecting end-products, and therefore, measuring the actual need is more complex. Focusing on the essential issues, direct procurement is excluded from the scope of this research.

Literary reviews in this research are selected to provide explicit and deeper knowledge about the thesis subject. The selected literature are intended to be limited by the research question to provide information related to that. All the data associated with the chosen market field, industrial MRO, contractual choice variations and options, or about outsourcing, in general, are not included. Instead, the aim has been to focus on essential matters. Therefore, for example, information about Lean related concept six sigma and value stream mapping has been excluded. In addition, background information about maintenance and different maintenance work categories has not been evaluated nor presented.

2 OUTSOURCING IN MAINTENANCE, REPAIR & OVERHAUL WORK

Kiiskinen et al. (2002, 11-13) clarify, outsourcing is a process where an organisation acquires external services to maintain or operate its process or part of it, and therefore, abandon self-executing. This chapter introduces the conceptual basis of aspects dealt with in this research. The content of this chapter is focusing on the outsourcing aspects of maintenance, repair and overhaul activities in industrial companies, according to limitations set in Chapter 1.6. Subchapters are dividing the content into strategical and financial aspects. Hence, these themes are the root cause of outsourcing in the first place. The need for outsourcing must come from the company's strategy, and it should be financially beneficial. Valvisto (2005, 128-129) explains that when the strategy and principles for outsourcing are clear, then the need and extensity of outsourced resources are well understood.

Järviö and Lehtiö (2012, 34) have noticed that outsourcing is one of the main actions for a company to reduce costs and improve efficiency. Outsourcing is a strategic business decision, which the main drivers are, according to Sanchís-Pedregosa et al. (2014), to improve financial performance, productivity and customer service level. Productivity is commonly defined in a technical-economic way to be a relation between inputs and outputs (Järviö & Lehtiö 2012, 249). Figure 6 is demonstrating how the costs have diverged in Finnish maintenance markets.

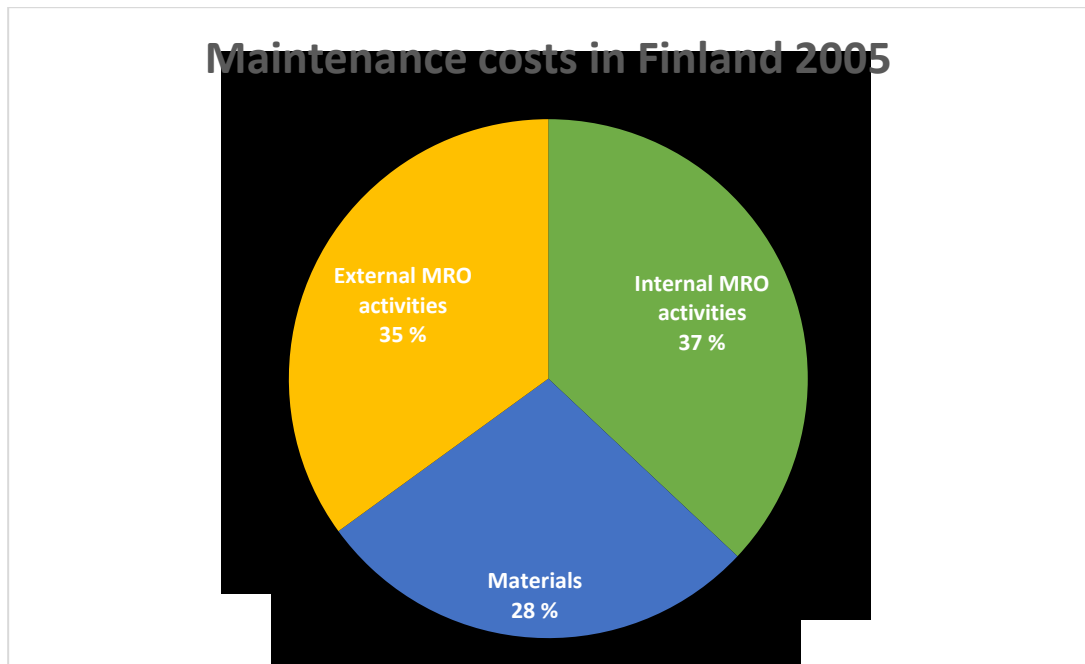


Figure 6. Costs of operations' machinery uphold (Adaptation to Järviö & Lehtiö 2012, 33)

From Figure 6, it can be concluded that there is a clear market potential for outsourcing since over one-third of the overall costs have already been outsourced. Järviö and Lehtiö (2012, 31) are acknowledging that the figure data is somewhat old already. However, they argue that numbers are still relatively representative, because inside the industry there have not been dramatic changes. The reason for external MRO resources costs portion growth is that optimising organisation performance and reduction of internal costs are the main drivers for outsourcing activities (Ghodeswar & Vaidyanathan 2008).

Outsourcing can usually be related to subcontracting and to comprise it as a genre of subcontracting where the basic elements of outsourcing are fulfilled (Kiiha 2002, 1-3). According to Kiiha (2002, 1-3), these basic elements are an internal stoppage of outsourced activities and a contractual relationship with a provider of outsourced services. Baatartogtokh et al. (2018) add, that there is a clear difference between outsourcing and subcontracting or contracting out where in the latter one the level of risk-sharing is lower, and the work is assigned to an external supplier on a work-by-work basis.

The planning stage of outsourcing involves awareness of what and how large of scope activities should be outsourced, together with the service provider's ability to perform these activities (Kiiha 2002, 74-75). Idhammer (2006b)

claims that companies' internal maintenance departments have rarely had actual competition when those usually have a monopoly on the maintenance activities of the production. An external contractor is often treated as a competitor when there is a fear that internal maintenance is not competitive. If this is not the case, and internal maintenance is proved to be competent, consequently, according to Idhammer (2006b), outsourcing of maintenance will not be a beneficial option.

2.1 Strategic aspect in outsourcing maintenance, repair and overhaul work

In the 1990s, the business trend became more aware of cost efficiency and core business focus, which lead to a structural evolution process in industrial business (Järviö & Lehtiö 2012, 198). This development resulted in outsourcing non-core activities like maintenance (Järviö & Lehtiö 2012, 198). Sanchís-Pedregosa et al. (2014) argue that this development into outsourcing non-core activities is because of high levels of competition in the global economy. As a result, the way companies acquire external resources has made business services procurement competence a market competition advantage (Sanchís-Pedregosa et al. 2014). Vesalainen (2010, 32) reminds, a company's business competence denotes the ability of a company to utilise its resources and business must be valuable correspondingly for the customers. Bertolini et al. (2004) add that outsourcing is one strategy for an industrial organisation to develop and increase its competitive advantage in markets.

Traditionally outsourcing MRO activities have been done primarily to reduce labour costs, by reducing headcount. Recently a more strategical approach is emerging, where MRO activities are outsourced to increase expertise and performance in the activities that are non-core for the company and to lower working capital investments and inventory levels. This means outsourcing is seen more often as a partnership solution, not as a one-time work case. For the strategical outsourcing of supplier evaluation, Nora (2017) presents the following three questions to be answered. (Nora 2017.) (1) Which suppliers are delivering late? (2) Who are our critical suppliers? (3) Are we getting the best prices?

With these questions, the outsourcing company can determine its status and negotiate improved agreements. Improvements can be volume incentives to ensure improvement targets are realised from growing the annual spend on specific suppliers and other discounts on prices. The volume can be expanded by using the same suppliers to multiple sites or by reducing the number of suppliers in a specific site, or both at the same time. This progress will also improve the standardisation and consolidation of the supply base, which will affect, for example, risk management of the purchasing company. (Nora 2017.)

When outsourcing maintenance activities in a strategic manner, expected positive outcomes are increased overall labour productivity and management of the fluctuations in the workload, reduced maintenance costs, improved environmental performance, obtained wider specialist skills and higher quality and the ability for internal personnel to focus on core activities (Bertolini et al. 2004). However, in a strategic decision, negative impact possibilities must be taken on the account. Bertolini et al. (2004) list the following five elements to be considered: (1) Internal activity is externalised, causes a reduction in controlling it and learning from it; (2) the loss of knowledge of facility's machinery; (3) possible dependencies on the provider; (4) variations in the quality of the product given to the customer, and (5) challenges among internal personnel, since they handover their functions.

To minimise these negative possibilities and to maximise positive ones, Bertoline et al. (2004) advice proper strategic analysis with feasibility study together with adequate competitive tendering and increasing managerial capabilities in advance to manage the relationship with a provider. Also, after thorough analysis, a possible outcome can be that not all maintenance functions are outsourced and for example, only specialist skills are the area that requires outsourcing to increase competitiveness (Bertoline et al. 2004). Sanchís-Pedregosa et al. (2014) emphasise that the outsourcing of services is considered more complex and difficult than the purchase of materials. For the fifth element, Nora (2017) offers a solution to create a team of stakeholders representing the needs of each team member affected by the activities of outsourcing.

2.2 Financial aspects in outsourcing maintenance, repair and overhaul work

Outsourcing is a business manoeuvre where a company uses an external partner or a service provider to perform duties that used to be in-house operations. Outsourcing became an integral part of business economics from the early 1990s. The financial aspect in outsourcing is to reduce labour costs, including salaries for personnel, equipment, including working capital, overhead and technology investments. Another aspect is that by outsourcing non-core processes or services, the company can gain improved focus on its core business, and therefore, increase overall productivity. (Twin 2019.)

MacInnes and Pearce (2003) demonstrate that a company earning 5 per cent profit on sales will gain equal profit results in saving \$50 000 than increasing sales revenue by \$1 million. Therefore, it is typically more effortless to make profits by minimising the cost structure, as the costs of MRO function (MacInnes & Pearce 2003). The economic meaning of MRO functions is evaluated through its expenses and effects on the loss of production (Mikkonen 2009, 35-37). Often MRO activities are indirect costs to a company (Mikkonen 2009, 35-37). Therefore, identifying functionality mechanisms and overall process structure is necessary to calculate possible benefits and risks related to MRO (Mikkonen 2009, 35-37). Sanchís-Pedregosa et al. (2014) clarify that especially with the larger companies, the cost structure and particularly overhead costs can be significantly more expensive than for a flexible service provider.

When simply viewing recently published average labour cost levels from Eurostat (2020), which are demonstrated in Figure 7, it justifies financially Okkonen's (2019) claims why Nordic companies are purchasing external labour from Eastern Europe for lower labour costs.

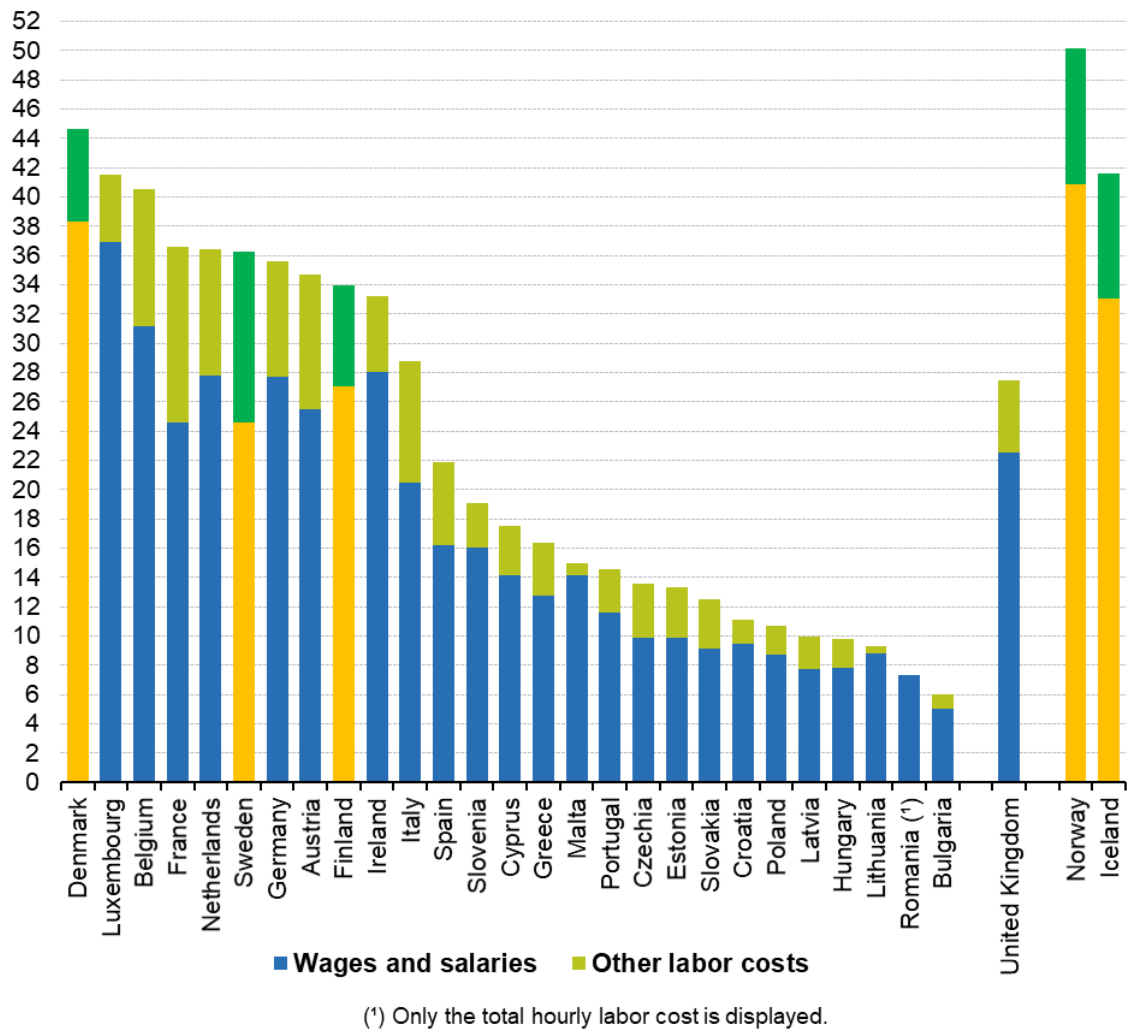


Figure 7. Estimated hourly labour costs, 2019 (Adaptation of Eurostat 2020)

In Figure 7, significant labour cost differences between European Union Member States are emphasised. Other labour costs include expenses like employers' social contributions and are average values from a different type of households. Nordic countries are marked with orange columns, and since Norway and Iceland are not members of the EU, those are shown separately. A notable matter is that not all EU countries have Euro as a currency. Since in Europe there are Schengen Area, which allows citizens to travel and move one Schengen cooperation country to another, this evaluation is limited to Schengen Area, and for example, Asian countries are not in focus (European Commission 2020).

These EU statistics illustrated in Figure 7 are in line with Okkonen's (2019) statement. For example, when a Swedish company temporarily employs a Lithuanian worker, the labour costs should be according to Swedish

regulations (European Commission 2016). However, if the production or other labour activities are moved from Sweden to Lithuania, the labour cost difference will generate savings of 26,9 €/h per worker on average, when the average labour cost in Sweden is 36,3 €/h and in Lithuania, it is only 9,4 €/h. This drastic difference between cost levels makes it lucrative to offer minimum wages to the Lithuanian temporary worker, and it still would be beneficial for the worker from another EU country. This situation will generate savings for the outsourcing company, especially when other outsourcing costs are not considered, like accommodation and travel. (Eurostat 2020.)

Patel (2017) reminds that outsourcing can be a beneficial option when the business demand is unlevelled, or according to Elomaa (2011, 15-16), the work nature is temporary or seasonal. Therefore, using outsourced personnel for a short time period can create cost savings, when the company is not forced to employ internal staff and to train them and possibly to cut labour after the business peak is over (Patel 2017). Related to this subject, Patel (2017) offers another benefit, access to a larger pool of talent and lower salaries. When using outsourced resources, a company can hire talents from a lot wider distance, or even from abroad to perform the duties required with less salary than with using local resources (Patel 2017). This is an especially relevant topic in the field of MRO where, for example, welders are brought to Finland from Poland and Baltic countries (Okkonen 2019). MRO costs differentiate in different industry and can even be the single highest expense item in the operational function's budget (Dekker 1996, 229).

Furthermore, when utilising outsourced labour resources, a company can gain decreased hiring expenses, less legal encumbrances, fewer financial strings, and reduced overhead costs (Knolmayer 2002). Thus, when these factors are not considered the study of Sanchís-Pedregosa et al. (2014) illustrated that no high labour cost or productivity improvements could be expected with partial outsourcing of activities in comparison with no outsourcing at all. However, to secure productivity with outsourcing, Idhammar (2006) advice to utilise incentives and goals to contract for the contractor to continuously perform better. Also, for outsourced service, without incentives, the more hours contractor sells, the more turnover they make, and the contractor can sell more hours if a subscribing company's maintenance needs are reactive.

Mostly the fear of losing the contract or an agreement will motivate the contractor to increase performance level continuously (Idhammar 2006).

3 MANAGEMENT OF OUTSOURCED MAINTENANCE, REPAIR & OVERHAUL RESOURCES

The conceptual basis of managing outsourced resources, especially in MRO business field, is concerned in this chapter. The content is based on literature reviews on the chapter's subject. The point of view is essential to determine a management proposal for the business concept suitable for offering outsourced MRO resources sustainably and profitably. The steering element is the research question, which is used to limit the literature research. The findings will be used evaluating the results from data collection and to combine business concept proposal. The chapter is divided into three aspects which are its subchapters. The aspects are risk management, lean and management of outsourced MRO resources. Risk management is an essential aspect to clarify the risks related to the business concept, and Lean is selected to provide additional value for the business solution. The last subchapter is focusing on the daily management issues related to outsourcing activities.

Concrete actions on MRO outsourcing should be based on company targets and defined strategy (Mikkonen 2009, 26). Sedeffine (2003, 9) reminds, besides organisational targets, should machine and equipment structure, personnel skills and experience, spare parts, tools, failure rates, failure and repairing history and average repairing and service times to be taken account, when defining the basic organisational duties of maintenance. Based on this planning, it can be beneficial to consider outsourcing MRO functions or parts of it. In summary, there should exist both operational and strategical evaluations before the decision. A service provider can offer assistance in this process by clearly stating its offering with references.

3.1 Risk management of outsourced resources

The aim for risk management is to minimise threats, maximise opportunities, and optimise organisational objectives, in other words, to ensure operational continuity. Furthermore, the target is to support decision making by providing

a perspective over a single risk and the overall risk exposure for the organisation. In operative risk management, the organisation possess a solid foundation that ensures risks to be properly identified, assessed and controlled. Risk management limits the consequences of threats that occur and can proactively identify possibilities to utilise. Therefore, it is improbable that an organisation will thrive without adequate risk management, and risk management will become a critical success factor for the organisation. (ISO 31000:2009. 2009.)

Operational risks. From an operational point of view, in outsourcing, according to Kiiskinen et al. (2002, 94), acknowledged central risks that jeopardise the successful outcome are the following four: (1) outsourced resources are not flexible enough to evolving business demands, (2) over-dependence on the service provider, (3) costs are higher than anticipated, and (4) internal resistance.

All these four elements require thorough analyses before the selection and change management when implementing (Kiiskinen et al. 2002, 94-97). Particularly, internal resistance can decrease overall productivity when employees feel their capability undervalued and their position in future insecure. Open communication during the outsourcing process is an essential success factor (Kiiskinen et al. 2002, 94-99). Moreover, Sanchís-Pedregosa et al. (2014) demonstrated in the results of their study that partial outsourcing of services will not increase or lower the level of productivity. According to Sanchís-Pedregosa et al. (2014), this might be because of higher monitoring costs.

Baartartogtokh et al. (2018) complement statements presented above with concrete risks listed here in order of precedence: (1) quality control challenges, (2) disruptions and delays, (3) neglecting safety, health and environmental standards.

These three elements can be reduced with proper coordination of outsourced resources. A notable finding was that not any of these risks were considered severe in Baartartogtokh et al. (2018) study. However, these elements are surely part of the key performance indicators for most of the companies in the

industrial markets. Also, these three risks must be taken on account when developing a business concept for offering external labour to the industrial market field.

Responsibility risks. Regarding risk management of an outsourcing company, a crucial aspect is the responsibility of a supplier. Nowadays, corporations are more aware of their public image and responsibility of their actions and supply chain management is directly linked to that (Porter & Kramer 2019). Porter and Kramer (2019) remind, recently companies have been outsourcing for lower salary level reasons. This change has resulted in deviations to quality and lack of continuous improvement in productivity (Porter & Kramer 2019). Therefore, the contractor's liability from the aspect of a supplier has become regulated in the jurisdiction at EU level, at least for governments (European Commission 2016).

In Finland, there is national jurisdiction (the Subscriber Liability Act) for the supplier responsibility matter, where companies must ensure that contractors and subcontractors fulfil their statutory payment obligations (TEM 2018). This Act seeks to promote fair competition between companies and compliance with working conditions (TEM 2018). For example, in Sweden, there exists no national jurisdiction for this kind of regulation; however, it is done between the social partners' agreements (TEM 2014). For a company offering service of external labour, this means for example, that company must ensure salaries are in line compared with national levels and the company has paid its taxes. If the supplier cannot be regarded as a responsible partner, there is certainly a risk for the purchaser, and that may result that business transactions are not allowed.

Other risk aspects. When outsourcing maintenance activities, that changes the company's functional structure consistently and management requirements, accordingly, outsourcing is a more significant event than just a change (Järviö & Lehtiö 2012, 229). Twin (2019) argues there is a considerable risk in outsourcing, communication between the company, and external service provider can be difficult, and result delays in project completion time and security risks can rise when multiple parties can access to sensitive data. Besides, Johnsen et al. (2014, 42) claim, contracts are in a

key role in avoiding the risks of non-compliance. According to van Weele (2005, 55-56), with a written contract, a company can ensure compliance with warranties and penalty clauses. Especially, in international purchasing, the contract should consider country-specific regulations and jurisdiction, which usually differ between countries. A frame agreement is a possible option for contractual risk management, and content of that is shortly explained in Chapter 3.3.

3.2 Lean in maintenance, repair and overhaul processes

Modig and Åhlstrom (2013, 37-39) explain that in Lean thinking, an essential target is to reduce and eliminate bottlenecks from processes, and therefore, improve the process flow in the value chain. In MRO activities, these bottlenecks can occur, for example, in an investment project, and therefore, the demand for a larger pool of resources are needed. This is where outsourcing solution becomes a valid option instead of postponing the duration time.

Mann (2010, 203-204) emphasises that according to lean principles compensation models must be valued by quality efforts performed, not by time basis. The reason is that Lean thinking aims for productivity and time-based rewarding for just being in the worksite. The same idea can be utilised in the outsourcing concept so that invoicing is not done according to hours spent, but according to value-adding choirs.

In the field of maintenance, lean is often practised with TPM (total productive maintenance) that was developed initially in the Japanese car manufacturing industry (Verne 2020). TPM is a systematic approach to turn nonfunctioning maintenance into an efficient system to become a word-class level performer (Järviö & Lehtiö 2012, 114). Concluded by Järviö and Lehtiö (2012, 144) the basic idea of TPM is wrapped around the total principle, which is the following: (1) total efficiency; attempt to the effect that is measurable with financial indicators, (2) total participation; everyone participates, non-failure operations are results from everyone's actions, (3) total coverage; reducing the need for maintenance, repair and overhaul by changing the structures and the way of working, and with preventive maintenance.

A complementing aspect from Verne (2020) is that TPM aims at four no targets: no defects, no breakdowns, no minor stops or slow running and no accidents. This basic “total” idea and TPM targets are linked to the quality elements of outsourced external resources. According to Järviö & Lehtiö (2012, 114), European TPM is combined from four steps: planning, measuring, repairing and top-performing stage.

Planning stage. This stage is about starting the project by planning the execution. A maintenance plan is an essential part of the stage. This plan must take into account all stakeholders affected by activities, directly or indirectly. A subcontractor should be involved in this stage to increase the engagement in later stages. (Järviö & Lehtiö 2012, 114.)

Measuring stage. In the measuring stage, existing maintenance-related, and operational data is collected and evaluated. This data is mainly, production stops, machine failures and repairing history. This data is afterwards critically analysed, and the result should be a couple of subjects for immediate improvement actions. It is crucial not to select too many subjects to maintain the creditability of the project. For this stage, the subcontractor can provide assistant by collecting the data and pointing out subjects that stress the workload most. Also, valuable information is that what kind of repairs have been done previously. (Järviö & Lehtiö 2012, 115.)

Repairing stage. The repairing stage is where most of the visible actions are made to improve the overall maintenance performance. The stage is divided into five phases of 5S model: Seiri/Sorting, Seiton/Set in order, Seiso/Shine, Seiketsu/Standardise, Shitsuke/Sustain. A subcontractor can participate in all these stages, dependent on how the assets management desires subcontractor takes ownership in the maintenance activities. (Järviö & Lehtiö 2012, 115-119.)

Performing stage. The last stage is about the optimisation of maintenance supporting systems, like outsourcing activities usage planning, and to decide a proper key performance indicator system for controlling and improving the overall performance. The last step in this stage is to actively minimise the

need for maintenance activities. This can be achieved with activity planning and machine design re-engineering. In both cases, a subcontractor can provide valuable information for the customer company. (Järviö & Lehtiö 2012, 119-120.)

3.3 Outsourced resources management

Outsourced resource management is a part of the supplier management theme. The Pareto rule can often be utilised in supplier management, where 20 per cent of the suppliers are worth 80 per cent of the full outsourced value. Therefore, relationship management should not focus on random suppliers. Instead, the focus should be on key suppliers and partners, and the management should be systematic and careful. It is common that a company will dedicate an employee responsible for the key supplier relationship and therefore responsible for steering the performance. When managing outsourced MRO resources, this employee title is often Asset manager. The most important matter is that all internal stakeholders, like production, maintenance, product development, mutually understand the role and purpose of a key supplier. (Logistiikanmaailma 2019.)

One contractual option for managing co-operation of outsourcing business solution considered in this research is a frame agreement, or in other words, framework agreement. According to Sherman (2019), framework agreement dictates terms for procurement contracts over a given period that can last numerous years. The agreement determines several aspects to simplify suppliers and purchasers' transactions. These aspects can be the pricing model, technical and quality specifications, payment terms, order quantity levels and delivery time. A purchaser can make this sort of an agreement with a single supplier or with several suppliers. A notable issue is that a framework agreement is not a contract since it does not commit the purchaser to actually purchase; it simply gives the terms of purchase if a transaction is occurring. (Sherman 2019.)

When managing outsourced resources, Kiiskinen et al. (2002, 98-99) emphasise that most common daily challenges are information management, communication failures, and rivalry between outsourced resources providers.

Challenges related to information often occurred because the different interest of the supplier and the provider toward information generated and the provider can access sensitive data, for example, operational cost knowledge.

Communicational challenges can occur if parties have different IT systems and other information technology-related differences. Also, for mutual communication to flourish, it is recommended by Kiiskinen et al. (2002, 99) for the supplier and provider to agree on common targets and regular follow-up meetings and reporting. (Kiiskinen et al. 2002.)

As for common targets between provider and customer, Bertolini et al. (2004) propose measures to the external labour provider performance evaluation process. These proposed key performance indicators are *equipment availability (e.g., MTBF, mean time between failure)*, *on-time performance (e.g., MTTR, mean time to repair)*, *the price per cost*, *safety and environmental performance measures (e.g., number of incidents)*, *work quality per rework*, and *amount of work*.

According to Järviö and Lehtiö (2012, 254) these listed measurements are examples of direct measurements and for instance, overall production productivity, which is an indirect measurement, is not listed. The problematic situation with overall production productivity as a measurement to outsourced service is that it is difficult to determine whether the improvement is caused by the service provider or something else. Therefore, it is justified to focus on direct measurements with the business service concept considered in this research.

4 DATA COLLECTION AND DATA ANALYSIS

Academic research produces information, which should be justified, critical, public and collected with determined methods (Järventausta et al. 1998, 12). Premises for the research are usually a systematic suspicion toward the research subject or to gain knowledge for determining purpose, typically for business use (Tuomi 2007, 10). Researches are divided into different categories based on their purpose; academic researchers are basic researches, applied researches and scientific development projects (Järventausta et al. 1998, 18). The foundation for every research is the

researcher's knowledge of research question the information is gathered for (Heikkilä 2008, 47).

The theoretical framework of this research was demonstrated in Figure 1. The framework is defining what kind of data should be collected and what method used for analysing it (Alasuutari 2011, 83). The data collection and data analysis are based on the framework's elements, data input, data processing and data output. The data collected is based on findings from the background review, and that is afterwards processed with selected methods, analysis. Processed data is complemented with reliability and validity evaluations. This gathered information is analysed comparing findings with literature review conclusions to create a business concept proposal.

4.1 Data collection

Hirsjärvi et al. (2013, 81) state that by defining operative limitations to the research, it eases collecting appropriate data for pointing out relevant observations related to the subject. Therefore, research limitations presented in Chapter 1.6 are guiding elements for data collection. Unrelated collected data is not shown in the research.

Research data was collected from existing data from commissioning company (secondary data), from the interviews of specialists, and from the questionnaire, which was formed based on the literature review of this research. In the data collection process, there were several challenges, and probably the major issue was that COVID-19 pandemic occurred during the research process and respondents felt insecure about the future and could not participate in this line of work. Another issue was with especially foreign interviewee candidates. Many initial candidates were reluctant to participate or not inside the proposed time period. The cause might be that they had related development projects ongoing inside their companies. Therefore, the number of interviewees was downsized and not as many located outside Finland. However, since the group size was reduced, the expertise level was increased for the reliability of the research.

Secondary data collection. The commissioner of this research, Elcoline Group Oy, has executed annual questionnaires for Nordic maintenance influencers and decision-makers, mainly from their customer pool, about annual overhaul resource needs. The questionnaires have been distributed via email with an invitation letter to the customers and other business contacts. To deepen this research, two of the latest reports, 2018 and 2019, was selected to provide more in-depth information about the resource needs, especially for overhauls and how those are aligning in the annual calendar. Data sources utilised were the actual reports, and all the user data in spreadsheets, and an interview of a person responsible for constructing the reports. (Elcoline Group Oy 2018 & Elcoline Group Oy 2019.)

Questionnaire data collection. A questionnaire was selected to be the firsthand information collection method to guide the research toward its targets. The questions were selected based on information gathered from the commissioning company and literary review. The questions and groupings are presented in Appendix 4. In the questionnaire, there were 21 questions in total, and most of the questions were multiple-choice questions, and five were open questions, which were optional to give answers, unlike multiple-choice questions. The question selection and formation were constructed consuming the research aim, objectives and limitations as a baseline and using found themes from the conceptual basis review and from Chapter 1.5. Afterwards, questions were modified and grouped in a process described in Chapter 4.3. The selected categories were the following:

- A. Background information questions for possible quantitative analyses.
- B. Questions about demands and the selecting process for external MRO labour.
- C. Questions concerning pricing and delivery time of external MRO labour.
- D. Questions about web-based ordering tool.

The method was to utilise similar categorisation in the themes of the interviews to find connections and patterns from both data. The questionnaire was executed via Finnish maintenance professional's organisation called Promaint. The questionnaire was made with Webropol web program, and a link to it was sent by email to Promaint mailing list. Therefore, the link was sent to around 6000 email addresses. The questionnaire was open from the

20 March to the 1 April in 2020. The invitation letter to filling the questionnaire is presented in Appendix 3.

Interviews data collection. The theme interviews are the most used method in Finland for collecting qualitative data. The idea in theme interview is to find out what the respondent thinks about something by asking that. This is how humans act in everyday life. It is a dialogue which initiative is coming from the researcher and what proceeds in terms of the researcher. The researcher is attempting in interaction to gather information related to research subjects from the interviewed person. According to Aaltola and Valli (2001, 24), previously in the theme interviews, the method was question – answer, however recently this has evolved to more of a discussion type interviewing situation. (Aaltola & Valli 2001, 24.)

Theme interviews executed in this research were mainly via mobile phone and MS Teams application. The COVID-19 situation precluded any face-to-face meetings. The interview themes were emailed before the interviews for the interviewees. An example of the invitation letter is presented in Appendix 5. Themes in each interview were: 1. the use of external MRO resources in the industrial market field, 2. the selecting process of desired external MRO resources, 3. the pricing and delivery time for external MRO resources, and 4. a web-based ordering tool for external MRO resources. Data from the interviews were collected by making notes during the interviews under each theme. All the notes were only for this research. Transcriptions were not performed due to GDPR restrictions. This reduces the reliability of the research, when it is not easy to verify the results without repeating the interviews.

4.2 Data analysis

For all the collected data, the selected approach in this action research is a factual point of view. According to Alasuutari (2011, 90-93) a factual point of view is a modification of empiricism, and it is justified to be used with questionnaires, interviews and dialogues. With the factual point of view, the researcher asks the same questions from specifically selected respondents and from the results, an understanding of a behaviour model is constructed.

For example, language, culture and situation features are considered commotion in perspective and not essential information. The simplification of the factual point of view is illustrated in Figure 8.

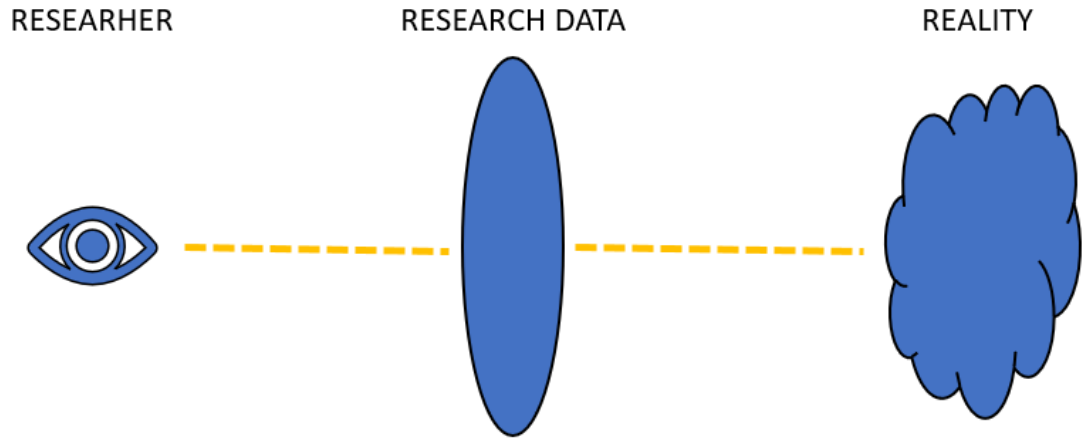


Figure 8. Factual point of view (Adaptation of Alasuutari 2011, 90)

Figure 8 is demonstrating the collected data as a lens through the researcher is viewing reality. Subsequently, all the commotions are simply distortions in the lens through the researcher is observing the reality. In the research, an integrated insight is created to construct a more reliable view of reality, which is the business concept. (Alasuutari 2011, 90.)

Secondary data analysis. For the secondary data analysis, the material that was acquired from the commissioning company was in the form of valuable analyses and was already in the original reports. Besides, the data behind the reports were gathered from questionnaires, and it was available in spreadsheet format. The value-adding work was to combine data and analysed results from the two years' studies available and present that in the context of this research. The analysing method in this was a qualitative evaluation of results, where the target was to figure out what type of service or expertise is required for especially annual overhauls and in what occasion different resources are the most needed. The conclusion from the data presented is based on findings from literature reviews. This data is used to expand the perspective on what there is included in the business solution proposal between parties to benefit all participants in the transaction, which is the second research objective.

Questionnaire data analysis. The survey data was sorted in four categories based on earlier findings from the commissioning company and literary review. The research question was used as a steering element in evaluations. The categories are based on the research question, formed from the research aim and objectives. The questions inside the questionnaire's categories are overlapping, especially between objectives, but the main steering element for the question groups is presented in Table 1. Table 1. Questionnaire question groups' main steering element in the analysis.

Table 1. Questionnaire question groups' main steering element in the analysis

Questionnaire category	Aim	1. objective	2. objective
A = background information questions for possible quantitative analyses.	Background information		
B = questions about demands and the selecting process for external MRO labor.	X		
C = questions concerning pricing and delivery time of external MRO labor.			X
D = questions about web-based ordering tool.		X	

These categories shown in Table 1 were analysed separately. The method was to view the data through research targets and limitations and to find conclusions and findings from the average results and significant deviations. Answers were searched for research aim, objectives and question. For example, if some specific feature is required for the web-based tool. Additionally, deviations between respondents group professions were under investigation to figure out the most lucrative marketing target group. However, for the reliability of the conclusions, this would have required at least triple the number of respondents.

Theme interviews analysis. In analysing, the collected interview material was sorted according to themes. From the data, similarities were searched, and similar words replaced to assist the grouping process, for example, reliable – trustworthy or order – purchase. Combined sentences were generated based on how many interviewees mentioned it and the evaluation of significance made by the researcher. Subsequently, these combined sentences were listed in the manner illustrated in Table 2.

Table 2. Table structure for sorted data from the interviews

1. The use of external MRO resources in the industrial market field	2. The selecting process of desired external MRO resources	3. The pricing and delivery time for external MRO resources	4. A web-based ordering tool for external MRO resources
1.			
2.			
3.			
4.			
5.			

The next phase was to sort out the data more for a clearer perspective. Under each theme, three categories were used for grouping - risks, development and management. These subcategories were engaged in Chapter 3. In the risks, aspects are included like challenges or prejudices, the development includes improvement needs or new ideas, and management is also about functionality and structures. The following step was to capsuleise information even more to short sentences. From these groupings, a summary style conclusion was combined information was utilised to form a table illustrated in Table 3.

Table 3. Key findings grouping from interviews

Theme	Risks	Development	Management
1. The use of external MRO resources in the industrial market field			
2. The selecting process of desired external MRO resources			
3. The pricing and delivery time for external MRO resources			
4. A web-based ordering tool for external MRO resources			

The findings were grouped under each group, as presented in Table 3 to determine the overall perspective based on literature findings. These subcategories were not specifically revealed to respondents. In the analysis, direct quotes were included to justify the researcher's interpretation.

Integrated analysis and business concept proposal. After the analysis of all individual data collection method, the outcomes were combined to a single result, a business concept proposal, which is presented in a table format for

the sake of clarity. The business concept proposal is steered with aspects from Chapter 2. It provides a solution to the research aim and objectives. This solution is based on all previous data analysis and theoretical findings. The findings from the data were first collected and listed in one spreadsheet. Afterwards, the list was reviewed several times and similar findings compound. For these phrases or words, a connecting and representational subject was generated. Subsequently, central findings from the aspect of limitations presented in Chapter 1.6 were listed. In case findings were contradicting each other, the information gained from the interviews of professionals were considered the most valuable. The reason is that this information was collected by the current customers or highly potential customers and reliable professionals on the research subject. Therefore, the way they would see matters or aspects beneficial will most definitely function with them.

4.3 Research reliability and validity

The credibility of the research can be evaluated by the validity and reliability of the research (Tuomi and Sarajärvi 2018,134). This evaluation is a crucial part of the research process, and it aims to minimise the possibility of misinterpretations and even mistakes (Tuomi and Sarajärvi 2018,134). Stuart et al. (2002) are arguing that research validity can be evaluated based on the generalisability of the research findings. This research was conducted as a single-case study within a specific company. Therefore, this research emphasised managerial implications instead of an extended generalisation. According to Thomas and Myers (2015, 29-30) a case study research or in this research, action research, does not aim to provide generalisable results, instead to examine phenomenon within a specific context. The action research process cycle of this research is presented in Figure 2. For the collection of data, it is essential to mention that the researcher was employed by the commissioning company during the thesis process, and that can impair the bias of the results.

The analysing of secondary data was made partly from the results gained from the previous analysis made by the Development Director of the commissioning company, Elcoline Group Oy. Therefore, to avoid

misinterpretations, the Development Director was also interviewed to explain the conclusions of the reports and drivers behind those, thus to provide background information with the execution, analyses and completion of the questionnaire. Besides, drivers and triggers for performing the annual small-scale research were clarified.

The preliminary questionnaire was at the first stage reviewed for the content part. Feedback was asked from the commissioning company's experts. Especially CEO of the company contributed strongly and for example, advised to clarify specific question word choices and to split a couple of questions into separate questions for clarity reasons. The second phase was to review the refined questionnaire for content structure and partly for validity. This phase was reviewed by two experts from XAMK. These experts were familiar with academic research execution methods. Based on the experts' comments and feedback, the structure of the questionnaire was simplified, and categorisation was implemented. This categorisation turned out to be a crucial improvement for the analysis process. Furthermore, it connected the aim and objectives to analysis process in a logical manner. This, in turn, caused changes to question order and wording to correspond better with the objective it was intended to provide information, which improved the validity of results. Therefore, the chance of misinterpretation of the answer was reduced. Also, some minor changes were made in word choices and sentence structure to improve the clarity of the items. Since some of the questions are so-called open questions, these are especially entirely subjective, making those open for a broad interpretation. This process of refining the questions is important to reduce the chance of misunderstanding the questions. A notable factor that can bias the result is that the researcher did not know who would respond to the questionnaire and had not met almost any of the respondents.

The theme interviews were thoroughly planned, and the structure was formed based on analyses, findings and conclusions made from the questionnaire. Permission for the interview was asked in advance mainly via phone, and discussion themes were delivered after the permission via email. The interviews were not recorded, but extensive notes were made. Permission for mentioning the name was also requested in advance. Names and positions are mentioned in order to increase the openness and therefore, reliability of

the results. The notes were not distributed to anyone else other than the researcher. All the notes were deleted after the analysing process was finished, and key points are written down, and the thesis was approved. The fact that a recording or transcript was not used can increase the possibility of misinterpretation of the answer. However, since the field of the subject is highly familiar to the researcher, and the researcher knew the interviewees in advance, the chance of misinterpretation is reduced. Additionally, there is a possibility that discussions during the interview were more freely when knowing that matters can be said close enough, and those are not recorded precisely.

As the method in data collection was to utilise the categories of the questionnaire in the themes of the interviews, this created a possibility to validate or challenge the findings from each data source in the data analysing phase. Furthermore, this decision provided an opportunity to create a tangible business concept with more reliable proposes when the findings are validated, and there is less urge for further studies. Besides, most of the preliminary assumptions, from the background information and the literature review were validated in the results of the research.

5 RESEARCH RESULTS

The analysed results of the research are presented with key statistics in this chapter. The results are constructed from data received from the commissioning company of the research, the questionnaire and the theme interviews. Data collected are summarised, compared with research question, objectives, and aims, but relevant findings were aimed not to be omitted. Each data source subchapter is analysed separately, and the overall results are integrating key findings into a tangible business concept proposal on the last subchapter of this chapter.

5.1 Secondary data review

The commissioning company provided secondary data review material from two similar questionnaires performed in 2018 and 2019. Elcoline Group Oy is performing these annual researches for marketing advantages and for improved customer service by planning their own resources in advance and

offers those to customers efficiently. According to Juvonen (2020), both annual overhaul resource needs questionnaires were executed in the same manner. At least 50 experts were selected for the questionnaire, and permission was confirmed in advance. Mutual questions were to fill in resources needed or planned per resource group (welders, electricians, mechanics, masons, etc.) bounded to calendar weeks. The target for the selected questions was to comprehend resource pikes per resource group. This information can be utilised to deliver the right amount of specific resources or to change planned overhaul timing. A summary of results from 2018 and 2019 results is presented in Figure 9.

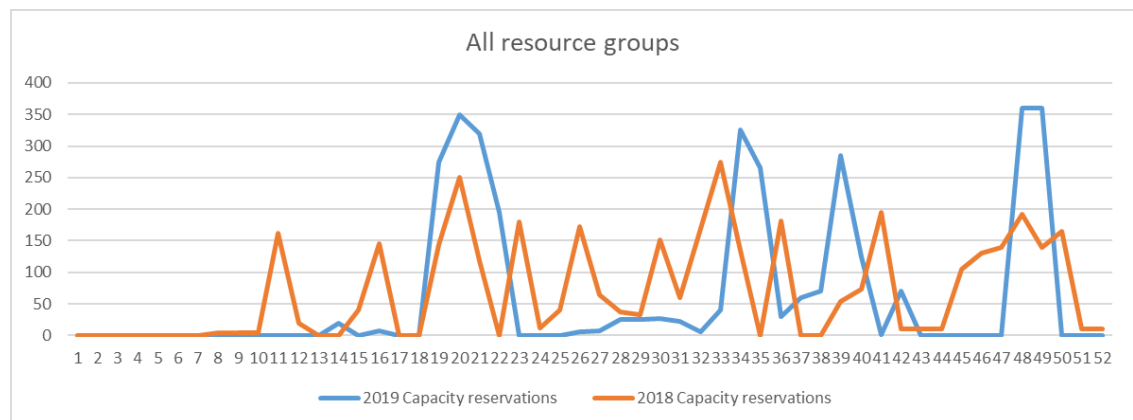


Figure 9. Summary of all resource groups (Elcoline Group Oy 2018, Elcoline Group Oy 2019)

In Figure 9, overall amounts are not comparable because of the different number of respondents. Figure 1 is showing the whole demand curve per week of the year. An important matter is that the overall demand in 2018 has been more flattened and not as sharp pikes as in 2019. Also, both years illustrates that there occurs barely any demand in the first ten weeks of the year, and the conclusion is that on that occasion, there are no larger overhauls executed. That occasion might be a working time slot for marketing external resource services. (Elcoline Group Oy 2018 & Elcoline Group Oy 2019.)

Both questionnaire reports confirm that there is the most demand for welders, mechanics, electricians and automation technicians. Juvonen (2020) emphasises that according to reports, there is also demand for site supervisors and lubrication system mechanics. A notable issue is that the demand for different specialists is not for the same time period, which

highlights the versatility of demand. Based on these results of the reports, the conclusion is that offered external MRO labour needs to be professional in its field and the most desired professionals are mechanics, welders and electricians. (Elcoline Group Oy 2018 & Elcoline Group Oy 2019.)

5.2 Questionnaires

The questionnaire link was delivered via email to over 6000 email address of Finnish maintenance influencers. In the questionnaire, there were 21 different questions, and five of those were open questions. The questions were in four categories, seven background information questions for possible quantitative analyses, eight questions about demands and the selecting process for external MRO labour, four questions concerning pricing and delivery time of external MRO labour, two questions about a web-based ordering tool. All questions per category are presented in Appendix 4. The questionnaire's results are evaluated per category, using qualitative methods presented in Chapter 4.

The overall results were highly disappointing when considering how many email addresses received the invitation to fill the questionnaire. As illustrated in Table 4, only 75 respondents opened the questionnaire and from those, only 33 respondents completed the whole questionnaire.

Table 4. Questionnaire's follow-up statistics

Follow up statistics	Overall	
	(N)	%
Completed questionnaire: Public web link	33	84
Questionnaire opened	75	192
Filling the questionnaire started	39	100

Because of the low number of respondents, no quantitative analyses were done for the reliability reasons (Table 4). Still, as Figure 10 demonstrates, there is currently market potential for external MRO services.

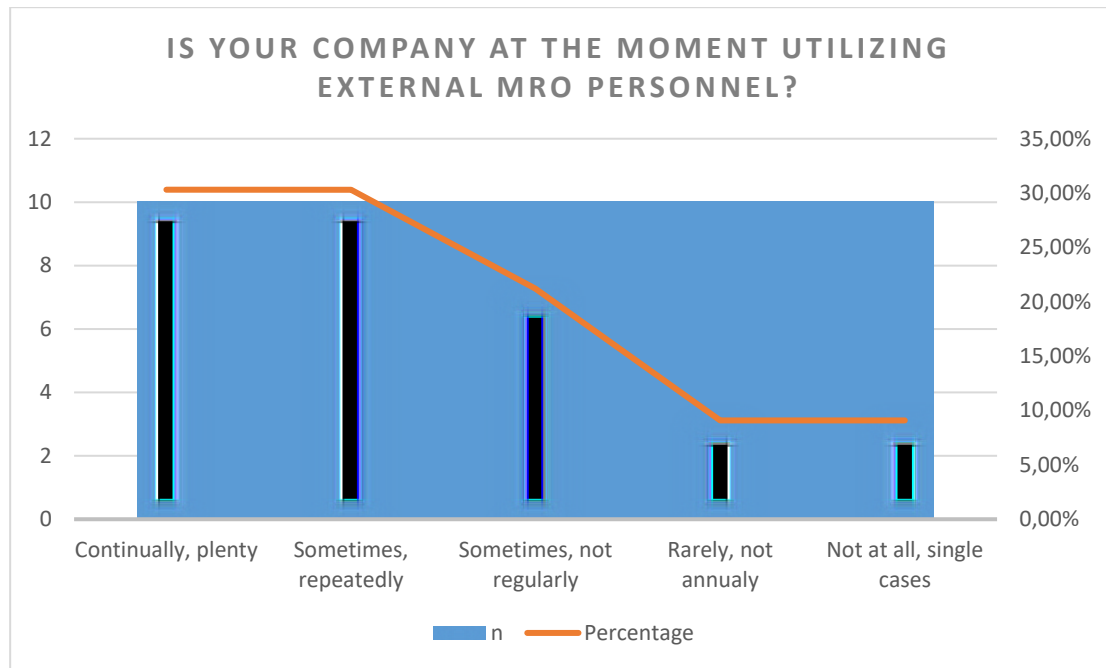
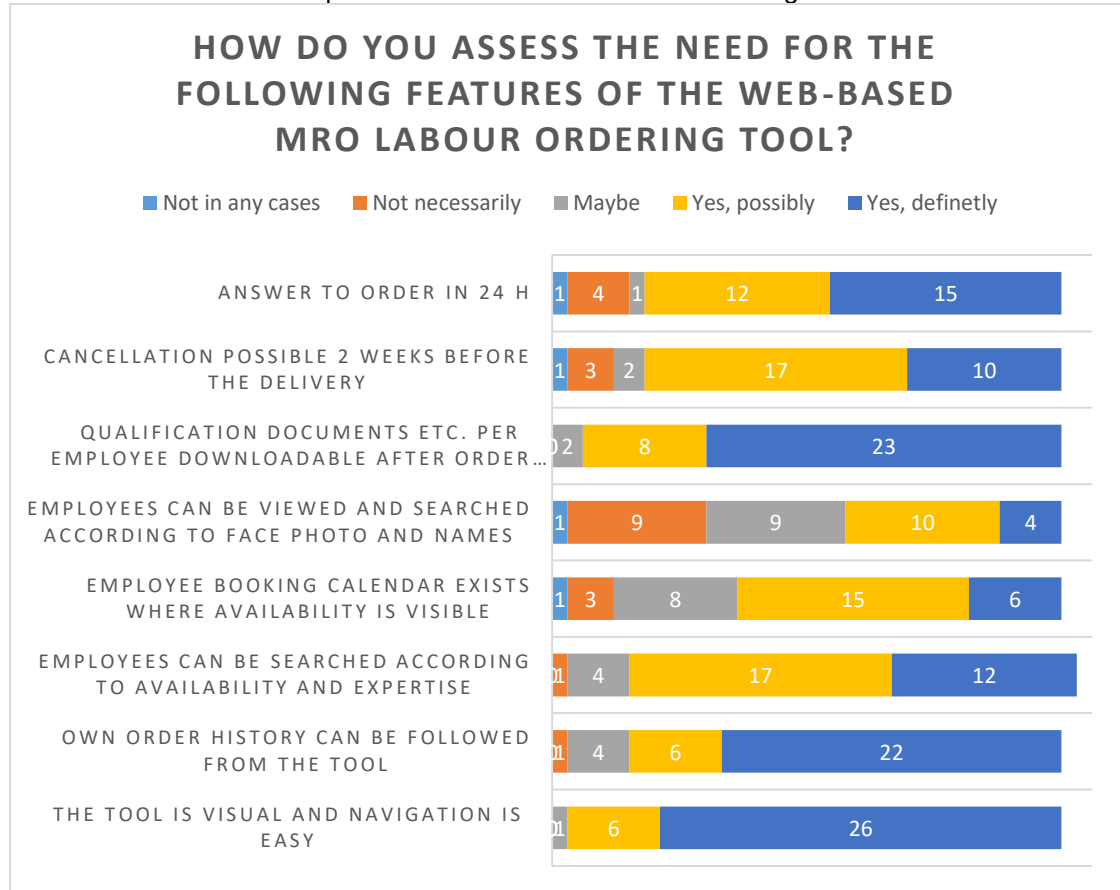


Figure 10. Results for the external MRO resources utilising

Presently around 80 per cent of respondents' companies are utilising annually external MRO personnel as Figure 10 presents. This result can be interpreted that there is an actual need for external MRO resources to fulfil the company's required internal activities.

As one of the aspects of the research was the need to use a web-based tool for ordering external MRO labour resources, two of the questionnaire's questions were considering this aspect. One of the questions was an open question where respondents' opinion was asked whether they see a web-based tool for ordering and selecting labour as useful. The result was that approximately 76 per cent regarded considered the tool helpful. The other question was a multiple-choice question that results are presented in Table 5.

Table 5. Results for the required features from web-based ordering tool



Analysed conclusions from Table 5's results were that an attractive web-based ordering tool should be visually pleasant and easy to navigate, order history should be available, necessary employee documents should be downloadable. Besides, employees should be searched according to availability and expertise, answers to inquiries should be fast, and order cancellation should be available. Other features asked were seen in average good to obtain, however, not necessary.

In the question category B, there were questions about demands and the selecting process for external MRO labour. These questions were formed to figure out what elements should be included or highlighted in the standard international business concept of offering external labour MRO to industrial customers and to selecting candidates. The results are presented in Figure 11.

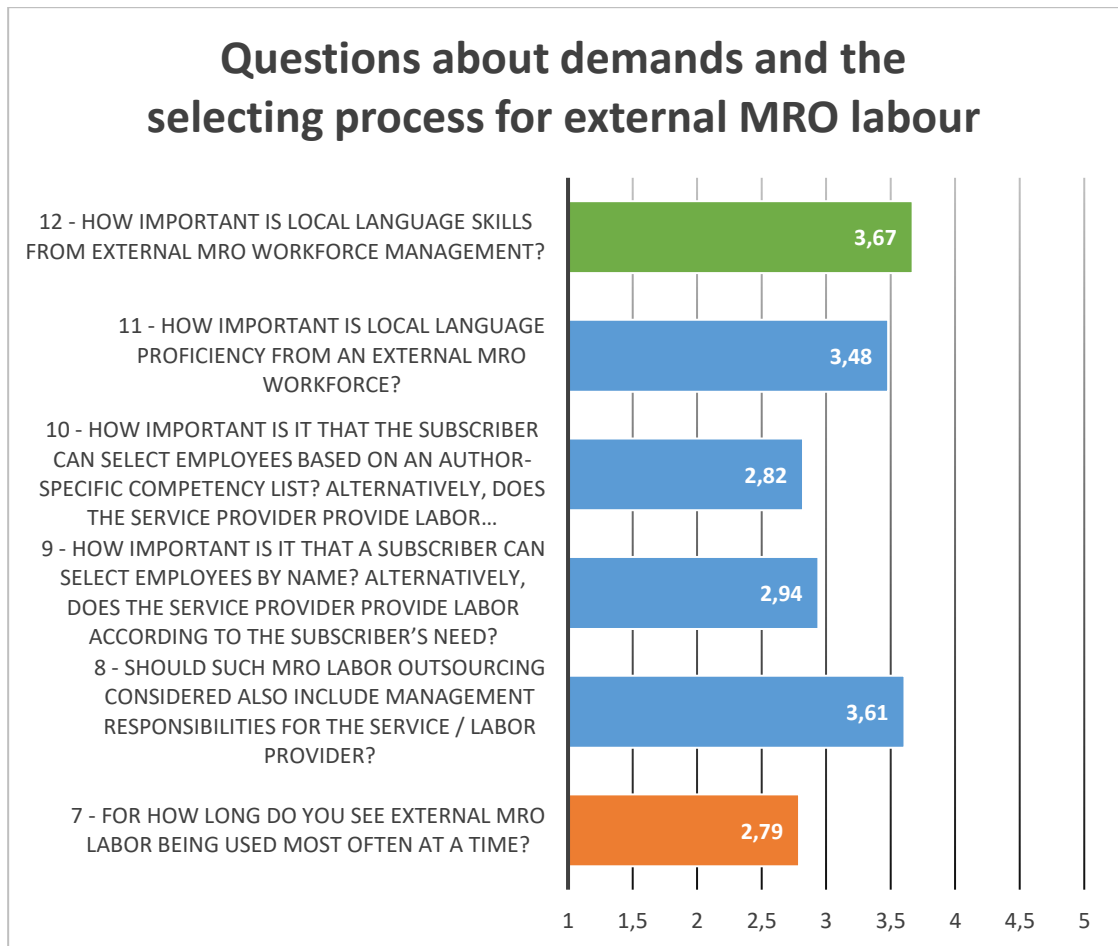


Figure 11. Results of question category B

The results of question category B demonstrate that all enquired elements should be taken on account at some level (Figure 11). Especially language requirements are that at least English skills should be existing. Additionally, question number seven's results promote the assumption that external MRO labour is utilised around three months at the time on average. Another element in this category was an open question (number 13). It asked what other specific skills or competencies are generally required of an external MRO workforce, in addition to language requirements. The results were not surprising, and special skills, physical endurance and safety activity were mentioned among other, but one especially exciting answer was that required skills should be demonstrated before the work starts at the site.

An open question 20 in category B was that *"In your opinion, is there a risk that productivity of internal MRO personnel decreases if external MRO labour is used? What could result in this scenario?"*. The results are that around 45 per cent of the respondents answered that the inquired risk exists. About 36 per cent of those indicated that the reason for decreasing productivity among

internal personnel is related to open communication and management issues, when the reasons for outsourcing are not clarified for the outsourcing company's internal personnel. In addition, over 41 per cent of the respondents not seeing risk, justified their perspective stating that external resources are used when internal resources are not enough and to purposes that require special skills, for example, welding, or to investment projects.

Another aspect considered in the questionnaire was to determine what should be the pricing model of the external MRO labour compared with internal resources pricing, what pricing model is the most attractive and what should be the common delivery time of resources from the order point. These questions were grouped to category C, and the results are demonstrated in Figure 12.

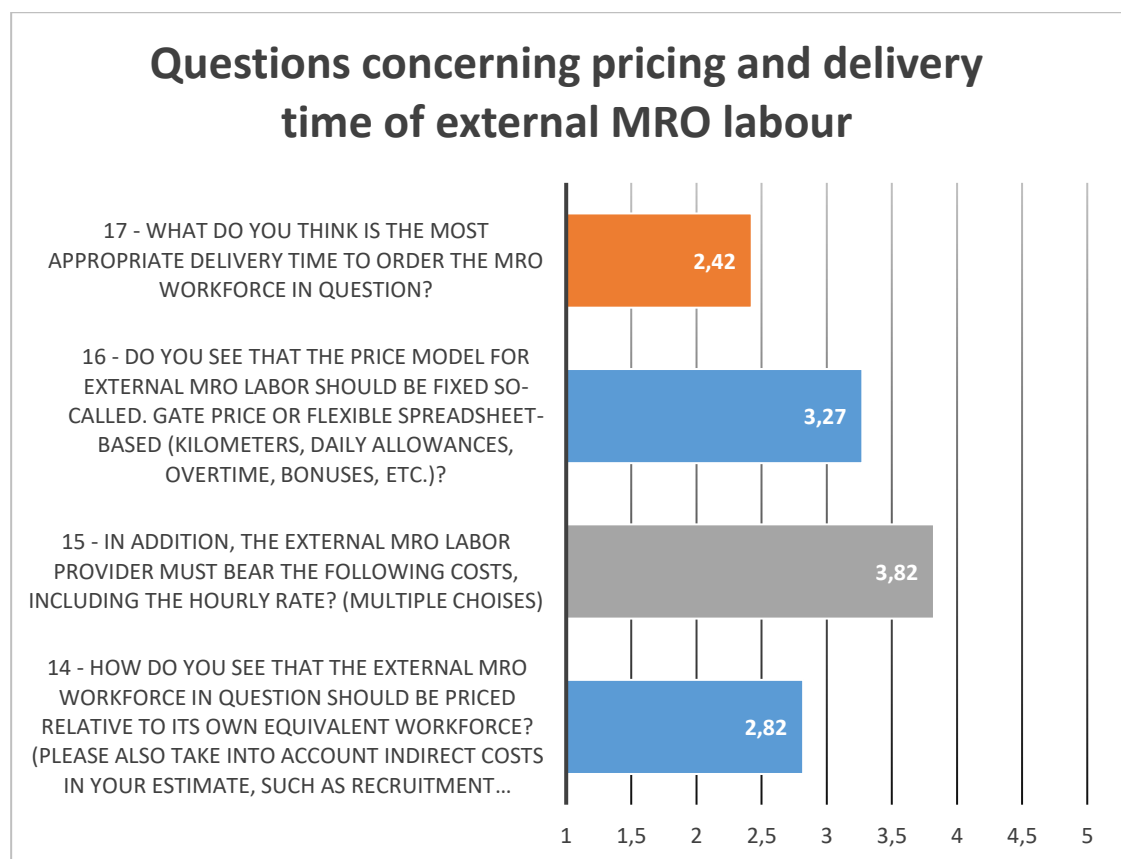


Figure 12. Results of question category C

The category C results shown in Figure 12, highlighted that external MRO labour could even be slightly more expensive than the internal cost of labour. This might be the case because of expertise requirements required in question number 13 in category B. A slightly worrying result was that almost

82 per cent of the respondents would desire to have subscribed external MRO resources on site in 14 days or less from the order point. Besides, the respondents indicated that pricing should be the most preferable a gate pricing, so-called an all-inclusive price, where one hourly price includes all costs in an agreed work time model. For example, travel costs could be separated from the gate price, because those are not dependable on the duration of the posting, and with short posting, it could cause losses for the supplier. Almost 97 per cent of the respondents indicated that external MRO labour provider must bear the employee's work clothes and special equipment costs included the hourly rate.

Overall, the questionnaire results demonstrate the essentiality of simplified questions that are properly categorised under themes. Now, the questionnaire's results are not explicit, and there were redundant questions that were not adding value to evaluation, rather making the questionnaire longer and further time-consuming. For example, not so many open questions were needed, and the format for all multiple questions should have been the same to simplify the analysing process. Furthermore, one respondent thanked that some of the questions were leading and contained assumptions. A possible root cause might be that the researcher is not entirely objective when employed to the commissioning company. One aspect might be that a proper GDPR statement was not included in the invitation letter, which was an obvious mistake.

5.3 Interviews

For the interviews, a theme interview method was selected. The target for the interviews was to verify or challenge conclusions from questionnaires and to find out solutions to the research question. Interviews were performed in a conversational manner where a structural question – answer was not the method. The interviewed specialists were selected from the current customers of the commissioning company of the research complemented with one expert from the commissioning company. All of them had a professional view and experience on the research subject. There were a total of five people interviewed, one of them was a female, and estimated average experience from the industrial MRO market field was 22 years. Interviewed people are

listed in Table 6 with their position, current employer and estimated experience from the research's market field for the reliability of the research.

Table 6. List of interviewed professionals

Name	Employer and position	Experience from industrial MRO
Pasi Nykänen	Sumitomo, Resources Coordinator, Production and Field Services at Sumitomo Shi FW Energia Oy	20
Päivi Räsänen	Andritz, Senior Procurement Manager at ANDRITZ Oy	30
Maxim Helle	Elcoline, Account Director at Elcoline Group Oy	18
Stefan Gustafsson	Sumitomo, Production & Field Service Manager at Sumitomo SHI FW Energi AB	26
Pekka Paganus	SSAB, Maintenance Director at SSAB Europe Oy	16

From the interviewed people, listed in Table 6, one was located in Sweden, and four in Finland. All of them have international experience. The interviewed people were selected by recommendations and researcher's connections. A key demand was that professional experience from the research subject had to be gained from at least ten years' time period. Another aspect was that each interviewee had experience using external labour resources.

The themes for the interviews were an adaptation to questionnaire categories and key questions to steer the discussion is listed under it:

1. The use of external MRO resources in the industrial market field
 - I. In Nordic countries generally, how common is external MRO labour usage currently? What resources are outsourceable? Are there some challenges or prejudices to be considered?
2. The selecting process of desired external MRO resources
 - I. How should the selecting process for external MRO labour function (competencies, language, supervision etc.)?
3. The pricing and delivery time for external MRO resources
 - I. How should the pricing model and delivery time preferably function for external MRO labour?
4. A web-based ordering tool for external MRO resources
 - I. Would a web-based ordering tool add value to the process, and how should it function in order to do so?

From the interviews, an overall factual point of view was generated according to the method presented in Chapter 4. From the first theme, the collected and summarised data is presented in Table 7.

Table 7. Data from the first theme of the interview

1. The use of external MRO resources in the industrial market field	In specific industry, even 80% of labor is outsourced. Outsourcing is common in industrial OEM business.
	Youth in Nordic countries is not interested in these kinds of professions. Professionals are decreasing in Nordic countries.
	It takes around 5 years to become professional in this field of profession. Apprenticeship should be utilized more.
	All blue-collar workers are outsourceable in this market.
	All resources can be outsourced to design level, but project management in own hands. Usually supervisors are not outsourced at the moment.
	It costs too much to possess activities that are not core functions.
	Especially seasonality of workload increases the need of outsourced external labor.
	Demand for outsourced external labor is increasing and lately demand for even supervisors and site managers has occurred.
	Increasing demands for quality and safety performance for the external labor.
	Pursuing to supplier partnership is increasing.
	At least one per five workers needs to speak English. Supervisors have to cope with English.
	Activities that are considered core activities, are outsourced.
	More focus to fewer service providers - partnership.
	Special skills demanding works are outsourced more frequently.

Table 7 is demonstrating how interviewees' opinions are, in general open to outsourcing activities. Especially blue-collar labour and activities that are not core functions or require specialised skills are considered beneficial for outsourcing. Also, the responses seemed to be in line with the results gained from the questionnaire. Interestingly, partnership with suppliers was a repeated aspect for most of the interviewees. The next phase in the analysing process was to sort and group the data and simplify it to explaining phrases. This analysis is presented in Table 8.

Table 8. The first theme grouping and simplifying to conclusions

Risks	Development	Management
Quality and safety are not at desired level	Supervisors and site managers can be outsourced	English requirements
Professionals are decreasing	Apprenticeship utilization	Proven professionals
	Demand for outsourcing is increasing	Blue collar positions can and are outsourced
	Focus on supplier partnerships	Seasonality increases outsourcing
	Special skills demanding works are outsourced more	Not core activities are outsourced

From the aspect of the web-based external MRO resources offering tool, the grouping in Table 8 is risks, development and management. The main risks are related to safety and quality issues, but also the decreasing level of professionals in Nordic labour was noted to be a risk. The latter one is also an opportunity to provide foreign labour with high safety mentality and right quality skills combined with English skills. Additionally, Table 8 shows that demand for outsourcing is increasing and customers are searching for partnerships with trusted and reliable suppliers. As a summary, the conclusion is that there is a market for this research's service concept idea. For the second object of the research, a partnership solution should be in focus and the basic level of demands, like English skills need to be the baseline of the offering.

The second theme in the interviews was about the selecting process of desired external MRO resources. From that theme, the collected and summarised data is presented in Table 9.

Table 9. Data from the second theme of the interview

2. The selecting process of desired external MRO resources	Experience from the workers is affecting positively. A long-term relationship with the supplier will increase trust.
	The same requirements demanded from all the suppliers.
	Efficient professionals. A correct quality of work - according to manufacturing documents.
	Have to possess and demonstrate required certificates and documents. Proven professionals.
	Proper safety mentality and behavior expected.
	Physical fitness is required, and excessive drinking is not allowed anymore.
	Important that the supplier is acting in a responsible manner and contractor's liability is what it must be.
	Supplier's and worker's references are checked and evaluated.
	Geography affects - long distance to site causes extra costs, like travelling costs.
	The supplier's versatility is considered when choosing suppliers.
	Frame agreements done with the suppliers. This reduces risks in the cost calculations.
	Labor is selected from the pool of service providers to fulfill all demands for all specific projects.
	Procurement office is evaluating suppliers (finance, safety, competencies etc.)
	Foreign workers are used in overhauls nowadays. Cultural differences must be considered.
	English skills are required, or there can be communication challenges and even safety issues.

From Table 9 can be determined that the theme and supporting question are interpreted or comprehended from different aspects of an individual interviewee. The most repeated element was the reliability of the supplier and its performance, e.g. safety, references, correct quality, trustworthiness. One interviewee stated that *"we usually have agreed about the basic volumes with the supplier and based on that we can book resources"*. This statement is emphasising the value of a frame agreement. Besides, geographical distance from the site to workers location was highlighted, even though this element did not appear in the questionnaire results. The grouped conclusions of Table 9's data are presented in Table 10.

Table 10. The second theme grouping and simplifying to conclusions

Risks	Development	Management
Delivery not according to needs	Frame agreements	Trust relationship - reliability
Safety mentality and behavior + cultural differences	Workers' references and data is guaranteed	Correct quality is ensured
Extra costs for geographical reasons	Nationality is not concerned	Proven professionals
Actual costs not in line with calculated		Versatility affects
Lack of physical fitness		English skills are required

This Table 10 is presenting more risk issues compared with the first theme's data, but especially safety elements are highlighted in both. As for the development group, the importance of a frame agreement is becoming a significant factor. In the management data group, similar issues appeared as in the questionnaire's open question 13's results, e.g. workmanship, English skills. The results from the second theme exposed that a functional service should have a frame agreement in place and the offering should be documented to be according to demands, e.g. certificates, checkable references and predictable pricing.

The third theme of the interviews was in a more operational level procurement aspect and about the pricing and delivery time for external MRO resources. From that theme, the collected and summarised data is presented in Table 11.

Table 11. Data from the third theme of the interview

3. The pricing and delivery time for external MRO resources	The pricing relates to availability and the total cost structure of a project.
	The pricing should be predictable. No sudden increases.
	A frame agreement with the supplier will be beneficial.
	A Fixed price table for hourly based labor (predictable).
	Orders are placed several months early.
	There is a risk of over pricing when using a fixed hour price (all-inclusive pricing) - not preferred.
	All-inclusive price is ok for big projects (orders), that has a fixed timetable. It is easy to work with.
	For less than ten people, delivery time should be four weeks or shorter. For larger groups, two months or more.
	With collaboration agreement one-month delivery time is ok.
	Location of offered labor is crucial, since it has a lot of effect on total costs, when the project is not several months.
	Hox. Customer specific safety course needs to be completed.
	For hourly labor, readiness to respond fast is required from suppliers.
	A Price table for hourly labor is more predictable and transparent (Finland).
	Productization of choirs have been tested and could be future solution for ordering and pricing of MRO activities.

The third theme of interviews was focusing on the pricing model and possible delivery promises. This theme was critical for the financial aspect of the business model to be constructed. From the data summary shown in Table 11, one single model was not found. Instead, different possibilities for different cases occurred. Also, there might exist strong differences between Sweden and Finland, where Finnish customers preferred predictable price table solution to be the most transparent, and therefore preferred, and a Swedish approach was related to the easiness of an all-inclusive price model. However, because of the modest quantity of interviewees, this conclusion is not generalisable. A notable matter was also considered that if the delivery time is extremely short for the external foreign labour it can cause quality issues in delivery content as well. Table 12 is presenting the simplified conclusions of the third theme's data.

Table 12. The third theme grouping and simplifying to conclusions

Risks	Development	Management
Late orders	Frame agreements	Predictable pricing
All-inclusive pricing	All-inclusive pricing for standard work	Collaboration agreement
Order several months early	Location should effect on pricing and delivery time.	Fast deliveries, if stand-by agreed
Too short delivery time		In Finland price table is ok

The results from the third theme of the interviews are illustrated in Table 12, with three category grouping. Risks are mainly related to delivery time. However, all-inclusive pricing was also seen as a risk. If the all-inclusive pricing model is used in many different scenarios, there might be cases that the pricing includes additional costs, not related to the standard case. From the data in Table 12, the conclusion is that frame agreement is essential in the beneficial business solution proposal. In this agreement, pricing and delivery times are agreed, and operations are adjusted to that. For the service provider, a notable matter is that overall operations can become dysfunctional if there are drastic differences in terms between customers who are using the same service. With the frame agreement solution, a partnership can be generated after fulfilling promises to, for example, delivery time and this will complete the aim of this research.

The last theme of the interviews was considering the actual tool for the business concept investigated in this research and especially the first objective of the research. The theme was about a web-based ordering tool for external MRO resources, and the summarised data is listed in Table 13.

Table 13. Data from the fourth theme of the interview

4. A web-based ordering tool for external MRO resources	For this service the work, it needs standardization of frame agreements between customers.
	It would be better, if the orders are not for individuals. Orders should be based on specific need (skills, time, location etc.) --> no CV bank idea.
	Site location should be determined in inquiry phase.
	World is changing, but there is still needs for human contact. Maybe confirmation or order specification done via phone?
	Document management should be included. For example, welding grade certificates, safety and hot work cards and identification information.
	It can be sensitive, if many customers can view or browse same employees, before the actual order/inquiry.
	First step could be: order - proposal (no names). Next step in developing the concept could be to choose from name list if possible.
	Feedback possibility is needed. For the workers especially.
	Visuality and functionality of the tool is essential, also mobile phone app would be good to have.
	Not really demand for a tool like this, because the projects are tailored. Communication and negotiations between people are needed in the future also.
	Data protection must be considered. (GDPR)
	Coordination of labor and work sites is essential for the service provider to success.
	History of proposed workers is interesting for the evaluation of the worker compared with specific work skill requirements.
	Information to worker must be transferred also, about the site location and work description, duration of work, accommodation etc.
	Integration to customers ERP system would generate extra value
	When in partner relationship, human contacts are not so necessary when ordering labor

An aspect not listed in Table 13 is that all the interviewees welcomed an idea of a web-based MRO resource offering and ordering tool. Only one interviewee was positive that in their processes there would not be interest for a tool managed by a single supplier, instead they would like to have a web-based tool that could be a pool of many suppliers' offerings, including the total availability of specific workman groups in a timetable. All the interviews were colourful around this theme, and many different aspects were considered based on the background of an interviewee, and topics from the notes related to this subject are illustrated in Table 13. The most repeated element was that

the tool should include document management of ordered workers. This way, all needed documents, e.g. the welding grade certificate, could be downloaded from the tool, and no extra emails are needed. In addition, the fourth theme generated the most improvement ideas, and ones used for most customers are listed in Table 14, where other produced phrases are presented.

Table 14. The fourth theme grouping and simplifying to conclusions

Risks	Development	Management
GDPR violations	Standardization of frame agreements	Orders for characteristics, not individuals
Tailored projects.	Mobile phone app	Site location determined
No human contact	Feed-back possibility	Human contact before the order is confirmed
No trust to supplier	Coordination possibility	Visuality and functionality
	Integration to customer ERP system	History information available

Conclusions from the fourth theme of interviews are listed in Table 14. In the risks category, data protection issues and possible lack of human contacts were the most mentioned, and those did not appear in the questionnaire's data. For fear of missing social contact results unwanted situations, a solution was presented to be that before the relationship is at the trusted partner level, there should be human contact in the process, for example, order confirmation done via phone. For the development issues, mobile phone functionality and feed-back possibilities are definitely elements to be taken in use. Beneficial for the existing tool was that all items listed in that group are in the current functionality of the tool. An additional interesting issue raised from the interviews that all the interviewees' companies were developing some sort of web-based sub-contractor management tool themselves. This is an indicator that time is right for this type of technology and service.

5.4 Analysed business concept proposal

In this subchapter, all the previous findings from the analyses are concluded in one business concept proposal presented in Table 15. The table is created by the methods and steps described in Chapter 4.

Table 15. Business concept proposal

	Strategical aspect	Financial aspect
Contract	Partnership	Frame agreement
Pricing	Flexible / Predictable / Transparent	Semi-gate price for different site areas. For example, the travelling costs excluded.
Materials included	All necessary standard tools	Tools used for the standard performance of specific work group and working clothes and PPE.
Delivery quantity	High volumes ordered separately	Different pricing for higher volumes
Delivery time	Flexible and according to promises	Standard one month and different price for a fast delivery
Order duration	Flexible and a lot of variation	Pricing level adjusted by the duration of the order
Quality	Right quality to specific order / Standardization. Keeping promises	Not offering over or under quality, the customer needs are the baseline. Testing the labor resources in advance and securing that required certificates and other necessary documents are updated.
Labor origin	Near the site and high flexibility	Eastern Europe countries preferred in long-term
Internal resistance	More communication and reasoning, not core functions, partnership	Proven professionals to specific needs, outsourcing is not done (only) cost basis
Delivery content and boundaries	Customers risks e.g. loss of knowledge of facility machinery	Basic offering: blue-collar labor and supervisors (mechanics, welders and electricians)
Special requirements	Safety mentality and behavior	Incentives for safe and efficient performance to frame agreement
Resource offering tool	Fast and reliable service	Web-based offering tool for standard demands (according to frame agreement terms)
Offering tool specifications	Visually pleasant and easy to navigate	
	No employees selecting. Request done by need or site specifications. Subsequently, offer confirmation grants employee data and documents	
	Language specification especially important (English requirements)	
	Necessary employee documents should downloadable,	
	Fast responses and order cancelation option	
	GDPR and other data protection is not neglected	
	Order history should be available	

Table 15 is presenting the central findings from the data analyses and illustrating those in the context of the contextual basis of Chapter 2 since the main drivers for an outsourcing activity are strategical or financial aspects. The categorising between financial and strategical is mainly directive. The left side column is presenting the key subjects to be included or at least considered in the business concept for external MRO resources in the international industrial market. The bottom section of Table 15 is painted in different colours to highlight that those proposals are for the web-based tool, and those are not categorised between strategical and financial since those are highly operative suggestions. Additionally, many of the proposals are items to be integrated into the frame agreement with the customer, e.g. delivery time and quantity. However, with those frames, the web-based tool can be modified to customer needs. For example, the quantity limits can be visually so that a customer cannot order more than 30 workers at once.

The particular suggestions in Table 15 indicate that there is a demand for only minor modifications to the existing web-based tool called ReFlow, which is presented in Chapter 1.5. Also, the significance of the frame agreement or a similar partnership framework agreement is highly emphasised, which was not entirely anticipated. The finding from the questionnaire's results that the external MRO resources do not have to be less expensive in comparison with internal resources is steering many suggestions, and the quality over the price is dictating the results. However, since the cost reduction is a fundamental basis for the ignition of an outsourcing process, the cost must be competitive among competitors. Otherwise, the results are concrete, conceivable and implementable to the Nordic industrial environment.

A specific finding was that external labour is often required to be on-site in 14 days or sooner from the order point. This requirement results that foreign external MRO labour needs to be in the country and previous posting is ending next week or the delivery process from the origin country is fluent, and labour is available. However, it is recommended that standard delivery time is 30 days at a starting point to reduce the extra work and costs required and to give time to clarify the delivery process. This is also a conclusion from the interviews, where a risk of poor quality of delivery was raised if the delivery time is too short.

6 CONCLUSIONS

This research studied an international business opportunity for outsourced external labour for MRO resources in the Nordic industrial market field. The purpose of this research was to develop a business concept utilising a web-based tool for this business opportunity that would be profitable for the seller and buyer in the long-term. This chapter is concluding the research with its key findings and evaluating if the purpose is fulfilled, and the research question is properly answered. Furthermore, the chapter consists of managerial implications and evaluations of future research possibilities. These elements, together with the proposed business concept, are providing the most tangible value for the commissioning company of this research. This external validity is a crucial part of the managerial implications.

The idea of the research and the triggering elements were clarified properly at the start of the thesis process by the commissioning company. This was a beneficial factor in emphasising the purpose of the research and setting unambiguous and tangible limitations for the subject processing. Without substantial limitations, the business concept created would not be executable void of further investigations. The contributory aspects were that the researcher had experience from the case subject, the web-based tool existed, and the commissioning company was willing to contribute to the research. The commissioning company's contribution is visible in the thesis, especially in the background data, the many interviews provided, and the secondary data.

The conceptual basis of the research concerns outsourcing and management of maintenance, repair and overhaul work. These subjects were selected to provide needed information assisting the process of answering the research question and to construct the basis for the data collection and analysis. The unifying aspects were outsourcing and MRO. These aspects were considered in the strategical and the financial points of view. Thereafter, the management aspect was divided into risk, lean and operational management. The Lean concept was mainly about TPM, and therefore, it was considered as development in general. Especially, the development aspect gave depth and an alternative point of view for the conceptual basis of the research and eventually to the business concept.

6.1 Key findings and reliability analysis

The most valuable findings from the research are integrated into the business concept proposal. This concept proposal is constructed by collecting the main conclusions into a table with literature findings as a structure. The idea of the strategical and the financial categorisation came from the fundamental statement that these aspects are the driving elements for outsourcing activities. Ergo, the concept needed to be able to give solutions to these especially, in order to be profitable for the service provider (alias seller) and interesting for the customer (alias buyer) in the long-term.

For a customer that is offering external MRO resources, a functional and continuous long-term service should have a frame agreement as a basis. This frame agreement is dictating the terms of an order, for example, pricing, delivery time, delivery quantity, payment terms and locations range. With these terms agreed, it is effortless for the customer to order MRO resources for different projects and sites. Subsequently, the web-based resource ordering tool to be functional and motivating to employ, a frame agreement was found to be integrated into the concept. This results that the web-based ordering tool should only be available for customers who first sign a frame agreement. Furthermore, this agreement can lead to a partnership status for the service provider. This partnership status can benefit the concept when the trust level is high, and direct human contact is not required for the ordering process. Additionally, if there are unambiguous differences in terms between customers who are using the same service, an unwanted situation probably appears. For example, this might result in costing tailoring needs for the web-based tool and quality issues to all operations.

Another key finding was that even though one of the outsourcing drivers is cost savings, the external MRO resources provided do not necessarily have to be less expensive than the cost of internal resources performing the same activities. Instead, external MRO resources are often used for activities demanding special skills, e.g. pipe welding, and to balance resource demand peaks, like during the annual overhauls. Besides, demand for external MRO resources from abroad is increasing due to lack of professionals in Nordic

countries. The youth in Nordic countries is losing interest in manual labour, and many professionals in the markets are retiring. The findings from the data collection verify this statement from the background data.

Especially for the questionnaire, it is questionable how reliable were the results when there were only 33 respondents who completed the questionnaire. Considering the fact that targeted audience were maintenance experts from leading maintenance association in Finland, familiar to the subject, it will increase the validity of the results, and therefore, it can be justified to presume in rough extension that the results can be reproducible. Moreover, several findings from the questionnaire were also discovered from the interviews data, which will increase the previous assumption of reliability. For the low number of respondents, it might worth considering that the questionnaire should have been open for responses for a longer period than two weeks or a reminder should have been sent to invited people, not to forget to give their valuable contribution. Also, the questionnaire should have been pre-tested more before the final version. Particularly, testing with respondents not familiar to the subject would have been beneficial to reduce the leading of the questions and to improve word choices. Nevertheless, the results from the questionnaire are in line with the results from the other sources of data and that increases the reliability.

6.2 Answers to the research question

For the research to be successful, it is crucial that the determined research question is answered. The research question was stated to be the guiding element of the research, and in that context, it must be answered in the results. The question was: *“how the business concept needs to be constructed to add value for the customer acquiring external maintenance resources from abroad via the web-based tool”*. In addition, the key purpose of the research was to add value for the international customer with a business model that is financially beneficial for the provider of the service and the seller.

The research results provide tangible business concept proposal, which is constructed from the customer perspective. The concept is directed to Nordic countries. In this case, the customer is the one outsourcing, and the

theoretical reviews are mainly from this point of view. Furthermore, the financial aspect of the business concept is covered with the quality demands, which is also linked to documentation management, workers from Eastern Europe, like Baltic countries, and with frame agreement securing the price levels and the predictiveness of functionality. In the data collected, the web-based tool was found to be a good idea and could be beneficial for the purpose. Especially when the tool is visually pleasant and easy to navigate, and there is a frame agreement in the foundation. The tool was found to be a key component in the business concept proposal, with a minor modification.

Surprisingly, as the partnership status and the significance of the frame agreement were highlighted in the research results, the background aim of the research developed into a different outcome than preliminary expected. This aim was to figure out how close to tactical outsourcing partnership is possible to get with this business concept. From the results of the research, it can be evaluated that a key supplier box is a position where to aim with this concept. That is between tactical and strategical procurement and hold higher supplier risk than subcontractor positioning.

6.3 Managerial implications

The managerial implications presented in this subchapter are concluding the meaning of the results in terms of actions. Since this research was a case study, it is especially essential for the commissioning company to gain concrete conclusions as an exchange for their efforts. Furthermore, these managerial implications compare the results with action possibilities, and with justification indicate if there are viable actions or not.

As the research results are tangible and according to the research question, which was developed from the background information and triggers of the commissioning company, it is justified to conclude that the research is fulfilling the demands set at it by the commissioning company. The commissioning company gained a business concept that is based on the most important drivers behind an outsourcing decision, strategical and financial. When the concept is providing solutions under these aspects, it has a higher probability

of interest the customer in the long-term and eases the process of purchasing external labour.

The results of the research can be applicable or at least educative for a company working in the same or similar business field of offering an hourly based priced MRO resources to industries demands. This is the consequence of the openness of the results and their justification. Furthermore, the idea of a frame agreement is applicable to the procurement practices to customers immediately, and its benefits are improving the whole business field when hourly based resources are not purchased separately for every case; instead, the ordering can be made via the availability and special requirements of the site. This will save time and money for every participant of the process and increase transparency for the purchaser.

The research results are taken in action during the following year in the commissioning company. The first issue is to evaluate the web-based tool, whether it requires modifications to serve its purpose correctly and trustworthy according to the demands of the concept. Since the results indicated that there are only minor modification requirements for the tool, the implementation process can proceed almost immediately after the project plan is approved. The modifications requirements are mainly functional, and the basic design of the tool demands no adjustments at this point. An understandable functionality process description for the sake of modifications needs to be presented to the Gambit Group Oy, who has produced the original tool.

The following step is the implementation of the business concept. This step shall be projected, and it has been agreed that the researcher will act as a project leader for this project. Since, the researcher is acting as a Business Director for a service of this type and due to the fact, that after this research process, the knowledge about the subject and the theme has increased furthermore. Subsequently, after the project plan for implementation is approved by the CEO of the commissioning company, the idea is to launch a pilot with a customer who has operations in several Nordic countries. An important notice is that a frame agreement needs to be in place with the customer selected for the piloting. For example, pricing will not be a function in the web-based tool in future either. Additionally, according to research

findings, the target is to launch the pilot with a certain group of professionals, like welders and mechanics, not with all types of service. Preliminary negotiations to launch this pilot have been done with a specific customer. The tentative implementation process is according to the following list.

1. Preparing project plan for the implementation based on this research.
2. Project plan approved by the CEO of the commissioning company.
3. Modifications to ReFlow tool are executed.
4. Project start with a pilot customer (autumn 2020).
5. Feedback from all the stakeholders from the first test period (one site works executed).
6. Possible modifications to the concept.
7. Feedback from all the stakeholders from the second test period (one quarterly year).
8. Possible modifications to the concept.
9. Launching the concept with other key customers (early 2021).

The implementation process illustrated above is a proposal, and it will be approved or modified before the final approval by the CEO of the commissioning company. Especially, the timeline can be adjusted depending on other major activities or development projects on-going in the company. Also, the development of the COVID-19 pandemic must be considered. Nevertheless, this project is estimated to increase customer satisfaction, which will be measured during the project as well as employee satisfaction and financial measures. The risks related to the concept are reduced especially with the open communication and justification, and a project steering group is founded with the pilot customer.

6.4 Future research possibilities

The research process and the scope were strictly limited to this thesis work. This way of working was productive for the case-study, and it is shown from the results; a tangible business concept was constructed for this limited opportunity in Nordic MRO business area. Thus, many future research possibilities were identified, yet not considered in this research. These possibilities are introduced in this subchapter.

The meaning of trust, especially in the seller-buyer relationship, is not considered in this research. In addition, the negotiation process of an agreement or contract is not included and should be examined more

thoroughly, especially for the frame agreement. These two themes are linked and might be profitable to examine these together in future researches. This would benefit the customer satisfaction outcome for the service provided when the purpose and functionality are clear and common targets are agreed for follow-up.

Naturally, the functionality of the web-based tool is essential for its success. This aspect is lightly considered in this research; however, any technical possibilities or limitations are not considered, nor it would have been possible due limitations and the point of view of this research. This aspect might be strongly related to programming issues. Besides, as it was stated, many of the commissioning company's customers are developing their own solutions for a web-based tool for managing outsourced resources. It is definitely worth to consider if joining forces on this matter is an option with a customer whom relationship level is regarded as a partner.

The data collection was designed to provide material for analyses and to fulfil research scope and aims as the results were concluded a couple of exciting subjects raised that could have been added to the questions. One of these was that would a respondent or an interviewee be willing to pay extra for service executed via a functional web-based tool. This question would have increased the knowledge about the pricing level targeted with this business concept compared with competitors without this kind of a tool. Currently, the idea is that this type of extra service should not cost extra for the customer since it will also benefit the provider with faster and more accurate information flow. The whole pricing theme and market price levels for the external MRO resources would be interesting future research.

It cannot be unsaid that the timing of this research was unideal. The COVID-19 pandemic was not foreseen when the thesis process was started in November 2019 and when the first epidemic signs from China came public in January, it was widely considered not to influence drastically global markets and industries as it eventually did. This pandemic most certainly had a big effect on the number of respondents to the questionnaire and for the willingness to participate in the interview. Besides, the industrial markets and behaviours are the most expected to be in a transition. It can be that national

security of supplies are valued greater in the upcoming years, and side effect might lead to MRO's that in-house expertise or local service providers are required. Therefore, the whole subject and findings might be under re-evaluation.

REFERENCES

- Aaltola, J. & Valli, R. 2001. Ikkunoita tutkimusmetodeihin I – metodin valinta ja aineistonkeruu: virikkeitä aloittellevalle tutkijalle. Jyväskylä: PS kustannus.
- Alasuutari, P. 2011. Laadullinen tutkimus 2.0. 4. uud.p. Tampere: Vastapaino.
- Baatartogtokh B. W., Dunbar, S. & Zyl, D. 2018. The state of outsourcing in the Canadian mining industry. *Resources Policy*, 59, 184-191.
- Baluch, N., Abdullah, C. S. & Mohtar, S. 2012. TPM AND LEAN MAINTENANCE – A CRITICAL REVIEW. *Interdisciplinary journal of contemporary research in business*, 4 No 2.
- Benton, Jr. W.C. 2010. Purchasing and supply chain management. 2nd edition. New York: McGraw-Hill/Irwin.
- Berkut, A. 2020. Working in another EU country. WWW document. Available at: <https://ec.europa.eu/social/main.jsp?catId=25> [Accessed 19 February 2020].
- Bertolini, M., Bevilacqua, M., Braglia, M. & Frosolini, M. 2004. An analytical method for maintenance outsourcing service selection. *International Journal of Quality & Reliability Management*, 21 No. 7, 772-788.
- Cambridge Dictionary. 2020a. Maintenance. WWW document. Available at: <https://dictionary.cambridge.org/dictionary/english/maintenance> [Accessed 28 March 2020].
- Cambridge Dictionary. 2020b. Overhaul. WWW document. Available at: <https://dictionary.cambridge.org/dictionary/english/overhaul> [Accessed 28 March 2020].
- Cambridge Dictionary. 2020c. Repair. WWW document. Available at: <https://dictionary.cambridge.org/dictionary/english/repair> [Accessed 28 March 2020].
- Dekker, R. 1996. Applications of maintenance optimization models: a review and analysis. WWW document. Available at: http://www.google.fi/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&sqi=2&ved=0CDsQFjAB&url=http%3Aper%2Fper%2Frepub.eur.nlper%2Fpubper%2F2218per%2Feur_dekker_17.pdf&ei=YnRjU5zkMaPYygOamIDgBA&usg=AFQjCNF43wjC_od5GCmo1jGT0Fbn_ZrxnA [Accessed 24 November 2019].
- Dunn, S. No Date. Maintenance Outsourcing - Critical Issues. WWW document. Available at: https://s3.amazonaws.com/academia.edu.documents/31194069/outsourcing_crit_issues.pdf?response-content-disposition=inlineper%2Bper%20filenameper%2DMaintenance_outsourcing_Critical_issues.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWOWYYGZ2Y53UL3Aper%2F20191118per%2Fus-east-1per%2Fs3per%2Faws4_request&X-Amz-

Date=20191118T174307Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=14f778dbf74f6a181e96a1400b4f123e973cc8542ebaad810c76c85f2711d91a [Accessed 18 November 2019].

Eden, C. & Ackermann, F. 2018. Theory into practice, practice to theory: Action research in method development. *European Journal of Operational Research*, 271, 1145-1155.

Elcoline Group Oy. 2018. Raskaan teollisuuden kunnossapitoseisokkien resurssitarpeet 2018. PDF document. Varkaus: Elcoline Group.

Elcoline Group Oy. 2019. Raskaan teollisuuden kunnossapitoseisokkien resurssitarpeet 2019. PDF document. Varkaus: Elcoline Group.

Elomaa, N. 2011. Ulkopuolisen työvoiman käyttö. Jyväskylä: Edita Publishing Oy.

European Commission. 2016. Document 32016R0007 – Commission integrating regulation (EU) 2016/7. WWW document. Available at: https://eur-lex.europa.eu/eli/reg_impl/2016/7/oj [Accessed 23 May 2020].

European Commission. 2020. Schengen Area. WWW document. Available at: https://ec.europa.eu/home-affairs/what-we-do/policies/borders-and-visas/schengen_en [Accessed 23 May 2020].

Eurostat. 2020. Wages and labour costs. WWW document. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Wages_and_labour_costs#Labour_costs [Accessed 23 May 2020].

Ghuri, P., Gronhaug, K. & Kristianslund, I. 1995. Research Methods in Business Studies. Practical guide. Hemel Hempstead, Prentice Hall. New York. Goodreads. 2019. WWW-document. Quotes David Aaker. Available at: https://www.goodreads.com/author/quotes/103796.David_A_Aaker [Accessed 25 January 2020].

Ghodeswar, B. & Vaidyanathan, J. 2008. Business process outsourcing: an approach to gain access to world-class capabilities. *Business Process Management Journal*, 23-37.

Heikkilä, T. 2008. Tilastollinen tutkimus. 7.p., uud.p. Helsinki: Edita Prima Oy.

Hill, A. & Hill, T. 2009. Manufacturing operations strategy. 3rd edition. Hampshire: Palgrave Macmillan.

Hirsjärvi, S. & Hurme, H. 2000. Tutkimushaastattelu. Teemahaastattelun teoria ja käytäntö. Helsinki: Yliopistopaino.

Hirsjärvi, S. Remes, P. & Sajavaara P. 2013. Tutki ja kirjoita. Helsinki: Tammi.

Idhammar, C. 2006. The contract maintenance question – Part II. WWW document. Available at: <http://www.reliableplant.com/Read/1159/contract-maintenance> [Accessed 20 November 2019].

International Organization for Standardization ISO 31000:2009. 2009. Risk Management – Principles and Guidance. Geneva, Switzerland: International Organization for Standards.

Juvonen, J. 2020. Development Director. Interview 10 March 2020. Elcoline Group Oy.

Johnsen, T., Howard, M. & Miemczyk, J. 2014. Purchasing and Supply Chain Management - A Sustainability Perspective. Routledge.

Järventausta, H. Moisala, M. & Toivakka, S. 1998. Tutkimalla oppii. Porvoo: WSOY.

Järviö, J. & Lehtiö, T. 2012. Kunnossapito – tuotanto-omaisuuden hoitaminen. 5th edition. Helsinki: KP-Media Oy.

Kananen, J. 2009. Toimintatutkimus yritysten kehittämisessä. Tampere: Tampereen Yliopistopaino – Juvenes Print.

Kiiha, J. 2002. Yritystoiminnan ulkoistaminen ja sopimusvastuu. Helsinki: Talentum Media Oy.

Kiiskinen, S., Linkoaho, A. & Santala, R. 2002. Prosessien johtaminen ja ulkoistaminen. Porvoo: WSOY.

Knolmayer, G. F. 2002. Cybermediaries Supporting the Management of Independent Workers: A Case Study of Extended Outsourcing Relationships. WWW document. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.94.344&rep=rep1&type=pdf> [Accessed 8 March 2020].

Kylmä, J. Vehviläinen-Julkunen, K. & Lähdevirta, J. 2003. Laadullinen terveystutkimus –mitä, miten ja miksi? Duodecim (119). 609–615.

LoBiondo, Wood, G. & Haber, J. 2002. Nursing Research: Methods, Critical Appraisal and Utilization. 5. Edition. St. Louis. Missouri: Mosby.

Logistiikanmaailma. 2019. Toimittajasuhteen kehittäminen. WWW document. Available at: <http://www.logistiikanmaailma.fi/osto-jamyynti/hankintaprosessi/toimittajasuhteiden-johtaminen/> [Accessed 2 May 2020].

MacInnes, R. L. & Pearce, S. L. 2003. Strategic MRO – A Roadmap for Transforming Assets into Competitive Advantage. New York: Productivity Press.

Mann, D. 2010. Creating a lean culture. 2nd edition. London: Taylor & Francis Group.

- Marttonen-Arola, S., Monto, S. & Kärri, T. 2013. Profitable working capital management in industrial maintenance companies. *Journal of Quality in Maintenance Engineering*. 19. 10.1108/JQME-08-2013-0054.
- Pascual R. & Godoy D. & Figueroa H. 2012. Optimizing Maintenance Service Contracts under Imperfect Maintenance and a Finite Time Horizon. PDF Document. Available at: https://www.researchgate.net/profile/Rodrigo_Pascual/publication/249644556_pascual12-r3/links/02e7e51e5ab8f950b6000000/pascual12-r3.pdf [Accessed 17 November 2019].
- Metsämuuronen, J. 2005. Tutkimuksen tekemisen perusteet ihmistieteissä. Jyväskylä: Gummerus.
- Mikkonen, H. 2009. Kuntoon perustuva kunnossapito. Helsinki: KP-Media Oy.
- Modig, N. & Åhlstrom, P. 2013. Tätä on Lean – Ratkaisu tehokkuusparadoksiin. Halmstad: Rheologica Publishing.
- Nora, I. 2017. 7 Strategies to Reduce Cost of Maintenance, Repair & Operation (MRO) Supplies. WWW document. Available at: <https://sipmm.edu.sg/7-strategies-reduce-cost-mro-supplies/> [Accessed 7 January].
- Okkonen, K. 2019. Näille aloille tuodaan vuokratyöläisiä ulkomailta – palkkapyynnöt nousseet ”sfääreihin”. WWW document. Available at: <https://www.is.fi/taloussanomat/art-2000006087840.html> [Accessed 9 February].
- Patel, D. 2017. The Pros and Cons of Outsourcing. WWW document. Available at: <https://www.forbes.com/sites/deeppatel/2017/07/17/the-pros-and-cons-of-outsourcing-and-the-effect-on-company-culture/#2139b944562d> [Accessed 9 February 2020].
- Peltonen, J. 2019. Elcoline – Suuntaamo – Vastuullisen ja asiakaslähtöisen kasvustrategian kirkastaminen. PDF document. Varkaus: Elcoline Group.
- Porter, M. E., & Kramer, M. R. 2019. Creating shared value. In *Managing sustainable business* (pp. 323-346). Springer: Dordrecht.
- Putkiranta, A. 2014. Kunnossapidon trendit muuttuvat ajan mukana. WWW document. Available at: <https://promaintlehti.fi/Tuotantotehokkuuden-kehittaminen/Kunnossapidon-trendit-muuttuvat-ajan-mukana> [Accessed 17 November 2019].
- Räsänen, J. 2019. Chairman of the board. Interview 21 November 2019. Elcoline Group Oy.
- Räsänen, J. 2019. Chief financial officer. Interview 20 December 2019. Elcoline Group Oy.
- Sacred Heart University Library. 2020. Organizing Academic Research Papers: Theoretical Framework. WWW-document. Available at:

<https://library.sacredheart.edu/c.php?g=29803&p=185919> [Accessed 3 February 2020].

Sanchís-Pedregosa, C., Palacín-Sánchez, M-J. & González-Zamora, M-D-M. 2014. Exploring the financial impact of outsourcing services strategy on manufacturing firms. WWW document. Available at: https://www.researchgate.net/profile/Maria_Jose_Palacin-Sanchez/publication/268821279_Exploring_the_financial_impact_of_outsourcing_services_strategy_on_manufacturing_firms/links/5786290908ae3949cf554a60/Exploring-the-financial-impact-of-outsourcing-services-strategy-on-manufacturing-firms.pdf [Accessed 14 March 2020].

Seideffine, S. 2003. Effective Maintenance Program Development/Optimization. 12. International Process Plant Reliability Conference 22.-23.10 2003, Houston, Texas. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.200.8873&rep=rep1&type=pdf> [Accessed 17 November 2019].

Sherman, F. 2019. What is a Framework Agreement? WWW document. Available at: <https://bizfluent.com/facts-7311317-framework-agreement-.html> [Accessed 20 May 2019].

Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R. & Samson, D. 2002. Effective case research in operations management: a process perspective. *Journal of Operations Management*, 20(5), pp.419-433.

Taylor, T. & Greenlaw, S. A. No date. 4.1 Demand and Supply at Work in Labor Markets. WWW document. Available at: <https://opentextbc.ca/principlesofeconomics/chapter/4-1-demand-and-supply-at-work-in-labor-markets/> [Accessed 21 May 2020].

Thomas, G. & Myers, K. 2015. The anatomy of the case study. Los Angeles: SAGE.

Tuomi, J. 2007. Tutki ja lue – johdatus tieteellisen tekstin ymmärtämiseen. Jyväskylä: Gummerus Kirjapaino Oy.

Tuomi, J. & Sarajärvi, A. 2018. Laadullinen tutkimus ja sisällönanalyysi – uudistettu laitos. Helsinki: Tammi.

Twin, A. 2019. Outsourcing. WWW document. Available at: <https://www.investopedia.com/terms/o/outsourcing.asp> [Accessed 9 February 2020].

Työ- ja elinkeinoministeriö. 2018. Tilaa javastuu. WWW document. Available at: <https://tem.fi/tilaa javastuu> [Accessed 23 May 2020].

Työ- ja elinkeinoministeriö. 2014. Tilaa javastuulain toimivuutta ja muutostarpeita selvittävän työryhmän mietintö. WWW document. Available at: <https://tem.fi/documents/1410877/2859687/Tilaa javastuulainper cent20toimivuuttaper cent20japer cent20muutostarpeitaper cent20selvittper centC3per centA4vper centC3per centA4nper cent20typer centC3per centB6ryhmper centC3per centA4nper cent20mietintper centC3per centB6per>

cent2024032014.pdf/d16cd085-aef7-484a-9740-2725a8eeef87 [Accessed 23 May 2020].

Valvisto, E. 2005. Oikeat ihmiset oikeille paikoille. Helsinki: Talentum.

Van Weele, A. J. 2005. Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice. London: Thomson Learning.

Verne. 2020. TPM (Total Productive Maintenance). WWW-document. Available at: <https://www.leanproduction.com/tpm.html> [Accessed 2 February 2020].

Vesalainen, J. 2010. Tavoitteena strateginen kyvykkyys – alihankkijan kilpailukyvyn määrätietoinen kehittäminen. Helsinki: Teknologiateollisuus ry.

Vesanen, M. et al. 2013. Sparraava esimies – Kuinka motivoida nuoria työssä? Helsinki: Taloudellinen tiedotustoimisto TAT.

Zhang, Z. et al. 2015. A Cloud-Based Framework for Lean Maintenance, Repair, and Overhaul of Complex Equipment. WWW document. Available at: https://www.researchgate.net/profile/Zhinan_Zhang/publication/277352686_A_cloud_based_framework_for_lean_MRO_of_complex_equipment/links/5603415208ae596d2591d656.pdf [Accessed 12 November 2019].

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