

Lappeenranta-Lahden teknillinen yliopisto LUT

School of Engineering Science

Master's Programme in Software Engineering and Digital Transformation

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SME success factors in a digitalizing world, literature research

Master's Thesis 2020

Examiners: Professor Kari Smolander
Assoc.Prof. Ari Happonen

TIIVISTELMÄ

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School of Engineering Science

Master's Programme in Software Engineering and Digital Transformation

Jaakko Tuuri

Kirjallisuustutkimus digitalisoituvan maailman PK-yritysten menestystekijöistä

Diplomityö 2020

66 sivua, 19 kuviota, 3 taulukkoa, 5 liitettä

Työn tarkastajat: Professor Kari Smolander
Assoc.Prof. Ari Happonen

Hakusanat: Digitalisaatio, Digitisaatio, Digitaalinen transformaatio, PK-yritys,
Menestymistekijät, Industry 4.0

Keywords: Digitalization, Digitization, Digital transformation, SME, Success
factors, Industry 4.0

Maailma on muuttumassa kohti digitaalista tulevaisuutta, ja yritysten tulee olla mukautumiskykyisiä selvitäkseen tässä dynaamisessa ympäristössä. Yritykset ovat lisäksi joutuneet puolipakolla omaksumaan digitaalisia ratkaisuja sekä uusia toimintamalleja pandemian aiheuttaessa ongelmia maailmanlaajuisesti. Millaisia menestystekijöitä pienten ja keskisuurten yritysten tulee omata tässä nopeassa muutoksessa olevassa modernissa, digitaalisessa maailmassa? Tämä diplomityö pyrkii tutkimaan aikaisempia akateemisia tutkimuksia pienten ja keskisuurten yritysten menestystekijöiden löytämiseksi, keskittyen digitalisaation. Näiden tulosten tueksi tämä työ sisällyttää myös vuosittain julkaistuja ei-akateemisia tutkimuksia, joista haetaan ajankohtaisempaa näkökulmaa yrityksiin. Lisäksi toteutettiin pieni joukko haastatteluita pienten ja keskisuurten yritysten tämänhetkisten menestystekijöiden kysymiseksi asiantuntevilta henkilöiltä.

ABSTRACT

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The world has been transforming towards digital future, and the companies need to be able to adapt into this dynamic environment. In addition, the companies have been faced with a shove towards utilizing digital solutions and new business models, as the pandemic causes turmoil around the world. What kinds of success factors do the small- and medium-sized enterprises have and need in this modern, digitalized world, currently undergoing rapid changes? This thesis aims to look at pre-existing academic literature for success factors related to the success of small- and medium-sized enterprises, with focus on digitalization. To complement these results, yearly non-academic studies were included to give more recent viewpoint on the state of the companies. In addition, small pool of interviews was carried out to ask views on current success factors of small- and medium-sized enterprises from knowledgeable people.

ACKNOWLEDGEMENTS

Thank you for those who have been supportive during the process of making this thesis!

Thanks to family and friends for their continued support, and many thanks to Assoc.Prof. Ari Happonen for acting as a supervisor for this master's thesis. Thanks also to Professor Kari Smolander for acting as an examiner for this master's thesis work.

Lastly, I would also like to say big thank you to all of you who agreed to be interviewed for the interview portion of this thesis. Your answers allowed this thesis to be completed.

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APPENDIX

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Appendix 2: Alternative ACM DL Database search phrases

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LIST OF SYMBOLS AND ABBREVIATIONS

AI	Artificial Intelligene
ACM	Association for Computing Machinery
COVID-19	COrona VIRus Disease 2019
DL	Digital Library
ECA	Export Credit Agency
EU	European Union
ETLA	Elinkeinoelämän tutkimuslaitos
GDP	Gross National Product
I4.0	Industry 4.0
ICT	Information and Communication Technology
IoT	Internet of Things
LUT	Lappeenranta University of Technology
MEAE	Ministry of Economic Affairs and Employment
n.d.	No date
PK	Pieni- ja keskisuuri
RQ	Research Question(s)
SME	Small- and Medium-sized Enterprises
WoS	Web of Science

1 INTRODUCTION

Nowadays, digitalization and its elements seem to be one of the key factors in businesses. Even more, rapid changes happening in economic environment caused by COVID-19 (Corona Virus Disease 2019) may even act as a booster – boosting the weight of digitalization as a success factor. Companies have received a “digital wakeup call”, so to speak. As work is increasingly pushed to remote work and importance of digitalized business activities is being shown more than ever, it is no wonder digitalization is talked about when it comes to operating a modern business. At the same time, even traditional companies are transforming operations towards service solutions by leaning into I4.0 (Industry 4.0) and digitalization based solutions. (Happonen et al., 2020a; Kortelainen et al., 2019, 2016) But how does digitalization itself play into success factors of a company? Are current success factors tied to the digitalization, or are other factors in more of a key role?

1.1 Background

Miniaturization of technology and utilization of various software solutions in everyday business ventures are cutting through companies across industries. Not forgetting, for example, embedded systems and cloud computing. In history, companies which have been able to transform with the world and have been ready to change their working manners towards newest phenomena, have shown success in the long run. Today, embracing digitalized business and utilizing digitalization is among the key things to adopt for many in order to adapt and develop their operations. (Happonen et al., 2020b, 2019) It is not unimaginable to say that businesses must take digitalization into consideration in some form as disregarding it can cause significant barriers for companies aiming for continuous success in modern world.

Digitalized services have been around for a while now. And whenever there is a successful instance, it has brought changes to surrounding industry. For example, introduction of Uber and other instances of platform economy in Finnish market have introduced big changes into both the economy at large and everyday lives of individual people. But what about the companies themselves which make of the majority?

In this age, within Finnish context, there is a distinguished characteristic present in the business world; 99.8% of the Finnish businesses are categorized as SMEs (Small- and Medium-sized Enterprises) (“Yrittäjyys Suomessa,” 2008). SMEs themselves are companies categorized by their size of less than 250 staff members, or turnover of 50€ m or less. (European Commission, 2016) These smaller companies are vast in count and broad in diversity, but they are not operating isolated. Success of smaller companies is usually impacted by the directions the big players in their respective fields are going towards; but it is not that they are being “dragged along”, so to speak. In case of Finland, interdependence between companies of different size categories is strong. While majority of companies in private sector are SMEs, big companies dependent of the services they generate majority of the revenue from, for example, exports. (Pinomaa, 2018)

Whether companies in various countries have already been using digital solutions that for example allow shift towards remote-focused work, current situation has forced many to adapt. And these changes have also impact on customers, and for example their purchase behaviors. There is a search for the current key ingredients for success in this current “age of digital revolution” – and for what sort of things should SMEs prepare for soon, especially now in the middle of turmoil caused by COVID-19. For example, supply chains have already suffered from the ongoing situation. (Chowdhury et al., 2020)

This study on success factors of SMEs is made for software engineering department of LUT University. For this reason, the focus on the role of digitalization as a success factor is of great interest, and cause for topic selection of this study. In the following chapter the aim and purpose of this study is explained in more detail.

1.2 Goals and Delimitations

Main goal of this study is to investigate potential success factors associated with digitalization in terms of general success of a SME. To achieve this, relevant literature from past five years is reviewed. This search is mainly done to see what has been written regarding the topic of SME success factors during the past few years, before the current situation surfaced. To have a closer view about SMEs themselves, yearly barometer studies carried out regarding the economic state of Finnish SMEs from the same time period were included

to be reviewed. In addition, barometer studies regarding state of digitalization in Finnish companies and Finland in general were included. While hypothesis could be made about the boosting effect of COVID-19 on importance of digitalization as a success factor and list success factors directly found from earlier scientific literature, the companies operating in their respective fields may not see them as such themselves. Therefore, it was also decided to organize a few interviews with selected companies and organizations to get direct, hands-on feedback regarding their views on success factors and the role of digitalization as such.

As SMEs specifically are of interest, other companies are entirely left out from our scope. And to limit the geographical width of the scope, focus is to be restricted to Finnish enterprises. This narrowing is good for this study as majority of the Finnish enterprises fall under the size category of SMEs. To be noted, there are various types of SMEs operating in different fields. In this study, the focus will be on SMEs in general. This means that while different fields can be described to have differences in success factors, the aim is to take an overall look at the SME-sized companies. By looking at digitalization in SMEs, and what has been written in literature, it is to be seen if there are valid keys for success to be listed. In other words, to try to see if digitalization provides either apparent direct or indirect success factors or barriers for success related directly to the overall success of a company. It is then discussed if some of these factors could be generalizable outside of their respective fields and/or company size category. This creates the foundation for main goal of this study. This goal is to find success factors for overall success of a SME in terms of digitalization.

Because digitalization is focus in this, all surrounding topics such as digitization and digital transformation are out of scope. Although while these topics are out of scope, they can still be briefly explored and examined if they happen to be relevant. This is mostly due to their connection with one another. This connection will be explored in the second chapter. Regarding software solutions used in digitalization, it is also briefly examined what kind of role does the software itself play in success of companies undergoing the digitalization. Purpose is to see if success factors critical for success of the SMEs lay elsewhere entirely or is software among biggest reasons behind success fueled by digitalization. Because there are many different types of software and “software related” topics, an analysis on effects of specific types are not to be done, nor is there an aim to define all these various types. Scope on this is limited on view on software used in digitalization efforts on general level. From

this we might learn if handling the software side in a company is a key success factor in digitalization, or if other factors besides software are of bigger importance.

To summarize goals of this study, the following research questions were formulated:

- What are success factors relevant for a general success of a SME?
- How is digitalization relevant to the success factors of a SME?
- How are themes directly related to digitalization relevant to the previous?

1.3 Structure of the thesis

This thesis report contains nine main chapters. First chapter that you are currently reading covers the frame and overall background of the topic of this study. The chapter shortly describes reasons behind this study and thesis. This includes what the intended goals are, and what parts of the mentioned topic are included in the scope. Second chapter lays down definitions and covers the background around the topic of this study more in depth. This adds to the earlier chapter, providing more detailed descriptions. Examples of some statistics regarding the relevant topic areas of this study are also included.

Third chapter explains methodologies used in this study. In this section the steps done in the research and phases included in them are explained. In addition, this section will name used sources and reasons for selection. Fourth chapter describes academic literature review part of the study, which was done according to methodologies presented previously. This chapter aims to create view on success factors of SMEs in historical context with the help of earlier scientific publications. This literature is supplemented by more recent data, coming from yearly studies and few interviews. Contents regarding these can be found respectively in chapters five and six. Each of these chapters include results for each individual part of the study. While the results are not discussed further in these sections, the findings are recapped.

Seventh chapter contains the results analysis and discussion. Analysis aims to compare findings from literature research presented in the sections four through six with each other. Literature, both academic and non-academic, is also compared to the results of the interviews. Discussion continues with more personal thoughts and viewpoints on the earlier content. Lastly, the eighth chapter contains the conclusion of this thesis report. It shortly

summarizes background, goals, and main results of the study. Results and conclusions based and derived from the findings are summarized, and suggestions regarding the future are given.

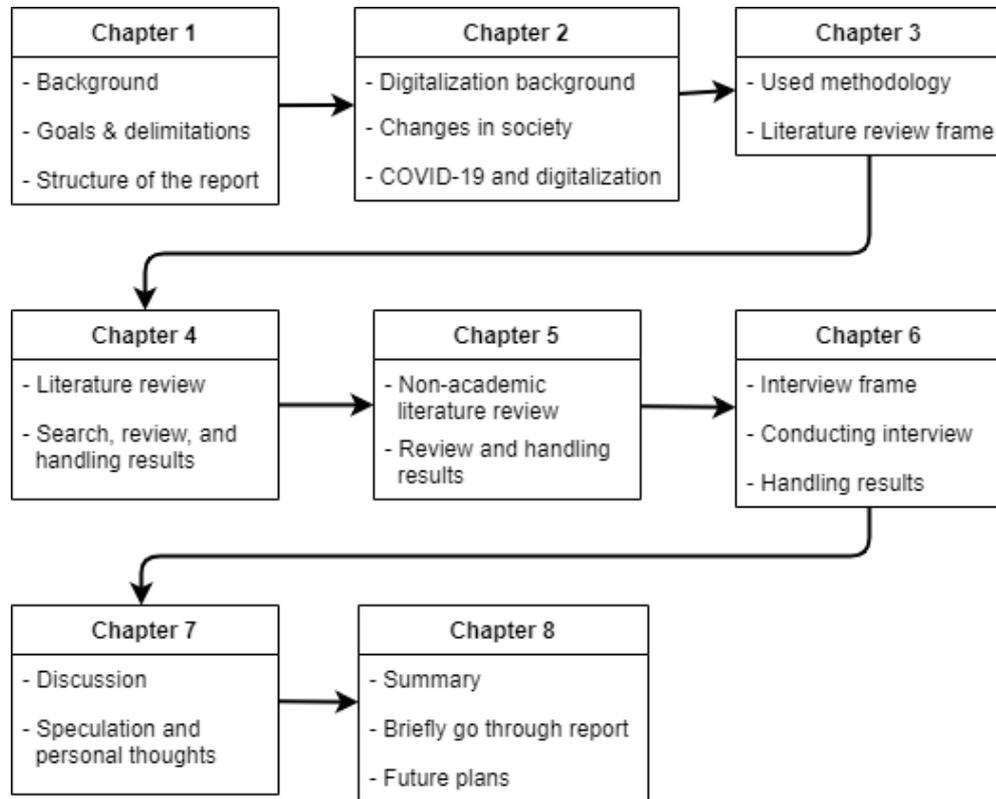


Figure 1: Chapter structure breakdown

2 DIGITALIZATION AND POST-COVID-19 WORLD

This chapter talks about digitalization, what it is about, and how the world has been changing lately. There have been four industrial revolutions so far, each bringing changes into how things work in various fields. For instance, the case with manufacturing industry: introduction of steam engines during first revolution, emergence of electricity and computing through second and third. Now we are currently amid fourth industrial revolution; introduction of intelligence and automation ranging from “smart devices” in both home and office to IoT monitoring and sensor-based technology solutions (Eskelinen et al., 2017), autonomous machinery, and vehicles being utilized in all fields.

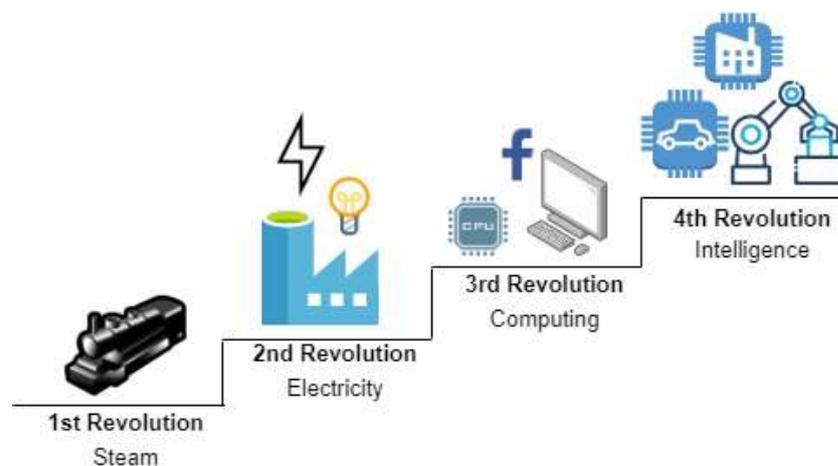


Figure 2: Timeline steps of industrial revolution

Digitalization is in a way core part of this new revolution. Fourth industrial revolution, also called I4.0, has been described to be emerging along newest step in our social evolution called “supersmart society”, or “Society 5.0”. This brings along elimination of unskilled labor in favor of automation and robots and rise in need for specialized labor. There is going to be a need for more research in the fields of digitalization and automatization. (Happonen and Minashkina, 2019) All changing the way how things related to work are handled; from definition of work to worker identity and worker-employer relationships. (Kurt, 2019)

What about digitalization? It does not happen by itself. You must have something that can be handled digitally - a digital representation needs to be created. It can be digitization of previously analog solutions such as paper forms in offices; or turning an entire workflow or

process into digital form. All in all, you need to start from somewhere. As commented by John Mancini, “Paper is a good place to start thinking about digital transformation, because it is the Achilles heel of most organizations. Paper clogs up processes. Paper creates disruptions to smooth information flows. Digital processes require digital information.” (“Taking the first step on your Digital Transformation Journey,” n.d.)

So, digitalization needs digitization, but together these are a steppingstone towards digital business. And a digital business utilizing digitized information in turn paves way towards digital transformation; enabling changes in a big scale, no longer restricted to the company itself. Overall, this process of bringing change into existing business models enables creation of new revenue and value-generation opportunities.

Digitalization process in companies usually happens in stages. Like with video rental, there may be medium changes or changing rental process into digital, but business model stays mostly the same; rental of physical objects. After a while business model may change from rental of physical to rental of digital, and maybe shift entirely to a subscription-based streaming service. That kind of service can then be used anywhere, anytime.

There are models which aim to explain through visualization this development. For example, the digital evolution model created by Combitech (“Combitech digital evolution model,” n.d.) shows road to digital transformation in five separate phases, through which services/products evolve as in the list below. According to the makers of this, most companies nowadays have gone through steps one to three.

1. Products
2. “Smart” products
3. Connected “smart” products
4. Ecosystem of industry’s connected “smart” products
5. Ecosystems connected with other ecosystems; interconnected ecosystems.

So, not only does digitalization change how companies themselves operate, it also improves networking with others. This can for example mean that value chains may strongly be affiliated with digitalization. That is because forming value chains is networking, collaboration, and shared innovation practices (Happonen et al., 2015; Happonen and siljander, 2020; Salmela et al., 2013) in one form or another, and digitalization can therefore

enable companies to perform better in this regard. Companies can, for example, make contracts specifically made between them and some other company, where they will work together on something; or where there's some customized product or service being provided. Alternatively, a company may be providing a widely used service such as a cloud computing solution for other companies in free market. In latter case there can be companies who are just customers buying a product, or companies who are in "mutually beneficial relationship" with those providing a service, component, or device. For example, through a beta-program with experimental equipment. In this case, buying company gets state-of-the-art tools and services, and selling company gets immediate feedback and insight on the state of the product they're selling.

Taking advantage of digitalization has benefitted companies around the world by, for example, allowing creation of new business models. (Eskelinen et al., 2017) Digitalizing business by, for example, creating websites for commerce or using cloud platforms has been done already all around. And this has worked well for companies doing this development work. But there has not been a big "push" for moving towards digital solutions, including those enabling remote work before. This changed with the current pandemic that has shaken things up globally, and companies needed to react to rapid changes. This included taking advantage of both preexisting digital capabilities and the implementation of new solutions.

The current year 2020 has been rough for all companies. Even in Finnish context there have been quick drop in economic outlook of SMEs. ("Pk-yritysbarometri," 2020) But while Finnish economy has gone down due to the current crisis, it has been better off than its neighbors'. Even leading economist of the Swedish bank SEB Robert Bergqvist says to be surprised of this success. (Jesse Kuparinen, 2020) It's no wonder that Finland has been said to be among those who handled COVID-19 crisis the best.

If there is found to be clear connection between digitalization and being a success factor, with COVID-19 boosting its importance, we can assume that government and politicians may want to keep the title of "being the best" by further supporting digitalization efforts of companies operating in Finland. For example, by finding ways to capitalize on digitalization-oriented activities in general. So, the question is: how does the digitalization play into general success of businesses?

3 RESEARCH METHODOLOGY

This chapter outlines the methodology used in this study. This chapter gives a generic overview of the methods chosen and their implementation. Detailed descriptions about what was done in terms of the implementation itself is provided in the chapters where the methods are used.

Academic literature material for academic material review of this study was to be collected from international online databases. Characteristics of both literature review and mapping study were used. Collecting and filtering literature material follows guidelines of systematic literature review. Model used for literature material search, collection, and sorting was based on guide to systematic review presented by Andy Siddaway. (Siddaway, 2014) Phases described can be seen in the figure three below.

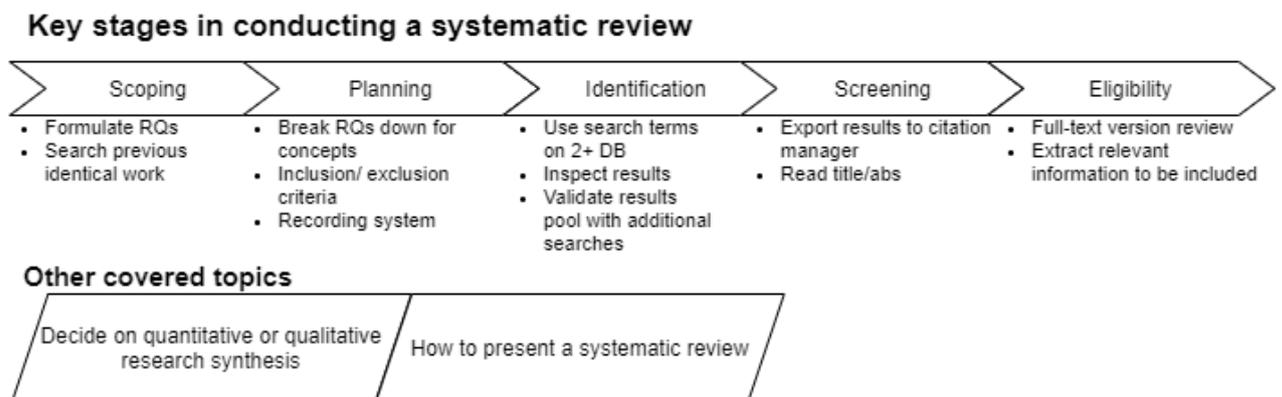


Figure 3: Siddaway's guide to systematic review

This model together with the contents of previously mentioned guide give information necessary to carry out a systematic review. The process includes five key stages, which start from deciding on topics and subjects of interest and research questions, ending up with sifting through full-text versions of potentially eligible publications. (Siddaway, 2014) Activities carried out in each stage can be seen in figure three above.

As previously stated, this study combines features from both systematic review and a mapping study. From the figure three stages one through four of a systematic review are followed, but the last stage is done differently, as it would require full-text review in-depth if the original guide were to be followed. Instead of sorting eligible content and

reviewing publications in-depth, the publications left in this stage are reviewed for an overview about their contents. And like in a mapping study, these publications are then categorized into different categories based on their topics.

The literature set contains academic publications from a selected time frame, which are determined to be relevant to the study through the prior process. Along this set, a non-academic source studies were planned to be included to be reviewed separately from the same time frame as the academic publications were searched from. These “barometer studies” are Finnish studies published on a yearly basis. They provide overall look into the “current climate” and how things may be developing, as the name suggest. Of course, related to the Finnish businesses in terms topic of each study. Reason for including these is to reflect on other sources from a viewpoint of Finnish businesses. Details on contents, results, and analysis will be discussed in chapter five, where these studies are reviewed. These barometer studies investigate economic situation of the SMEs, and the “digital state” of the nation, including companies, private sector and the citizens.

To compare current academic literature point of view and the point of view of non-academic barometer studies into the experiences of companies themselves related to the research topic a few interviews were also carried out. The interviews were done on selected representatives/employees of SMEs and/or organizations operating in Finland. Results of these interviews were then compared to contents of previously collected data from literature and non-academic studies.

The purpose of these interviews is to test the success factors listed in literature, and to get a viewpoint of people working in companies on findings. The style of the interviews was selected to be a semi-structured interview. This would allow more open answers from interviewees, and discussions about topics present in academic literature and non-academic studies.

Overall direction for research done in this study is qualitative. Collected amount of material from interviews is too limited in amount and scope for proper statistical analysis. Same can be said about barometer studies.

4 SYSTEMATIC LITERATURE REVIEW OF ACADEMIC LITERATURE

This chapter discusses the academic literature material search, handling, and reviewing part of the study. Steps taken and findings found are listed in the corresponding subchapters.

4.1 Sources, search, and filtering

Key stages listed in Siddaway's guide, as visually shown in the figure three in previous chapter, were followed from stage one through four. First stage included formulating research questions around which the search terms and keywords would be formulated in stage two. Keywords are the most important part of doing database searches for scientific publications. Therefore, and to follow the suggestions of the guide, search process started with coming up with potential keywords around the topics of the research questions.

To establish a baseline, few mandatory keywords were selected. These "base keywords" were keywords such as "SME" and its various variations like "Small- and Medium-sized Enterprise", and "success factors". These keywords were used in preliminary searches against various databases, and in order to define other keywords to be used along the way. For this purpose, general portals like 'Google Scholar', but also databases like Scopus, were used. Searches with keywords yielding both relevant and reasonable sized result pools were selected to be used later. Keywords were selected and generated through brainstorming, picking relevant terms around topics of interest such as digitalization and success factors, and picking common terms from results. In this stage the databases used to the actual search were not yet determined. For the purpose of quick testing, search portals such as 'Google Scholar' and 'LUT Finna' were used to get quick results. To be noted that even though search portal 'LUT Finna' was used for this study, it has been replaced by the service named 'LUT Primo'. ("LUT Primo," n.d.)

First few searches were done to test the validity of used keywords. This was done so that unnecessary or completely irrelevant topics would not be included in the results or included as little as possible. Modifying used keywords and filtering out bad keywords were done when required. This aimed to guarantee that mismatching results would not be included in

search results or included as little as possible. For example, if a term used in searches would happen to have multiple meanings depending on context. Like in the case of the keyword “SME”; it, as an acronym, can have various meanings. Aim was to include only those articles which talk about ‘Small- and Medium-sized Enterprises’ when searched with “SME” keyword. Other modifications done included, for example, search with “digitalization”. It needed to be shortened to “digitali-“form, so that not only results including correct “digitalization” term would be returned, but also those with incorrect “digitalisation” term.

Top 20 results from each search were quickly reviewed to see if results would be relevant when specific keyword combinations were used. Combinations were optimized and selected keywords were modified so that better results would be found. After generating keywords and testing their usability, those determined to be relevant were selected to be used in searches as various combinations. These keyword combinations, or “search phrases”, can be found listed in the attachment one. In total, nine search phrases were formulated.

Next step was to determine which databases should be included into the actual search, in which these previously formulated search phrases were to be used. Selected databases are from pool of databases I as author have prior experience and knowledge about. Used databases were selected by comparing the tools provided for search, sources from which these tools get their results from, and if the results of searches were satisfactory. It was also required that the quality criteria these databases have for their content catalogue could be believed to be trustworthy.

For this search, SpringerLink, WoS (Web of Science), Scopus, and ‘ACM DL’ (Association for Computing Machinery Digital Library) were used. When selecting specific databases, ScienceDirect was left out in favor of Scopus, as search tool functionality was better. Scopus was more flexible with its search tool, providing more options and filtering to choose from than ScienceDirect. For example, searches made with manually created query strings were allowed. This switch was fully acceptable, as both get their search results from Elsevier. “General search portals” such as ‘Google Scholar’ and ‘LUT Finna’, including the replacement service ‘LUT Primo’, were left out. This was done even though they were used to formulate the search phrases. Reason being that they provide wide range of varying results

from wide variety of different sources, all of which cannot be fully guaranteed to be creditable.

After the databases and search phrases were ready to be used, filters for content were determined. Only publications published in English since 2015 were to be included. Having only English papers would make the review process more efficient as translating content wouldn't be required, and majority of creditable publications are written in English in the first place. When selecting the time frame from which the publications would be searched from, last five years was deemed far enough. This time frame includes not only the latest papers but provides those that are done within the last few years. It is also important to point out that even when papers are published in 2015-2016, they are being worked at much earlier than that. Main purpose for this time frame selection was to guarantee that the relevant publications regarding the modern views on the topics of this study, for example around digitalization, were returned from the searches.

Additionally, publication type was limited to Journals/Articles and Proceedings/'Conference papers', while including yet undefined types in the case of Scopus. As WoS and Scopus allowed search for "Review" type publications, this was also included in filters. Reason for this was that while review-type papers are usually reviews made on existing literature, they might contain new viewpoints on those topics if published reasonable time after the original paper.

Different databases allowed search from different collections within them. Searches performed were done to core collections of their respective databases where applicable. This was done due to alternative collections mostly having content that was entirely irrelevant. Such content was for instance publications about medical field or data sets in WoS. Some databases, however, did not allow selection from alternative collections. This was case for Scopus and SpringerLink. However, SpringerLink was a little bit special case in this regard, as it allowed filtering results based on discipline or subdiscipline. The aim was to have around four databases selected, which process publications relevant to the topic of this study and those that provided results with searches to base collections. Based on the selection and preliminary searches, the four databases and settings for them as shown in the table one below was used.

Database	Search	Search notes	Year filter	Type filter	Misc filters	Result value taken from
ACM DL	Basic	Type filter manual refine, re-searched with wildcards removed in phrase searches (note on search tool)	2015-2020	All Publications: Proceedings, Journals	ACM Full-Text Collection	"Publications">"All Publications" list
Scopus	Advanced	TITLE-ABS-KEY search, terms used as-is	2015-2020	Doctype: ar, cp, re, Undefined	Lang: Eng	"Document type" filter
Springer-Link	Basic	Type filter manual refine, terms used as-is	2015-2020	Article, Conference Paper	Subdiscipline: Software Engineering, Include Preview-Only, English	"Content Type" filter
WoS	Basic	Topic search, 3 fields used, terms used as-is	2015-2020	Article, Proceedings Paper, Review	WoS Core Collection, English	"Document Types" filter

Table 1: Search filters and details per database

As mentioned in the table one above there were also some issues in using the search tool of the ‘ACM DL’. Instead of being able to use same predefined search phrases, there was need to create new versions specifically for the search tool of the ‘ACM DL’. Reason for this was the wildcard symbols (“*” and “?”) used in search phrases. As the search tool of the ‘ACM DL’ mentioned that phrase search did not allow wildcards, new search phrases with wildcards removed had to be made. These modified search phrases can be found listed in appendix two. Search tools of the rest of the databases allowed more wide use of wildcard symbols.

For the record keeping system it was decided to utilize Zotero citation manager and its storage to keep track of both filtered results now, and screened publications later. Excel was to be used for actual screening process, since it eased the creation of figures regarding the search results. It also allowed an easy way to add notes to each search result, while giving possibility to keep track of different search result sets in separate tabs. After the record keeping system was in place, the actual search could take place.

Differences in search result counts were surprisingly drastic in some instances when comparing databases. While this is not investigated in this study, the impact of this difference can be seen in the figure four below. A majority of filtered out results were solely from SpringerLink. The previously mentioned discipline-filtering was used to lower the amount of given results drastically, as the amount of results was otherwise too big without making changes to the search phrases themselves. “Software Engineering” was chosen as subdiscipline-filter. As this study is done for the Software Engineering department of the LUT University and given that the topic of this study revolves around digitalization, this was determined to be acceptable filter to lower the results amount to acceptable levels.

Results from each database were combined into a single set. Overall, it can be assumed that the search and selection was done well enough, given strict filtering the material went through. Resulting set was at the size of 845 publications, as seen in the figure four below. This count still includes duplicate entries, which were removed once results were imported and readied for screening. Stages forward are covered in the next chapter.

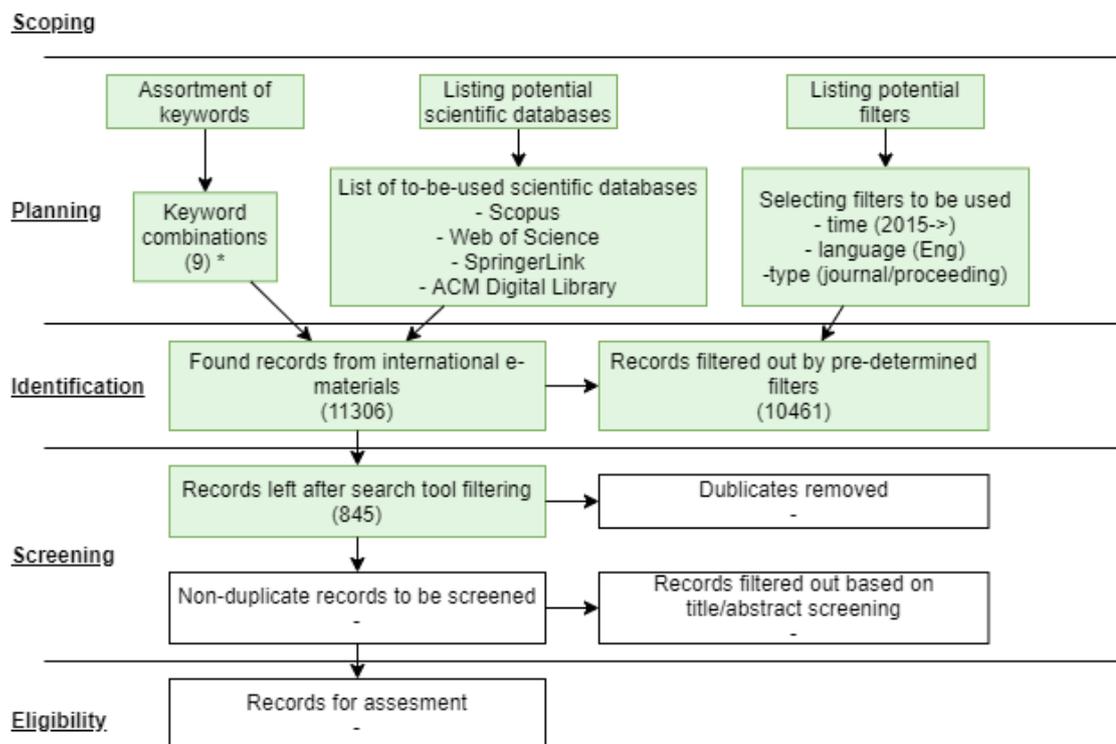


Figure 4: Literature search process based on Siddaway’s systematic review guide. Situation after ‘Identification’ stage.

As mentioned previously, Zotero was used to collect and save the results, and Excel was used to sort them out afterwards in the fourth stage of the process, screening. In this phase, during the import of the search results, some issues were faced. It was noticed that the Zotero add-on used to import search results did not import all the returned search results, and as such those missing had to be manually collected. This was mainly an issue with ‘ACM DL’, as some results were collection of multiple entries which were probably not recognized by the Zotero add-on.

Because of this observed issue with importing, the search was remade to the databases in order to ensure that all results were included. Because this re-search was done at a later date, there were bound to be more results included in the total amount. It was identified that there were indeed results which Zotero add-on could not import, but there were also entries which were not imported before for unknown reasons. The figure four was updated to include all these previously missing results, in addition to the few entirely new results.

4.2 Handling the search results

After the filtered search results have been imported into Zotero, from which they were exported to the Excel-document, the actual screening stage could be started. Figure five below shows amount of search results before screening process, shown distributed between search phrases and individual databases. This figure has still duplicates contained in its numbers, but this is done so that the search results of separate databases are fully represented in the diagram. ‘ACM DL’, SpringerLink, Scopus, and WoS had in total 250, 219, 189, and 187 results in total respectively.

The result sets for S5 and S6 were extremely low with when compared to the rest, with two and zero results respectively. Based on the keywords used in the search it can probably be safely assumed that combining “Digital convergence” with other keywords lowered the results pool drastically. However, in order to search solely the SME-related publications, it was deemed necessary to include “SME” and its variations in the used search phrases.

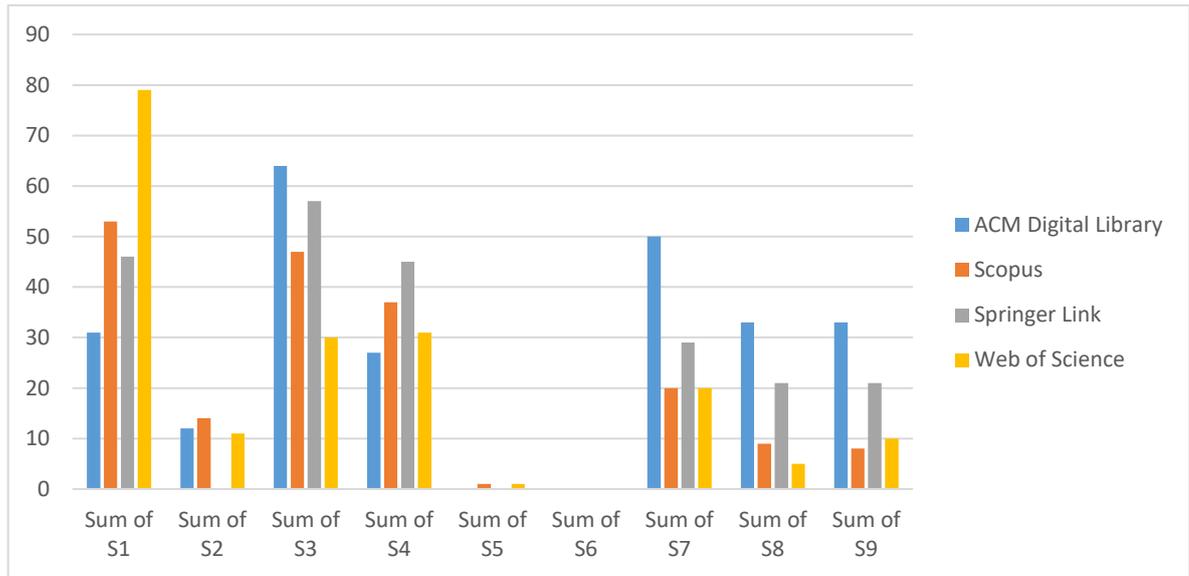


Figure 5: Filtered literature search results count per database (before screening)

Once the results set was in Excel, the duplicates could be removed. This dropped amount of publications in results set from 845 to 548. After this, a sensitive screening process whether results are included into the final list of included publications. This stage involved going through each search result individually, briefly looking at its title, abstract and attached keywords, and deciding on its relevancy. Relevancy criteria for this process stage was that any publication had to be about understanding general success or barriers to it, or about improving the success of a company. This means that if a publication discusses about implementation of a technology, critical success factors regarding some technology, or simply improving some specific process or activity within a company, it will not be included. In other words, publications need to be about directly impacting the overall success and performance of a company to be included.

Based on this, the results were sorted into “YES”, “NO”, and “MAYBE” categories. Results in first category were instantly included, results in second category were instantly discarded, and results in last category were to be determined later. “MAYBE” category was used if a result was considered somewhat difficult to immediately include or discard.

Scoping

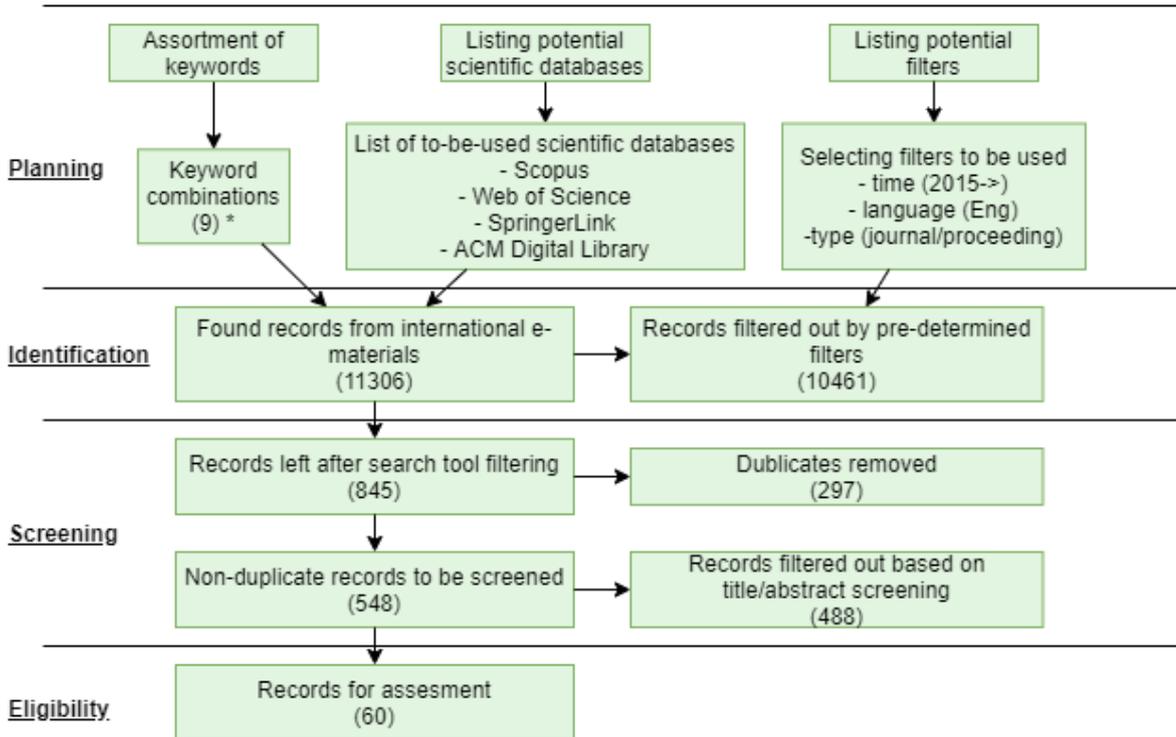


Figure 6: Literature search process based on Siddaway's systematic review guide. Literature search complete.

During this screening process, the total pool of publications was lowered to a size of 60. These publications that were left from the screening stage can be found listed in full in the appendix three. The total amount of publications rises steadily each year, even after being filtered by the screening process. This can be seen in the figure seven. While current year 2020 falls short in comparison, the topics in screened publications are being written about increasingly more each year.

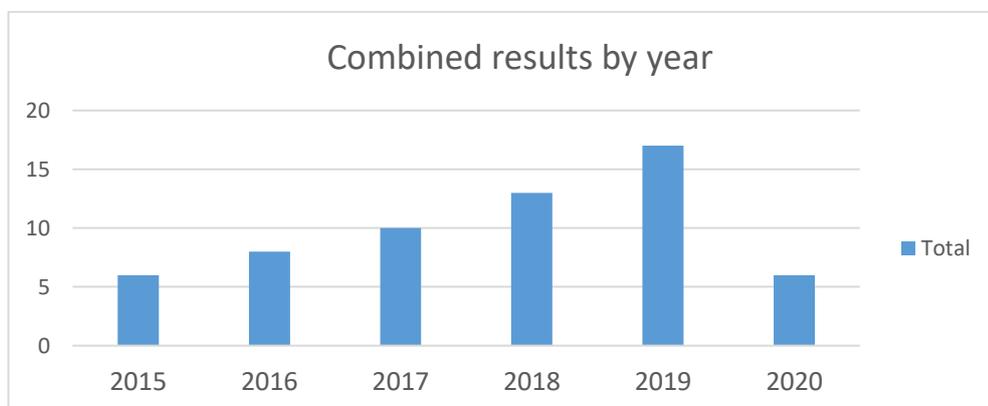


Figure 7: Filtered literature search results count by year (after screening)

Results counted by type are somewhat evenly distributed between conference proceedings and journal articles, the amounts being 34 and 26 respectively as seen in the figure eight. Higher amount of proceedings makes sense, as the topic of the digitalization and the keywords used in the search phrases lean towards more technical side. Proceedings tend to be more common on technical fields than journal articles.

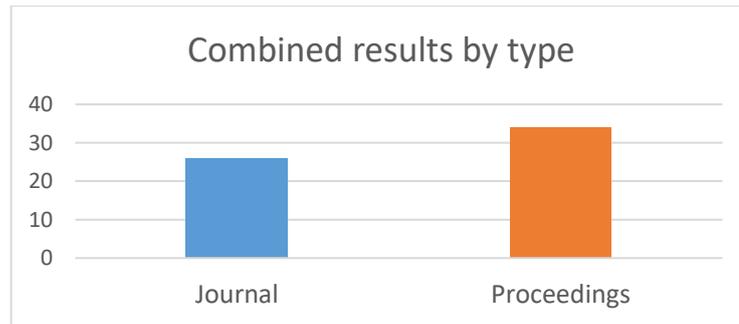


Figure 8: Filtered literature search results count by type

After the screening stage was completed, the next and final stage in the literature review was the “Eligibility” stage. As previously stated, this phase was carried out differently from what was described in the literature review guide by Siddaway. (Siddaway, 2014) Instead of reading full text of each publication in-depth while extracting relevant information, they were briefly read through for their contents and filtered into categories based on topics they discuss about. This is done in fashion like how a mapping study is carried out. A set of categories was created based on topics surrounding digitalization, while taking topics mentioned in the abstract or keywords of the publications into consideration. This was partly done during the previous screening stage. Final list of the topics/categories selected for this last stage can be seen in the table two below.

ID	Topic/category	Description
C1	Industry 4.0 (topic)	Discussed about I4.0 directly
C2	Company (size <= SME)	Discusses about enterprise(s) that are as big, or smaller, than SMEs
C3	Company (other size)	Discusses about enterprise(s) which are any other size than SME or smaller
C4	Innovation (business model)	Discusses about innovation regarding business models
C5	Innovation (other)	General discussion about innovation related things, like the innovating itself
C6	Business performance (any)	General discussion regarding the performance of an enterprise
C7	Understanding success/failure of business	Aim is to understand things directly related to the success of a business, or discusses about it
C8	Networking (B2B)	Discusses about networking and networks between enterprises

C9	Collaboration (B2B)	Discusses about collaboration among businesses
C10	Framework/Model	Formulates and/or presents a framework or a model on something
C11	Tech utilization (about using technology)	Utilization of technology in or regarding companies is discussed
C12	Entrepreneurial mindset	Discusses about entrepreneurial mindset, or things directly related to it
C13	Entrepreneurship (general)	Discusses about entrepreneurship in general
C14	Digitization/Digitalization	Discusses the topics of digitization and/or digitalization

Table 2: Categories and their descriptions

The category sorting allowed to see the most often occurring topics in the final set of publications. So, the list of 60 publications in appendix three were matched against these categories. This was made by adding each relevant identifier from table two above for each of them individually by reviewing their contents without doing an in-depth analysis on them. Full list of the categories explained in table two including matched publications for each of them can be found in the appendix four. The amount of matched publications per category are visually shown in the figure nine below. The data is from the previously mentioned appendix.

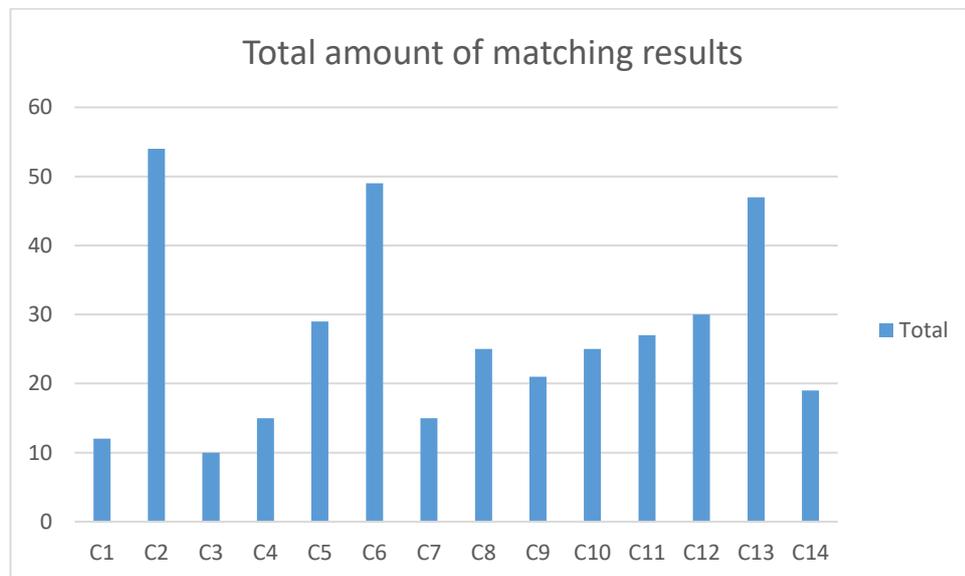


Figure 9: Topic/category match count by ID

During the review of publications for the category matching, the contents were briefly read through. By doing so the contents could be screened for things related to the success factors. These related items found from contents and reviewing the results of topic/category matching are discussed in the following chapter.

4.3 Findings

When sorted ascendingly based on total matches per category, the results of the previously performed topic/category matching can be divided into four groups. The sorting of these categories into groups is based on the difference between first and last item in group in such a way, that this difference is similar across all the groups. In this case the difference used was approximately five units per group. This split formed two groups of four and two groups of three, starting from the low end.

Out of the match counts, categories C2, C6, and C13 stand out with most of the matches. These categories being “Company (size <= SME)”, “Business performance (any)”, and “Entrepreneurship (general)” respectively. These categories are the biggest by match count. This is as expected, since the search focus was on SMEs and their success factors, and entrepreneurship in general is related to businesses. The drop between rightmost group and the second from right is also biggest drop between groups, and between individual categories. Rest of the slope is gradual, as seen in the figure 10 below.

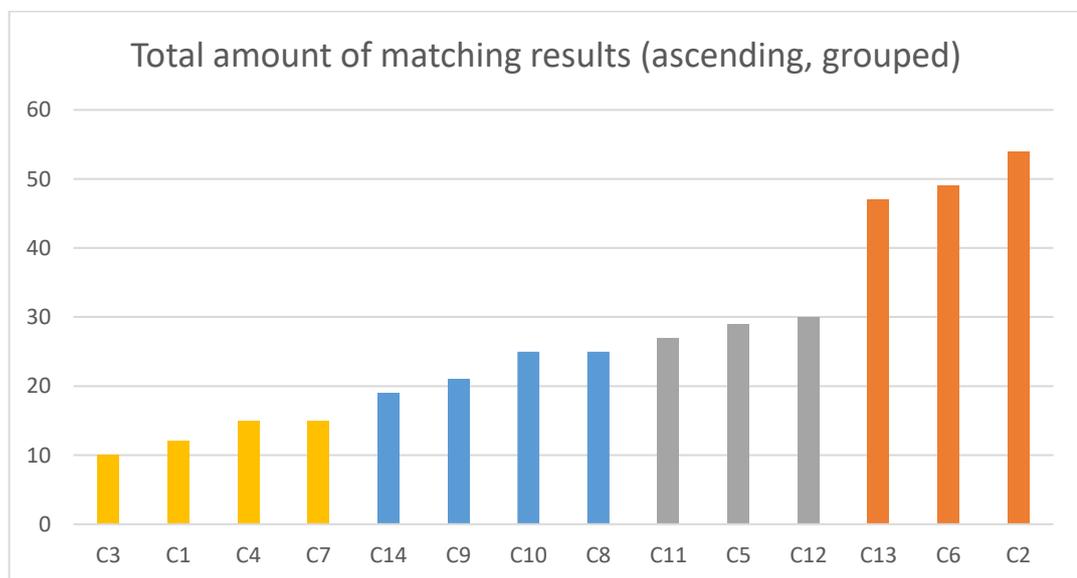


Figure 10: Topic/category match count listed ascendingly by size and grouped together

Second group from right includes “Entrepreneurial mindset”, “Innovation (Other)”, and “Tech utilization (about using technology)”. First two can be imagined fitting together theme

wise, while innovation can fit together with utilizing new technology. Second group from left includes “Networking (B2B)”, “Framework/Model”, “Collaboration (B2B)”, and “Digitization/Digitalization”. Here, collaboration and networking can fit together, but digitalization can be used as enabling factor for them. Leftmost group contains “Understanding success/failure of business”, “Innovation (business model)”, “Industry 4.0 (topic)”, and “Company (other size)”. These topics appear the least in the final pool of 60 publications. “Company (other size)” being in this group makes sense, as the search was solely focused on finding publications regarding SMEs. However, some in this category could also be included into C2 category, but the companies referred in them were called startups. As these do not have defined size, they are listed under C3.

4.3.1 General factors regarding success, category C7

Because categories C7, C14, and C1 are all topics related to the topic of this study, their results will be looked separately first. After this, the contents of the rest will be looked at together. To start with the publications under the first category, C7, the discussed topics are about success of a company in general. These included various general factors that are directly related to the success of a company, and factors that have negative impact on success by causing, for example, discontinuity of a business.

In general, the success factors related to the overall success of a SME were categorized into three categories. These were factors related to the personal factors, like entrepreneur themselves, internal factors, which are related to the company itself, and external factors, which are related to the environment the company operates in. To start with the role of the entrepreneurs themselves, they have a significant role in SMEs. Having beneficial characteristics of the entrepreneur are beneficial for the general success of a company. These entrepreneurial traits include internalized drive for success and self-efficacy, proactiveness, and risk-taking attitude. Proactiveness especially is related to the ability of seeking and taking advantage of opportunities, but to take advantage of those a capability of calculating and taking risks is required. Proactiveness and willingness to adapt were mentioned to go well together in improving success of a company.

In addition to the entrepreneurial traits which are connected to the entrepreneurship itself, there were also other factors about the individual itself. Adequate levels of personal know-how from experience and education was mentioned, but also the capability to learn new things. Along this, a positive attitude towards innovation is also required. Willingness and readiness for marketing in general, but also skills required to do so, were also often mentioned capabilities related to the success.

While managerial capability and management skills in company are a must. Managerial competencies included ability to general planning, organizing, and managing all resources available, including human resources. Poor management was listed among principal causes for failure, followed by financial deficiencies. However, the entrepreneur themselves does not need to have this know-how, provided there is someone in the company has them. Related to the know-how present in the company, the human capital, including collective skills, knowledge, and experience, was mentioned to be of great importance for a company. Regarding the human capital of a company, the cohesion within the workforce of a company was mentioned to influence success of a company, as it plays to the overall motivation of the employees. For this, having a way of managing the internal culture of a company is needed, so that the internal sense of identity can be made clearer.

Economic-related factors such as the state of the micro- and macroeconomic setting, but also having access to financial support and enough capital were listed to a positive impact on success of a SME. Partly associated to this previous setting, but also by itself, the regulatory environment the company operates in places the restrictions and guidelines which the companies must follow has an impact on success of a company. Along with the legal and regulatory environment, and the previously mentioned economic environment, the political, socio-cultural, and technological environments matter as well. Regarding the surrounding companies, the business networks and the position of the company in relation to them have were mentioned to have positive effect on success of the company.

Having a clear market vision for the company was mentioned to be important. You need to know what the company does. But not only does having a market vision enough, there is a need for a long-term vision as well. And paired with the earlier willingness to market, proper marketing strategies are required from a company. Internationalization or capability to do so

if necessary was important. This was also mentioned to be partly related to market and product development, as ability to respond to competitive challenges and needs of the customers is important when going international. In general, capitalizing untapped markets and market niches by being proactive has positive effect on success.

4.3.2 Digitalization and I4.0, categories C14 and C3

The C14 category contains publications with topics regarding digitization or digitalization. Considering that these are among the main topics of this study itself, the total pool of publications is at relatively good 19 matches, considering the used search phrases. There is one shared match with C7, that being R13, which outlined the “digital orientation” for digital businesses. It involved a combination of three strategic orientations for a company, which were learning, market, and entrepreneurial orientations. This combination was mentioned to be about positioning a company in way that the opportunities presented by digital technologies were taken advantage of. This included attitudes related to this activity, such as proactive innovation.

The documents in C14 were not about factors directly related to the success of a company as those in C7 category. The topic of discussion is related to digitization, digitalization, ways those can be utilized, and their impact on performance of the company. These include success factors related to the digitalization process itself, including requirements and challenges regarding it. Factors related to this were things such the adoption of IT, enough related know-how among the employees, and strategy used to drive this digital change. Strategic planning in companies, especially regarding IT, need to take digitization within the company into consideration.

Usage of digital collaboration solutions, with a supportive company culture, improve the collaboration performance among SMEs. SMEs can get value from operating as part of an ecosystem, where different companies create value through collaboration. Relationship performance between companies can be improved with digital transformation, but that by itself is not enough. Smart technologies are needed to take full advantage of this digitalized state regarding the collaboration between companies.

Innovation is a success factor for achieving competitiveness. Digitalization can be used to support and enable innovation in companies. Implementing innovation enabling technologies improves collaboration in business networks. Also, implementing technology transfer between companies can benefit the innovation activities related to exploiting opportunities related to technology. Digitalization also provides advantages by improving performance and productivity, but also by enhancing market access. This is the case with, for example, traditional shops. Adding an online channel to reach customers improves the customer experience and provides competitive advantage for the company. In general, having enough knowledge and familiarity regarding market the company operates in has an impact on how well the positive effects on digitalization can be utilized. When it comes to companies that sell a product for their customer, using digitalization to improve servitization and customer engagement can provide competitive advantage to the company

Even though the I4.0 is common topic in literature, the amount of publications with this topic directly were on the low end of the screened 60 publications at 13 matches. The matched results share two with matches in category C14, those being R5 and R29. There are no shared matches with earlier C7. The publications in this category were mostly about implementation of I4.0, including approaches to it, enabling factors, and challenges regarding the implementation.

I4.0 pushes towards using digital solutions to transform companies. Business models do not guarantee long-term success in rapidly changing environment. For this, proactive business model innovation is required. Openness and being agile and flexible organizationally are important characteristics for a SME intending to implement I4.0 into their company. This involves having a culture of innovation within a company, but also having a necessary expertise. SMEs have the benefit of agility thanks to their size, but resources and know-how are often limited in SMEs.

I4.0 has an impact especially on manufacturing industry, as digital solutions change manufacturing processes, but also impact logistics and business models. The implementation of new technologies brings an increase in automation, but to benefit from I4.0, the need for integration of various separate IT frameworks is needed. Integrating design and design management into company and its business model in I4.0 can create value by having positive

impact on innovation and competitiveness. Competitiveness of SMEs in I4.0 can also be supported by utilizing controlling management. This can also improve innovation capabilities of a company. I4.0 involves and enables collaboration not only within the company, but also between other companies in value generation network.

4.3.3 Rest of the publications, Categories other than C3, C7, and C14

Rest of the papers, which are not included in previously mentioned categories C3, C7, or C14, end up with total amount of 17 publications. And as these are from any specific category, the contents are miscellaneous topic combination of other, remaining publications. These included topics such as cloud computing and use of social media. Regarding cloud computing, taking use of it gives a SME possibility to improve reduced costs and cost efficiency, but also enables them to become more agile with the use of scalable cloud solutions. Most common issues with cloud computing for companies were security and privacy concerns. Regarding social media, usage of it for corporate communication was mentioned to give advantages to the SMEs, according to study made in Arab world. These advantages involved, for example, providing a direct way to communicate with clients.

New technologies allow new directions and solutions for companies. Business intelligence and business process management were mentioned as potential tools for achieving performance improvements in SMEs. In order to continue performing well, and in order to achieve competitive advantage, companies need to keep innovating. In a framework suggested in a study, new IT innovations and using existing innovations in new ways were linked to sustainable performance of a company, while the organizational agility of the company plays an intermediary role. Traditional management in SMEs may not be enough in modern, dynamic market environments. Therefore, it was suggested, that an agile, collaborative mode of management should be used. This involves integrating the employees into the management process and utilizing a wide sharing and usage of knowledge within the company. By doing so, the company could achieve higher levels of innovation and growth.

Market development process before entering the markets is important for a company intending to go international and enter another market. And for international success, the

role of the capabilities of the entrepreneur is important. Entrepreneurial and market orientation practices have positive impact on performance of a SME, as said in study made in Egypt. It was also found that external environment has a significant impact on success of an SME. Being able to take advantage of opportunities and adapt to market challenges is required to succeed.

SMEs can get advantages from technology spillover, while knowledge spillover plays an intermediary function. This makes a positive impact on international growth of the SME. This was described in a study about companies in Chinese market. Internationalization itself has been mentioned to provide business development opportunities for companies, selecting an appropriate entry strategy for new market is important. However, not all strategies are suitable for every company. In addition, switching between strategies during the internationalization process can be difficult.

Startups lacking competences usually search for them from external sources by contracting other companies. These contractual partnerships have a potential of becoming a long-term partnership by adopting a role of a boundary spanner. When collaborating with other companies, negotiation coordination can benefit the activities by solving interoperability issues. Model for such was suggested in a study. For starting companies which struggle with low capital, crowdfunding can be a way to mitigate these issues. The way how a specific crowdfunding campaign succeeds is, however, depends on selecting the correct platform, and making sure the project is marketed in an appealing manner.

5 REVIEW OF NON-ACADEMIC LITERATURE

While academic literature gives a creditable source for finding success factors for SMEs, COVID-19 has caused big changes in how the SMEs operate. There is more uncertainty in the current situation than what would have been in the case of non-COVID-19 situation. Given the time frame in which most of these studies were done and published in, and the time frame of current worldwide situation, they might not provide the best indicators about how state of SMEs has developed during the past year specifically. For this case yearly barometer studies can provide a good reference for general view on yearly changes, which can also be used to supportive material for what academic literature provides.

Because the research work for this study is done in Finland, Finnish barometer studies are used. Included studies are twice a year published ‘SME Barometers’, and once a year published Digibarometers. Time frame from which these are taken is same as for the used academic literature in this study. This means any publications since 2015. Details on what these barometer studies are, when they are done, and who and to whom they are made are described in their respective subchapters, starting with ‘SME Barometers’.

5.1 SME Barometers

‘SME Barometers’ are studies published twice a year by ‘Suomen Yrittäjät ry’. The studies are carried out by ‘Suomen Yrittäjät ry’, Finnvera, and Finnish MEAE (Ministry of Economic Affairs and Employment). The ‘SME Barometer’ reports themselves are authored by economists of ‘Suomen Yrittäjät ry’. Both regional and national reports are published, with both focusing on slightly different viewpoint. (“Pk-yrittysbarometrit,” 2016)

‘Suomen Yrittäjät ry’ is an interest and service organization for SMEs and their owners, with aim to improve the position of entrepreneurs and the conditions for entrepreneurship, and to make Finland an entrepreneurial society. They provide various services to their members, such as lobbying and counselling services. (“About Suomen Yrittäjät,” 2016) Finnvera is a specialised financing company owned by the State of Finland and it is the official ECA (Export Credit Agency) of Finland. The company provides financing for the start, growth and internationalization of enterprises and guarantees against risks arising from exports.

Finnvera is responsible to the MEAE. (“Finnvera in brief | Finnvera,” n.d.) MEAE itself is part of the Finnish government, responsible of creating conditions for economically, socially and ecologically sustainable growth. (“The Ministry of Economic Affairs and Employment,” n.d.)

The purpose of ‘SME Barometers’ studies is to observe and describe activities and economic operating environment of the SMEs in Finland. They aim to comprehensively describe perceptions of Finnish SMEs about the changes in these, and the factors affecting their business and development prospects. Single ‘SME Barometer’ study is based on the answers received from Finnish SMEs with sample size of 4000-6000 respondents. (“Pk-yrity sbarometrit,” 2016)

5.2 Digibarometers

Digibarometer is a yearly study published by ‘Taloustieto Oy’, executed by ‘Etlatieto Oy’, and released by multiple parties. For example, at least ‘Finnish Ministry of Transport and Communications’ has been among them during the past five years. ‘Taloustieto Oy’ is a publisher of economic literature and a subsidiary of ‘Research Institute of the Finnish Economy’ ETLA (Elinkeinoelämän tutkimuslaitos). ‘Etlatieto Oy’ is also a subsidiary of ETLA. It is a research unit, which mainly does empirical business and industry research into current megatrends. It is funded by external project funding. ETLA itself is a non-profit organization, which receives its third of its funding from supporting organizations in “supporters’ association”. Rest of the funding comes from research projects funded by public agencies, various ministries, ‘The Nordic Council of Ministers’, EU (European Union), and private foundations. (“ETLA - Funding,” n.d.)

These digibarometer studies measure the digital position of the nation and the changes that have taken place in it, also in relation to other countries. They measure the digital position of the nation in three fields: public sector, companies, and people. In these studies, the performance of Finland is compared to that of other countries of similar size and market area, but also to biggest players in global scale such as the USA. Including the one published this year, three of the digibarometers since 2014 have been formulated around a central topic

which changes from year to year. In these cases, the reoccurring content is still found in the abstract and appendix of the report. (“Digibarometri,” n.d.)

5.3 Findings

‘SME Barometers’ were screened from spring 2015 till fall 2020. Given that there are two barometer studies published each year, the total amount included here is 12 reports. For Digibarometers the same time frame was used, but those are only published once per year. In total, six of them were therefore included. All reports of both barometer studies will be briefly investigated in this chapter, starting with ‘SME Barometers’. After those are concluded, the chapter continues with look into Digibarometers. All the graphs shown in the following chapters were made by the author of this thesis by utilizing information available within the ‘PK Barometer’ and Digibarometer reports published between the years 2015 and 2020.

5.3.1 SME Barometers

Although the graphs have shown direction upwards in 2015 and a peak in 2016, starting from the ‘SME barometer’ of fall of 2017, the economic outlook has been diminishing. Turnover growth has been falling, investments are lacking, reduced, or put on hold, and new work is being generated increasingly slowly. These same general trends have continued up until the latest report from the fall of 2020. In addition to these, decreasing amount of new work is being generated in the companies, and lack of skilled workforce has been as issue.

Investments are not being made in Finnish SMEs, with reasons for this being listed factors such as funding issues, mostly due to tight financial insurance requirements, and lowered turnover growth. However, starting from fall of 2019 it has been mentioned, that the companies are utilizing instant credits to mitigate the bottlenecks caused by lack of funding. In addition, the emergency funding for companies granted due to the COVID-19 situation has been utilized by companies after the spring of 2020. The environment in which the SMEs operate is changing quickly, so there is need to develop the company and adapt. But which factors are most important?

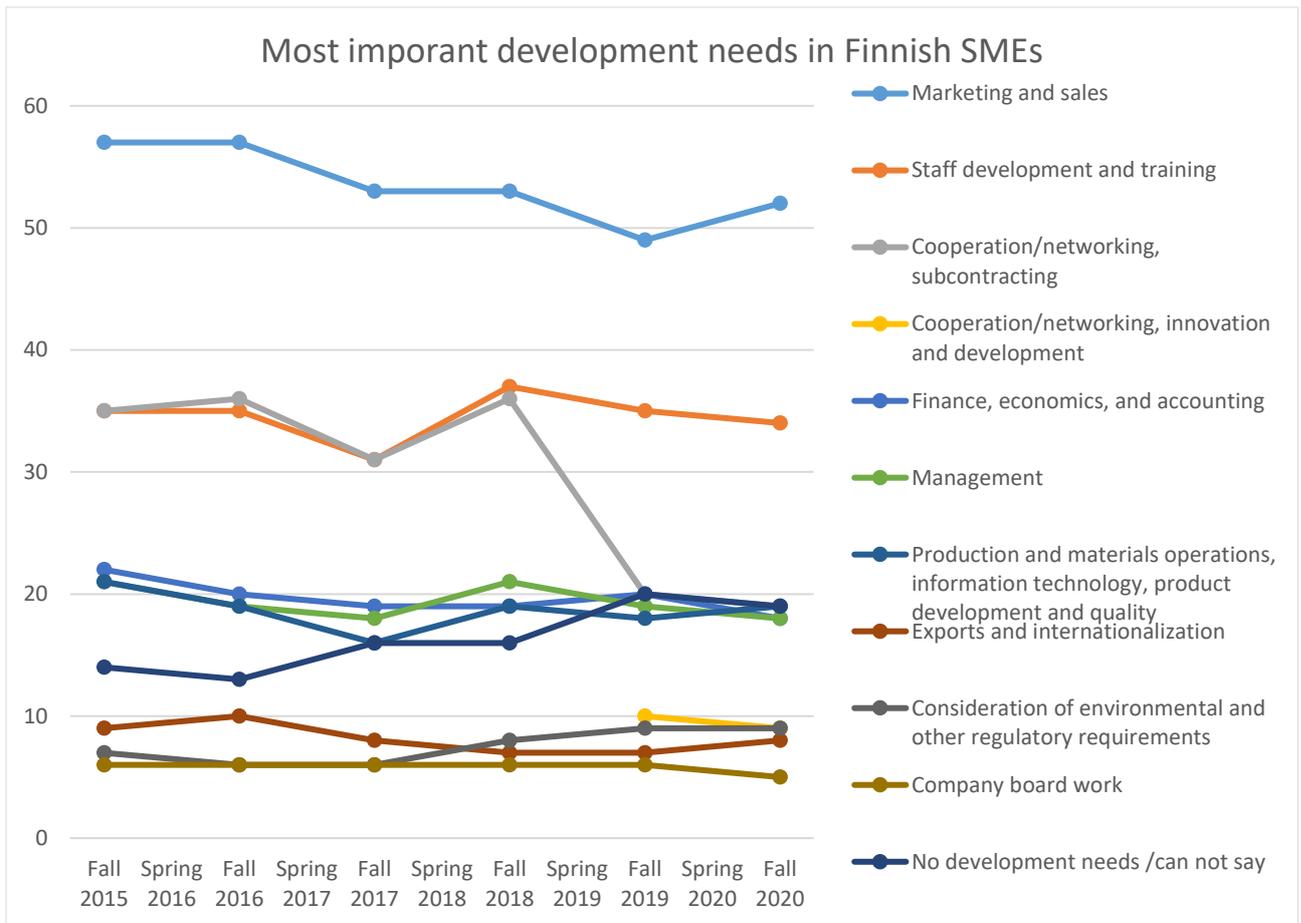


Figure 11: Most important development needs in Finnish SMEs 2015(Fall)-2020

The figure 11 above shows how the outlook on various development needs and their importance has been changing in during the years. Generally, majority of these most important development needs have stayed mostly stable and unchanged for Finnish SMEs. However, ‘Marketing and sales’ has increased in importance while rest of the development needs continue in their gradual decline in importance. For example, the ‘Staff development and training’ has continued decreasing. Current impact of COVID-19 crisis is not seen clearly impacting majority of the important development needs. If anything, the impact is that the graphs have slowly declined.

There is one oddity in figure 11, mainly about the gray “Cooperation/networking, subcontracting” graph. It takes a drastic drop from fall 2018 to fall 2019. This is impacted by introduction of the new “Cooperation/networking, innovation and development” graph, shown in figure 11 in yellow. It starts from the same year where the gray graph takes a dive.

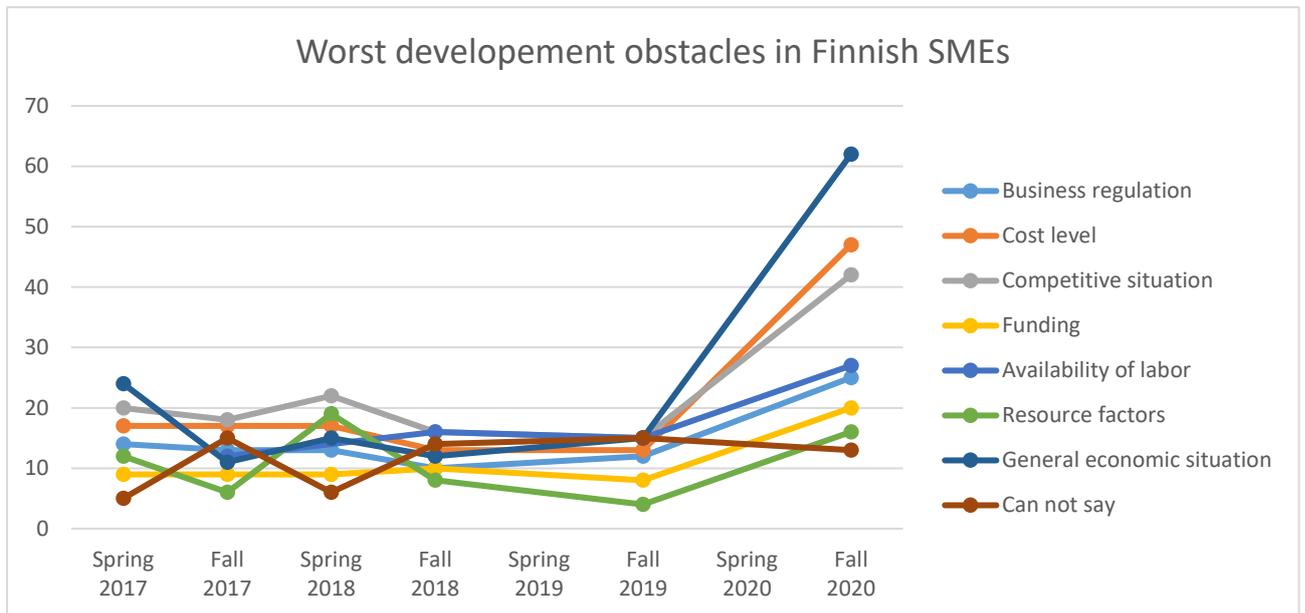


Figure 12: Worst development obstacles in Finnish SMEs 2017-2020

The most important development needs didn't change that much, even in the light of events of last year. However, the worst development obstacles, which were surveyed and recorded starting from spring of 2017, have taken a drastic turn in the past years. As seen in the figure 12 above, all worst development obstacles for SMEs have skyrocketed in relevance. While obstacle like 'Resource factors' has gone up and down during the last few years while the rest of listed factors have stayed mostly stable in their percentage counts, everything is going up this year. This is most likely impacted by COVID-19 crisis, increasing the amount reported for all development obstacles. Biggest increase observed in top three has been with 'General economic situation', 'Cost level', and 'Competitive situation' respectively.

Digitalization and utilization of digital solutions has been growing among Finnish SMEs, but the overall rate of the growth has been small. Usually the development has been taking form in increasing competences related to digital operating environments and ability to take advantage of digitalization. Also, taking cloud-based solutions into use, utilizing social media as a channel, and increasing the acquisitions made online have been ways to further digitalization in SMEs lately. In addition, starting from 2018 the usage of AI (Artificial Intelligence) has become one of the drivers the companies seek growth with.

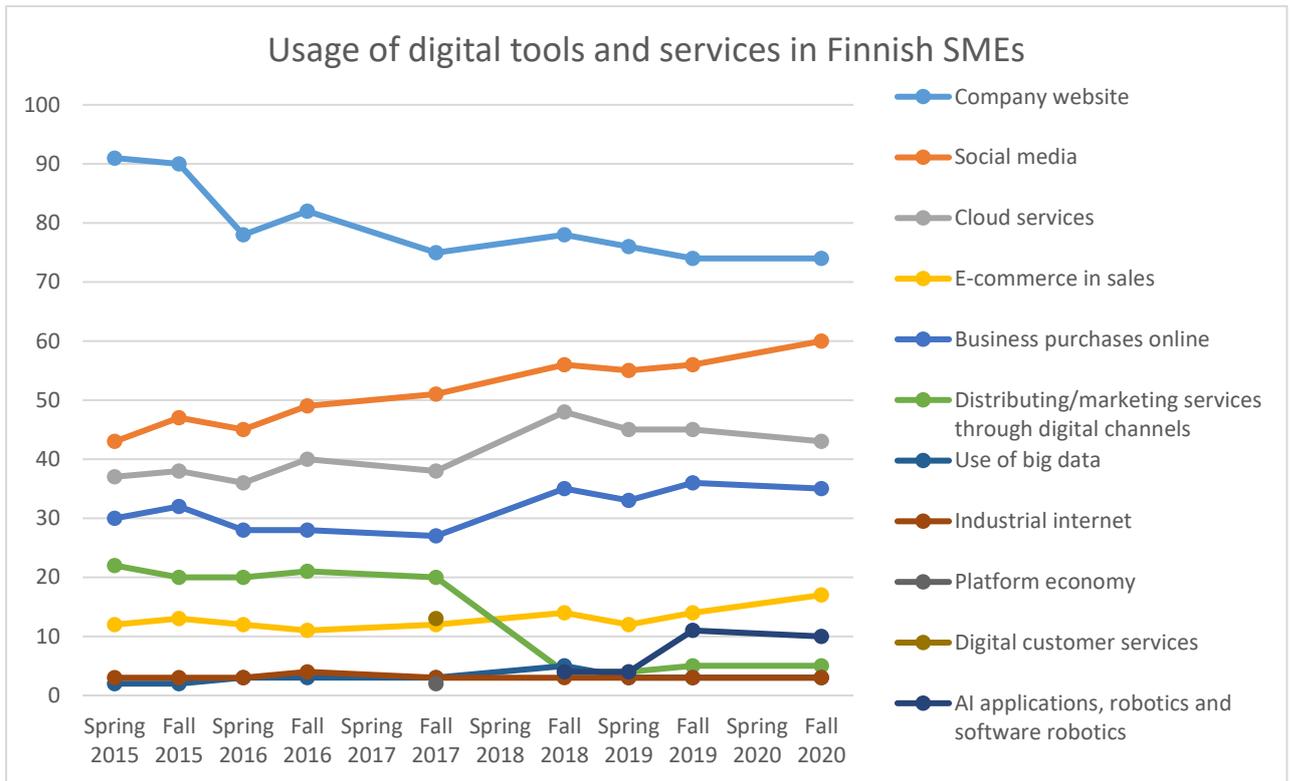


Figure 13: Usage of digital tools and services in Finnish SMEs 2015-2020

As previously mentioned, the utilization of digitalization has been in slow rise in Finnish SMEs. This slow growth can be seen in the figure 13 above, where digital tools and services utilized by Finnish SMEs are listed. For example, use of ‘Social media’, ‘E-commerce in sales’, and “Business purchases online” have been rising slowly but steadily over the years. When looking at the last year, during which the biggest changes have happened. ‘E-commerce in sales’ and ‘Social media’ graphs have taken noticeable climb, while rest are either stable or slowly declining. Given the current COVID-19 situation, and the restrictions to movement of people because of it, having these two graphs going upwards makes sense. Green graph can be seen to take dive between fall 2017 and fall 2018, but that is because of changes in how the questions were asked. The graph carries forward in gradual manner after this point in time.

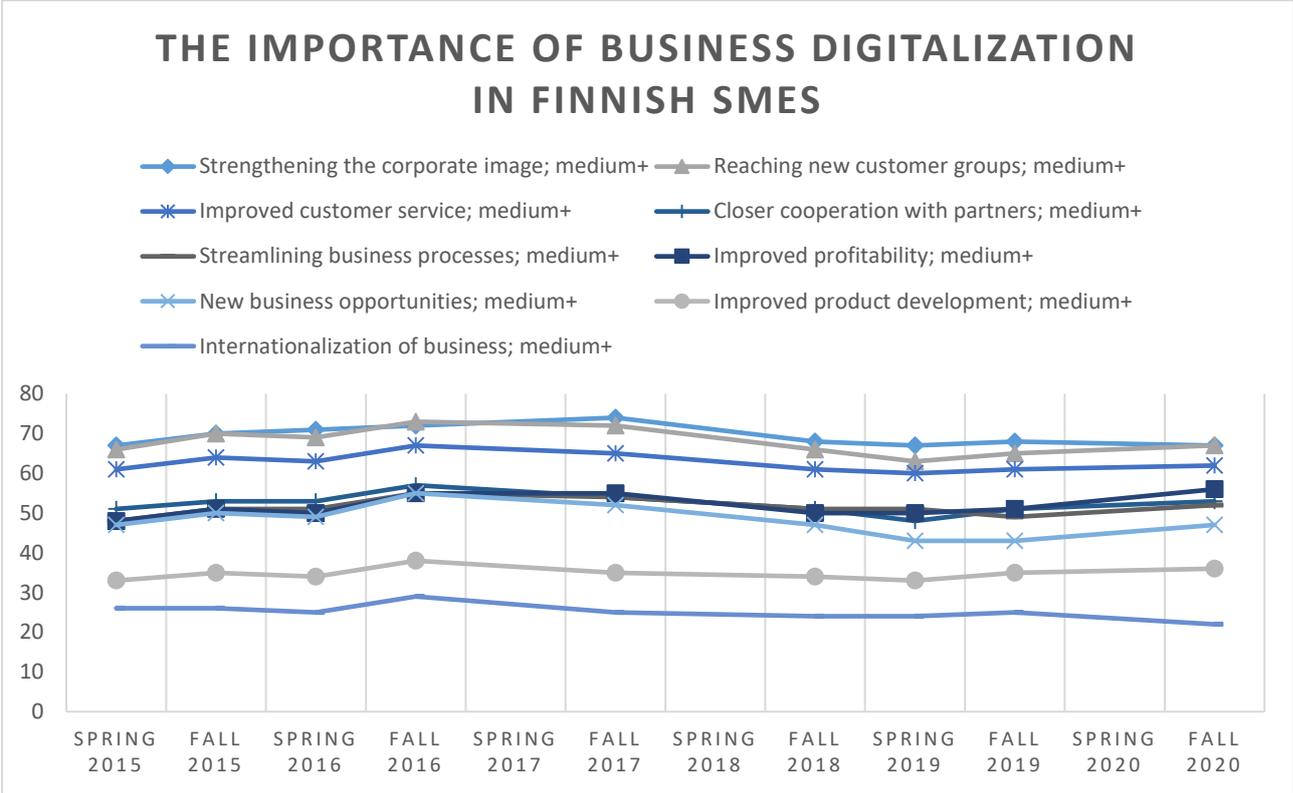


Figure 14: The importance of business digitalization in Finnish SMEs 2015-2020

Importance of business digitalization has been rather stable in Finnish SMEs. As the figure 14 shows, the impact from the use of digitalization has been rather unchanged in the past years. However, during the last year specifically, the graphs show an increase in impact on ‘New business opportunities’, ‘Reaching new customer groups’, and ‘Improving profitability’. Rest of the graphs have stayed stable, but ‘Internationalization of business’ has visibly declined. This goes along with the current situation caused by COVID-19, in which companies have hard time staying operational. Importance of reaching customers, staying profitable, and trying to stay operational by taking advantage of new business opportunities comes from the unique situation the companies have ended up in.

Companies have been repeatedly been said to seek growth from innovation, renewal, and internationalization. Key tool in renewal being innovations, along manufacturing and product development. Starting from 2018, innovation cooperation has also risen to one of the commonly mentioned ways the companies seek growth, in addition to innovation activities in general which have been present during all previous years.

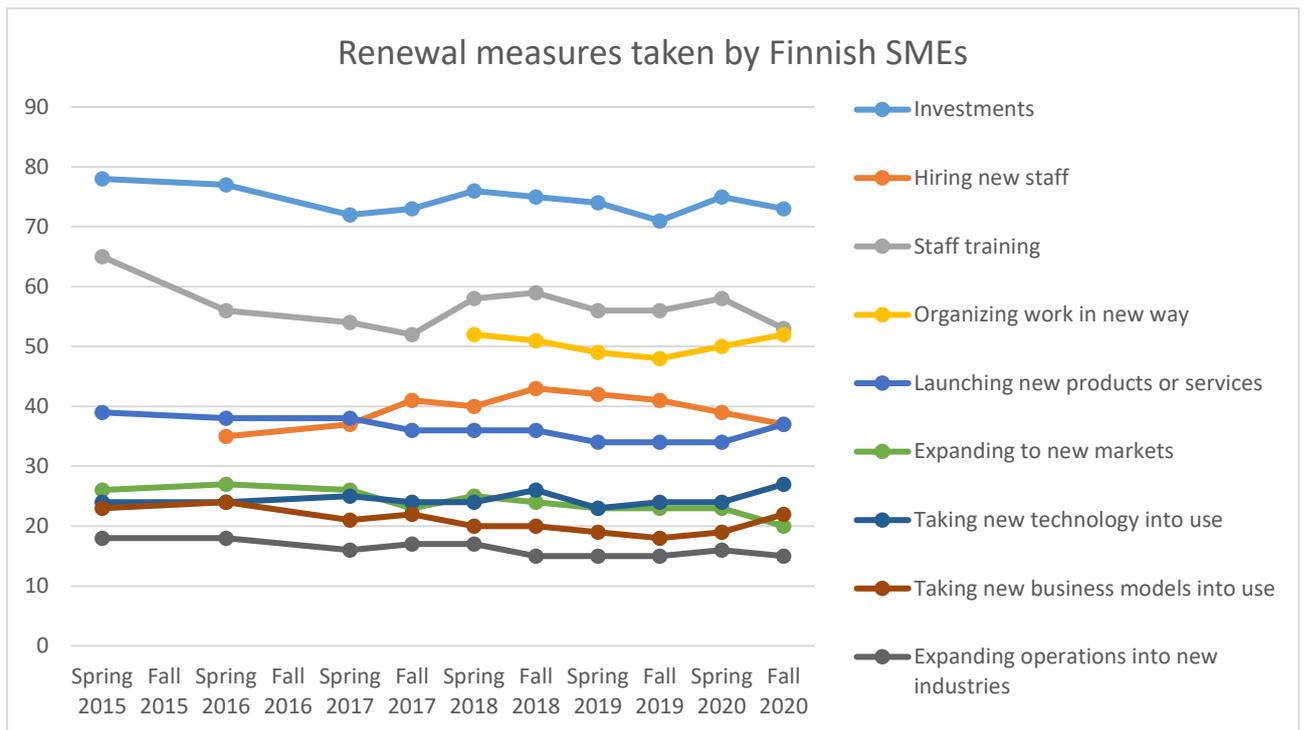


Figure 15: Renewal measures taken by Finnish SMEs 2015-2020

Figure 15 above follows the summaries given in reports themselves, which indicate steady decline in hiring new staff, for example, due to difficulties hiring skilled workers, and in investments made by the SMEs due to declined turnover. While ‘Hiring new staff’ has been in decline for the past years, the ‘Staff training’ as a measure for renewal of a company has taken a drop during the last year.

Impact of global COVID-19 crisis can be seen in how the renewal measures taken by the SMEs has changed during the last year. Because companies are struggling due to restrictions, they must start doing things differently in order to stay afloat. This can be seen in increase in ‘Organizing work in a new way’, ‘Launching new products or services’, ‘Taking new technology into use’, and ‘Taking new business models into use’, as shown in the figure 15.

5.3.2 Digibarometers

Digibarometer is mainly concerned in doing yearly evaluation of digital state of nation in Finland and few other selected countries. This involves measuring how well countries have been able to take advantage of digitalization, when measured from perspectives of three

sectors. These include companies, citizens, and public sector. And from each of these sectors, the stages of implications, utilization, and capabilities regarding digitalization is measured.

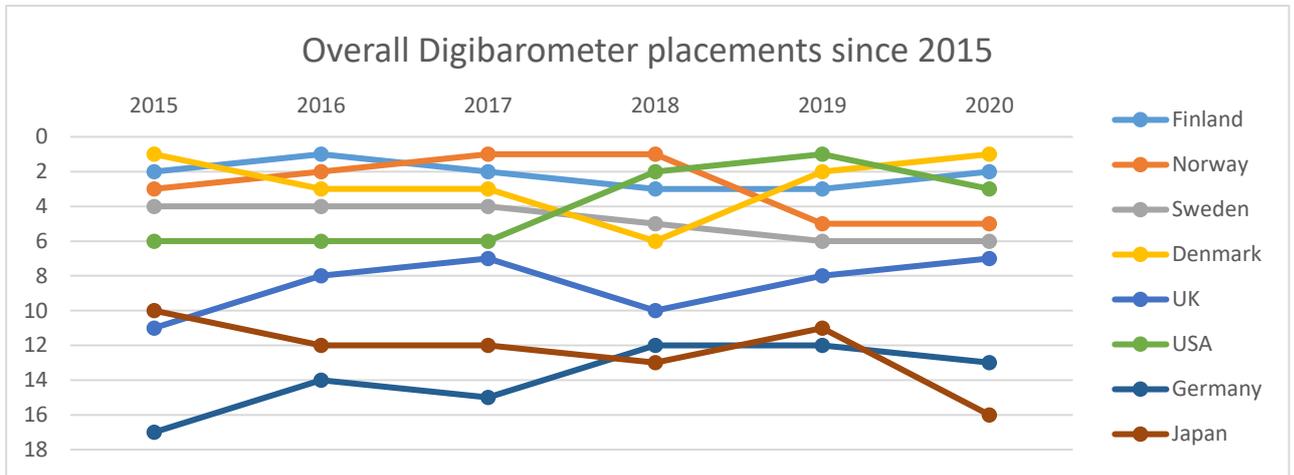


Figure 16: Overall Digibarometer placements 2015-2020

Overall placement of Finland in the Digibarometer has been steadily in top three, among other Nordics like Denmark, as seen in figure 16 above. This means that Finland has been, in the general sense, able to take advantage of digitalization. However, this graph doesn't tell the whole story. The figure 16 does not directly tell which sector and which factors are behind this score. To do so, the individual sectors and their segments need to be reviewed. Because this study is done concerning success factors of SMEs, the focus will be on the company sectors in the published Digibarometers. This means that the sectors regarding citizens and public sector will not be reviewed in-depth. Company sector of Finland, including all its stages and the overall yearly placement of the sector, can be seen in the figure 17 below.

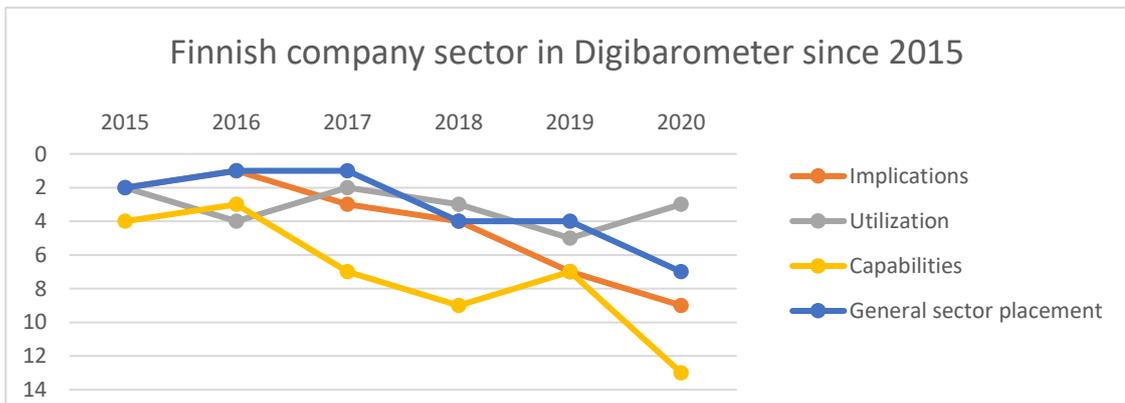


Figure 17: Finnish company sector and its stages in Digibarometer 2015-2020

General placement of Finnish company sector has been in steady decline for the last few years. In 2020, Finnish company sector makes a bigger drop for the second time in the time since 2015. First drop in 2018, and second drop in 2020. “Utilization” graph stays somewhat stable, while “Implications” and “Capabilities” keep on going down. From this you can see that the Finnish companies are not doing well digitalization wise, even though the utilization graph implies that technologies are being used. All in all, company sector is not the sector keeping the overall rank of Finland as high as it currently is in the Digibarometer. Credit from this belongs to citizens and public sectors. To view what the Finnish companies are lacking, it is necessary to list out individual indicators used in each stage, including the rank of the Finnish companies in each of them.

<u>Stage</u>	<u>Indicators (and rank of Finland in 2020 Digibarometer)</u>
<i>Implications</i>	<ul style="list-style-type: none"> • ICT (Information and communication Technology) has an impact on competitiveness (6) • ICT fulfills the needs of the company (1) • Online business purchases (4) • Impact of ICT-capital on GDP (Gross National Product) (19)
<i>Utilization</i>	<ul style="list-style-type: none"> • Utilizing ICT in B2B transactions (3) • Utilizing big data in business (9) • Considering information network security (2) • Using social media for business (8)
<i>Capabilities</i>	<ul style="list-style-type: none"> • Using fast broadband connection (4) • Technical capabilities to utilize cloud services (16) • Recruiting process from ICT-field does not have issues (9) • Company websites has IPv6 readiness (9)

Table 3: Finnish company sector stages and indicators in Digibarometer 2020

From this table 3 above, the factors the Finnish companies are seen performing worst are lack of impact to GDP from ICT and lacking technical capabilities to utilize cloud services. Besides these there are multiple other factors where rank of Finland has been lower, at

around 9. Lacking in these points means that ICT is not used properly to improve competitiveness, and that recruiting new people with ICT expertise is not working without hardships. Finnish companies are also behind in IPv6 readiness, big data usage, and social media usage. In short, Finnish companies do use digital solutions, but they are capitalizing on them. Central issue with Finland is that new business models and services haven't been able to be created by utilizing digitalization. Even though Finland in general has one of the best capabilities to take advantage of digitalization, but there have still been problems in creating new digital operating models and services. Quite often, the digitalization is thought as an accessory for corporate strategy, not as a starting point for it. New technology itself is not the solution, but the way it is used. Cloud services and digitalization enable a performance increase for a company. For example, last time a big digital leap happened was when Finnish companies moved email services to cloud.

Application and effects of AI can be categorized into two supporting regions. AI as a pillar of internal processes of an organization, and as a building block of services, products, and functions of an organization. AI enables more automation to be implemented, but AI is also utilized to generate turnover through other products and services. Companies utilizing AI are more often the bigger companies, as shown in the figure 18 below.

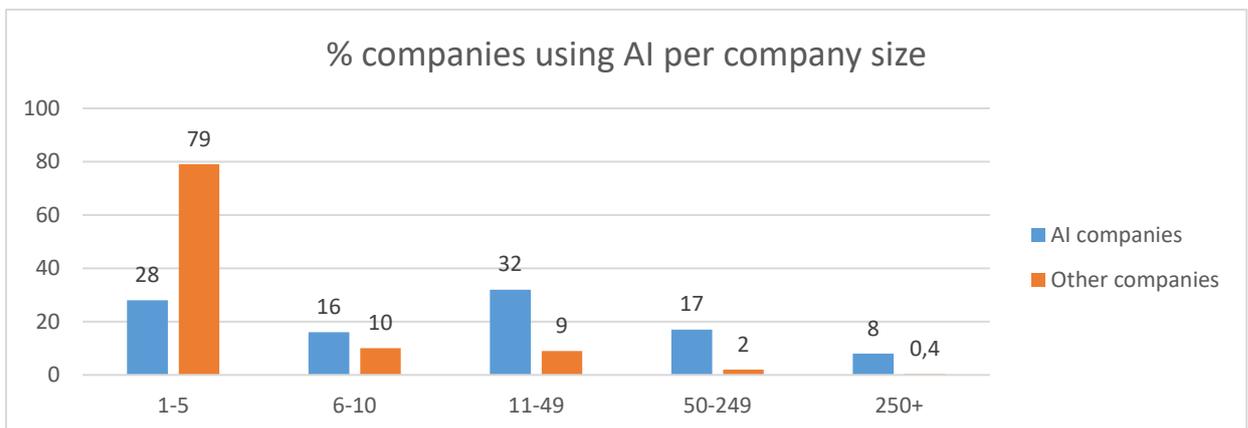


Figure 18: Percentage of companies using AI per company size (2017)

Emerging technology creates the conditions for the change of existing markets and creates new types of markets and industries in the long run. Culture of experimentation could be used to find out more about limits and possibilities of technologies. It is possible to achieve significant competitive advantage in the rapid application of new, more intelligent solutions.

Companies that are digitally prepared, and who have been investing in digital sales and marketing abilities, can achieve growth faster. Digital capabilities and abilities, but also the ability to create new business online are extremely significant regarding general economic growth. In digital sales and marketing, understating of capabilities from the perspective of technology, organization, and data, are at the center. Digital capability correlates with the growth rate of a company. Although the cause-effect connection between digital capabilities and growth rate is not studied, it can be stated, that taking advantage of digitalization is one of the ways to faster growth and market success for almost every company. For example, the industrial marketing is digitalizing. Included here are industries like textile and logistics. But, the most digitalized industry is still the consumer-oriented commerce.

Digital transformation of sales and marketing needs both technologies and digital know-how, but also fast and adaptable organization, and way to collect data. Enormous amount of data is generated from various sources, such as IoT (Internet of Things), social media, or online advertisement clicks. This data can be refined, and analyses, products, and services created based on this make the data valuable. Collected data is multipurpose, and it is different in nature than historical data from, for example, an internal system. Utilization of big data grows as the size of the company grows, but the utilization in general is becoming increasingly more common.

Different information systems are increasingly merging into digital platforms, and these platforms play an important role in the changes happening in modern information systems. Information moves between different parties in new and faster ways, moving towards more systematic and wide-reaching networking. Cyber security is now more relevant than ever. Rapidly changing technologies cause lack of skills in companies, bringing forth more challenges regarding cyber security. Cyber security as an expertise is a combination of technical and strategical capabilities. It involves perceiving the big picture, and importance of a broader business expertise. While cyber security is important part of operation of companies, it is poorly visible in communication and marketing of companies. However, this depends on size of the company, as the figure 19 below shows. The bigger the company, the more of the emphasis is placed on cyber security. It also affects whether information systems are regularly tested for security vulnerabilities.

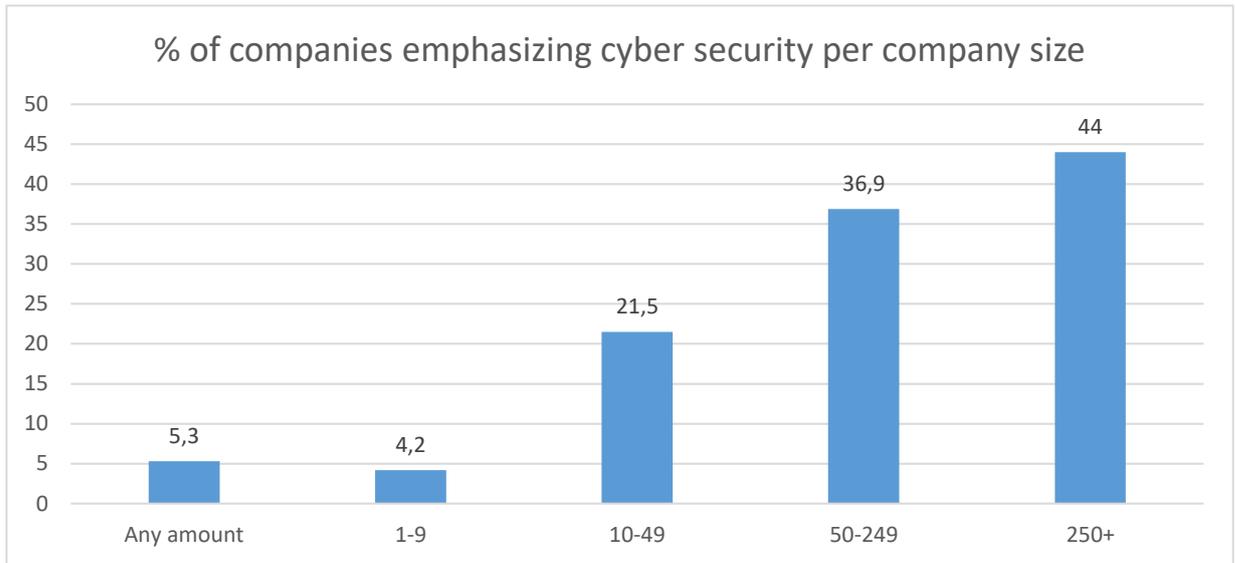


Figure 19: Percentage of companies emphasizing cyber security per company size (2020)

SMEs are in a weird middle ground when it comes to cyber security challenges. Cyber security challenges are primarily related to shortage of skills and lack of resources. Medium-sized companies are “in the middle” in terms of cyber security. Because of their size they are starting to be tempting targets for potential hacking and data breach, while the internal cyber security practices and staff capabilities might not be on similar level to bigger companies, causing potential security vulnerabilities.

6 INTERVIEWS

Purpose of the interviews in this study is to receive viewpoints from knowledgeable people regarding current situation and success factors of SMEs, and to test general findings from literature by asking comments on them. The results are then used as supportive material in this study. Planning, formulation, and conducting the interviews in question are described in this chapter.

6.1 Interview frame formulation

Type of interview selected for this study was a semi-structured interview. This method was selected because focus is on qualitative data collection, as these interviews are to be used as supportive sources for other sources used in this study. As such, goal is mainly to test potential success factors and statements mentioned in both academic and non-academic literature. This includes things such as trends shown in yearly Finnish barometer studies, but these are mostly related to Finnish context. Secondary goal was to see if there might be some individual success factors present in the interview answers, which did not surface from the literature.

Interviewees themselves were selected for the interview based on their current experience and history regarding businesses and business activities. These people were contacted and briefly questioned for their interest in taking part of an interview. Because interest is in collecting qualitative data, the number of interviews was to be limited to just a small pool with size of five conducted interviews. But before the interviewees were contacted, the base frame for the interviews needed to be created. This was done to have some frame of reference on the contents of the interview if questioned about by the potential interviewees upon contacting them.

Because the interviews are going the semi-structured, a comprehensive list of specific questions is not going to be created. Instead, questions surrounding topics of interest are used, and the interviews themselves flow forward in similar manner to a discussion. These questions are then organized into sections into the overall interview frame. First section in the interview frame contains the introductions. In this section the purpose of the interview is made clear to the interviewee, including the allocated time slot unless one has already been

previously agreed upon. The interviewer explains briefly who they are, for what purpose and to who these interviews are carried out. Before the actual interview can begin, permissions regarding audio recording and anonymity are asked from the interviewee before moving to the next section. Second section is about the background information of the interviewee. In this section the background information regarding background, current position, and earlier experience and education of the interviewee is asked from them.

Once the general information regarding the interview and the interviewee are sorted out, the interview can move to section three. Questions regarding general success are asked in this section. These include the open question about the success factors of company, more specifically a SME, and a question about which fields are flourishing despite the currently ongoing global situation. Also asking if the interviewee is aware of some companies operating in the IT-field that are struggling, even though currently hot topics such as digitalization could be expected to be relevant especially for them. After this, the questions move on to ways the SMEs can overcome their struggles brought upon them by the current COVID-19 situation And if and how the export-related issues and limitations can be handled as the economy and company operations are hindered by restrictions.

After the general success of the SMEs is taken into consideration, the fourth section moves along with the digitalization related questions. Of course, the terms used are defined as they have been earlier in the chapter two of this report. The questions in this chapter involve the general view of the interviewee on the role of digitalization in terms of general success of a SME, and what would be required from the company in order to succeed in the digitalization process. In addition, a question about the areas which are, as of now, of importance to the companies regarding their operations. For example, regarding aspects the companies have a need for development for

Last two sections were discussions regarding the generic success factors mentioned in the academic literature, and outlooks provided by the non-academic literature. This involved listening to the opinions of interviewees on them. After this, the interview would be concluded. The interviews are supposed to be a way to get feedback from the interviewees regarding topics of this study, and their opinions on both the topics and what was found in the literature. The frame of the interview which was created based on the descriptions in this

chapter can be found in the appendix five. Individual sections, short descriptions for their contents, and all questions/topics included in each of them are listed.

6.2 Conducting interview

Interviews were to be conducted remotely by utilizing services that allow remote conferencing, mostly due to the current COVID-19 situation. From tools that provide this type of service ‘Microsoft Teams’ was selected as it is widely used and accessible. While Teams also possess a recording function, an external solution was to be used for recording only the audio locally. Audio recording/editing software named Audacity was deemed fit for this role, and it allowed only the audio to be recorded locally for later review. The interviews followed the previously created frame, with approximately one hour being reserved per interview for each interviewee. At the beginning of each interview, permissions regarding anonymity and recording were requested from the interviewee. If a recording permit was given, the audio recording would be started at this point and stopped when the interview was concluded.

First interview was done without any supporting presentation or material. While the course of the interview followed the premade frame in structure, only the interviewer saw what was going on and what was being written down. To ease the interviewing process, and to have a point of reference regarding currently discussed topic in the overall structure of the interview, a slide set representing the frame of the interview was created with ‘Microsoft PowerPoint’. Because the interviews were done remotely with ‘Microsoft Teams’, this slide set could be shared with the interviewee while the interview was still ongoing, allowing them to view the current topic/question when and if they needed. As this slide set could also be used to write down answers received from the interviewees, it would allow the interviewees to see what was being written down. This in turn could also allow the interviewees to provide feedback or corrections regarding the answers during the interview.

After the interviews were carried out, results were collected in a document. Its contents consisted of the combination of all the answers received from the interviewees during their respective interviews. In the process of writing this document the recordings were used to fill in more information, provided that the recording permit was given during the interviews

themselves, and that the recoding itself was successfully saved and available. Summary of topics and points discussed in the interviews, and therefore listed in the created document, are covered in the following chapter.

6.3 Interview answers summary

All the interviewees had educational background from higher education, from either technology or economics. The answers received from interviewees were along the same lines with one another. All see the importance of digitalization in the modern companies. In general, the opinion on digitalization was positive, and that the importance of it in the operations of SMEs is ever growing. For example, a company, especially one on the consumer market, that lacks online presence and is not even in some way digital, does not technically exist. And the revenue through online stores and investments towards getting one has increased even more thanks to the current COVID-19 situation.

Companies have had technical tools at their disposal for some time. And under the current situation there has been a push to utilize these capabilities, if they already exist, to move towards digitalized remote solutions. In a sense, this is a “forced familiarization” period for all companies regarding these solutions. And regarding this shift towards remote work, the responsiveness of a company has an impact on how well the company has been able to accomplish it. In general, this direction is the one to which the companies and work will move towards. Work gets increasingly detached from location as COVID-19 gives its own boost for digitalization development towards digital business. The increase in remote work may not be all good, though. As people see each other less in the workplace, the cohesion of the workplace community might degrade. As the cohesion is usually maintained by getting to know other employees by meeting at the workplace. In addition, you get to know the company itself. Lack of contact with other employees might become a potential issue for performance of the company, as cohesion within the company degrades.

Role of digitalization has been seen by many companies as “just a helper” or a non-critical part of business for some years. Even though there are discussions about digitalization in companies, it is just seen as IT expense by the management. Digitalization talks often boil down to talks about sub-optimized IT procurements. An overall business vision regarding

how the digitalization affects the performance of a company is required. Being able to see the investments or development as potential ways to provide better digital services is said to be rare thing. Digitalization can be used to lessen the repetitive manual workload of employees, bring more information available from the process itself, or to improve cost efficiency and operational efficiency. How this is done depends on industry.

As a success factor, digitalization is in the center, and among the first few things a company should be looking at. Minimum is usually to try and stay not far behind what the current industry leaders are doing. Some level of digitalization is required to succeed regardless the industry the company is operating on. Although big leap to full digital transformation is not something that can or should be done, companies generally do not see digital business or digital transformation as end goals they should be aiming for. For example, in the case of Finnish companies, being among leaders in digital transformation is not something they have been in.

To succeed in digitalization, you need willingness and readiness to take risks. You cannot plan everything nor can you finish everything in one go, but there needs to be a clear sense of direction regarding high-level development goals. Short steps need to be taken in agile manner, not just stubbornly pressing on. And to do this, there needs to be a specified business goal the digitalization effort aims to fulfill, with the management backing the digitalization process. Also, the digitalization needs to be done carefully, as critical success factors can be lost when digitalizing processes without understanding them fully. For this reason, it may be beneficial to acquire outside help with change management, if the company itself does not possess a necessary know-how. Choosing correct partner to match the company is critical in this situation. In the end, digitalization is a tool, like a computer. Just using a piece of technology is not the important part, but the way it is utilized and adopted into the internal organization of a company. A new tool used badly can often be worse than using old tool that was used properly.

Companies that are profitable have done well regardless the current situation. These are usually those who can develop their operations and adapt. As such, they are often also among those who are successful in the digital world. The capability and willingness to change is important part of modern companies, as the pace of change is fast. Company needs to adapt

fast or risk getting left behind. While these companies succeed, the companies who were doing poorly before are doing poorly now as well. Clear vision for the company is important. You need to know who and what is being sold, and why someone is buying it. Without focusing too much on the product itself, what the company is providing needs to be able to be described simply and shortly.

Capability to operate internationally has positive impact for many. This can be seen in service industry, where amount of locally operating companies is shrinking. Also, the negative impact of distance has partly been mitigated by the COVID-19 situation, as digital remote solutions are being used more widely. Must keep in mind that while internationalization gives potential for growth, different market areas are still different. Operating model in Scandinavia might not work in Central Europe, so there is some market and product development required when going international.

Interest towards entrepreneurship has risen lately, and COVID-19 has increased this. The threshold for starting a company and becoming an entrepreneur is lower nowadays. Especially the case with small businesses enabled by digital solutions, as the capital required to start, and the risks involved are both low. The role of the entrepreneur itself in the company's success is seen as important. Success factors regarding this are motivation, a personal eagerness towards entrepreneurship, and a properly channeled need for success. Proactive, innovative, and risk-taking approach to action are also listed as desirable traits. The ability to recognize opportunities and needs on market provides opportunities, but the opportunistic behavior is not all what is required. Tolerance towards failure is also important for a business. When developing business or product, it will most likely not succeed in first try. Single entrepreneur does not need to know everything, but there needs to be those in company that have the necessary knowledge. For example, within the team or management. And if there is no knowledge of something available within the company, it can be acquired from external sources. Same applies to companies. Collaborating with others and using ecosystem thinking when manufacturing products. Overall, it would be better for a company to keep doing what they do best and focus on their strengths.

Quality of the customer service and practices involving it are important, as this involves understanding your customers, but also taking care of your existing customers. In addition

to this, the quality assurance and management. Then there are networks. Network of companies and contacts is important, especially in Finland. Collaboration networks with companies and organizations, but also networks and connections to both existing and potential customers are important. B2B selling revolves around networks. Staff which is both committed and knowledgeable is usually where the true value of an SME lies. As companies are small, the human capital in them is of big importance. Competition for competent employees is harsh, and there is a chronic lack of workers especially in the IT-industry. Need for right kinds of recruitments is amplified by this. If company suffers from recruitment problems, it can influence the performance and overall success of the company.

But even the best staff needs proper management. Management and personnel management skills of the management of the company, including proper financial management are important skillsets. Many SMEs suffer from lacking knowledge and practices in this regard. There are also factors related to the culture of the workplace and the company. Capability of taking and withstanding risks paired with the resilience when dealing with uncertainty are important characteristics to keep the operations of the company determined. The readiness to embrace failure is also characteristic to have. Especially when paired with rapid testing of concepts, where new things are tested quickly. This “fail fast” culture is useful for companies in modern world, where changes happen fast, and you must keep up.

When looking at the markets, they have great impact on success of a company. If the current market is saturated, there is no longer growth. As an example, from manufacturing industry: manufacturing control systems are not selling well anymore, leaving many small local companies in the dust. All that’s left in the market are the bigger, global players. With software firms, those who have been doing only generic development work without any specialties regarding competence or the industry are unable to compete. Price of coding gets lower and lower, with trend of general software development declining. Agile companies, who can produce customized product as customer needs seem to grow fastest.

Capability to finding potential niches in right kind of markets with the ability to operate in them is an advantage. In addition, it was also said that not only does it matter that the market is right, there needs to be also potential for growth and development in the chosen markets. Willingness and capability to market provides growth potential for a company and keeping

the marketing channels open this current situation is important. Successful selection of marketing channels to reach target groups is crucial. For example, reaching young people through social media. Marketing is important, as you need visibility for the company. The effect it has on recruitment efforts is also positive, as it can help to improve the reputation of the company.

Data should be taken seriously. Even though there might be no yet clear use for it, it should be collected, from both internal and external sources. Developing data collection capabilities for meaningful data collection should also be done. People are waking up to all those things you can do with collected data. It is important to keep the future open while making technology investments. Investing on solutions that enable the collection of usable data is never a wasted investment.

With the data collection and handling, the topic of cyber security rises. Regarding cyber security as success factor, its importance increases as information flow and use of digital solutions increase. Hacking, data leaks, and other similar events are both a risk and a hinderance for success. Many SMEs still do not fully understand handling the cyber security properly. Interviewees agreed on the description brought up in barometer studies, that SMEs are in an odd situation in terms of cyber security. They are big enough to be valid targets, but still small enough that the handling of cyber security is generally not up par with that of bigger companies; both knowledge and resource wise.

General success factors related to company and entrepreneurial traits mentioned in academic literature category C7 were found good when discussed about with the interviewees, although some commented that their weight depends on what industry is being discussed about. In addition, the ‘digital orientation’ presented in academic literature source R13 as combination of learning, market, and entrepreneurial orientations, was said to be fully agreeable by the interviewees.

7 RESULTS AND DISCUSSION

The amount of I4.0 papers included in the screened list of 60 publications is relatively low considering that it is a buzzword of sorts in recent literature. This may be explained with how the screening process was carried out, and what filters were used. As all directly technology related publications and those that did not discuss directly concerning factors relevant to success of a SME, it is safe to assume that majority of the I4.0 literature was filtered out during the screening process.

Entrepreneurial characteristics and an entrepreneurial mindset were mentioned to be common topics in the literature. Both the academic and non-academic sources mentioned about similar success factors. In addition, these same characteristics were mentioned by the interviewees during interviews. Importance of marketing, being able to adapt, and being proactive risk-taker. The same qualities, capabilities, and abilities mentioned for company itself, its human capital, operating environment, and the entrepreneur themselves. Both literature and interviews brought up same topics. Especially when it came to generic success factors. Even barometer studies showed the importance of those same factors, like it was case with marketing and sales, which had clear increase in the figure 11 as most important development need in Finnish SMEs.

Overall look regarding development of digitalization in Finland seems to be slowly rising, even though barometer studies show the economic outlook going downhill year after year, with constant remarks about ever reducing investments done by SMEs. Moreover, there has been mentions about “digital leaps” incited by COVID-19 (“Korona pakottaa digiharppaukseen,” 2020) happening in Finland, even though nothing of sorts can be seen in the data provided by yearly barometers. While it can easily be dismissed as just using buzzwords, there might be some truth to that. There may have not been any massive developments recently regarding digital solutions, but that the existing capabilities might now be getting utilized. According to the Digibarometer, the Finnish companies have had hard time creating new digital operating models and services, even though the Finland has amazing capabilities for them. That is why it is interesting to see the development towards which the renewal measures taken by SMEs have changed during the last year. As seen in figure 15, things related to using new technology and business models, but also the graph

about reorganizing how work is done were becoming increasingly popular this year. In addition, the graph tracking the launching of new products and services is showing an increase. From this you could assume, that the Finnish companies finally have received the external drive for developing new operating models and services.

Trend regarding new markets and internationalization has been in decline this year, as shown by figures 14 and 15. Not only was the expanding to new markets and industries in decline among renewal measures used by the Finnish SMEs, the importance of business digitalization for internationalization has been in decline. Given the time frame, this decrease in interest towards new markets could be attributed to COVID-19.

The figure 12 showing the worst development obstacles for a Finnish SME shows clear and drastic changes in response to what has happened since fall 2019. This is something you could call “the COVID-19 effect”. All the previous development obstacles have become even greater, and even the graphs show the biggest three: economic situation, cost level issues, and current competitive situation. Companies are struggling to operate while fighting for customers. If they fail to generate revenue, the company could go bankrupt.

The low placement of “Company board work” among most important development needs shown in figure 11 is somewhat puzzling. Of course, the management is shown higher, but even then, the prior graph keeps decreasing steadily. It would make sense that bad, unmotivated, and non-committed board and upper management are significant factors for poor performance of a company. Importance of competent management could be imagined to be of great importance in current setting.

In the beginning of this report, there was a mention to look at the role of software in digitalization. Based on what the literature and the interviews say, the technology itself is not nearly as important than the use of them. And even more, using correct solution for specific environment, and using it correctly. So, does this mean that software by itself is irrelevant? Well, yes, but the software starts to matter when rest of the relevant factors for success of a company and its digitalization have been taken care of properly. In that situation the importance of using proper, good quality software becomes more apparent. But even in this case the earlier points stand. The software is a tool which needs to be used properly.

8 CONCLUSION

The purpose of this thesis was to investigate success factors of SMEs, with the interest leaning towards the role of digitalization as a success factor. The research questions were formulated around this topic, and they were about finding the success factors relevant for general success of a SME, but also what the role of digitalization in relation to these success factors is. And if digitalization is relevant, then in what fashion? In the end, I believe these goals were achieved with the material collected from both academic and non-academic sources.

While this study does not provide straight and concrete answers to how SMEs should operate or provide guidelines about which factors the companies should pay the most attention to, the contents can provide a general outlook on the topic of SME success factors and digitalization. The contents of this report can be of interest to anyone interested in success factors of a SME, whether the focus is on digitalization, just generic factors, or both. In addition, the themes related to this study can be of use as a starting point for research and teaching,

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APPENDIX 1. Database search phrases from keywords

ID	Search phrase (as used in search)
S1	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND "success factor*" AND review
S2	("micro-business*" OR "micro business*" OR "microbusiness*" OR "micro-enterpri?e*" OR "micro enterpri?e*" OR "microenterpri?e*") AND "success factor*"
S3	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND (success* OR "success factor*") AND (digi* OR digitali*)
S4	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND "industry 4.0*" AND success*
S5	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND "Digital convergence"
S6	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND "Digital convergence" AND (success* OR "success factor*")
S7	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND advantag* AND digitali*
S8	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND advantag* AND digiti*
S9	(sme OR smb OR sme? OR smb? OR "small and medium* enterpri?e*" OR "small and medium* business*") AND advantag* AND "digital transformation"

APPENDIX 2. Alternative ACM DL Database search phrases

ID	Search phrase (as used in search)
AS1	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND ("success factors" OR "success factor") AND review
AS2	(micro-business* OR "micro business" OR microbusiness* OR micro-enterpri*e* OR "micro enterprise" OR "micro enterprices" OR "micro enterprise" OR microenterpri*e*) AND("success factor" OR "success factors")
AS3	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND ("success factors" OR "success factor" OR success) AND (digi* OR digitali*)
AS4	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND "industry 4.0" AND success*
AS5	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND "Digital convergence"
AS6	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND "Digital convergence" AND (success* OR "success factor" OR "success factors")
AS7	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND advantag* AND digitali*
AS8	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND advantag* AND digiti?ation
AS9	(sme OR smb OR sme? OR smb? OR ("small and medium enterprise") OR ("small and medium business")) AND advantag* AND "digital transformation"

APPENDIX 3. Literature review screened results list (continues)

ID	Year	Author	Title
R1	2018	Salleh, Noor Afzan	A Systematic Literature Review of Cloud computing Adoption and Impacts among Small Medium Enterprises (SMEs)
R2	2018	Ascarya	Analysis of the determinants of micro enterprises graduation
R3	2019	Meshram, Sachin	Analyzing Success Factors of Small and Medium Enterprises (SMEs): A Study in Indian Context
R4	2020	Eller, Robert	Antecedents, consequences, and challenges of small and medium-sized enterprise digitalization
R5	2019	Heppner, Holger	Becoming Digital – Instruments for SME
R6	2017	Coreynen, Wim	Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers
R7	2019	Bach, Mirjana Pejic	BPM and BI in SMEs: The role of BPM/BI alignment in organizational performance
R8	2015	Mohamad, Azilna	Business Discontinuity Among Small and Medium Enterprises
R9	2017	Ibarra, Dorleta	Business Model Innovation in Industry 4.0: The Case of a University-Industry Experience in Smes
R10	2020	Irimias, Anna	Change Management, Digital Maturity, and Green Development: Are Successful Firms Leveraging on Sustainability?
R11	2017	Zeleti, Fatemeh Ahmadi	Competitive Capability Framework for Open Government Data Organizations
R12	2016	Aisha, Atya Nur	Conceptual Model of Entrepreneurial, Managerial and Technical Software Competencies Towards SME Performance in Subsector Software Industries
R13	2018	Quinton, Sarah	Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy
R14	2019	Pisar, Premysl	Controlling as a tool for SME management with an emphasis on innovations in the context of Industry 4.0
R15	2018	Badin, Olivia Sanchez	Critical success factors for small and medium forest enterprises: A review
R16	2019	Faridi, M.R.	Customer engagement technology in SME's in Saudi Arabia: Does it ensue in disturbance or disruption
R17	2019	Erdogan, Ece	Delivering a Systematic Framework for the Selection and Evaluation of Startups
R18	2016	Gerlitz, Laima	Design Management as a Domain of Smart and Sustainable Enterprise: Business Modelling for Innovation and Smart Growth in Industry 4.0
R19	2017	Te, Yiea-Funk	Design of a Small and Medium Enterprise Growth Prediction Model Based on Web Mining
R20	2016	Doherty, Eileen	Development of an IT Strategic Planning Capability for the Digital Age
R21	2019	Jones, Mark	Does Industry 4.0 Pose a Challenge for the SME Machine Builder? A Case Study and Reflection of Readiness for a UK SME
R22	2017	Neubert, Michael	Early and Fast Internationalisation of High-Tech Start-up Firms
R23	2019	Saudi, M.H.M.	Environmental sustainability in the fourth industrial revolution: The nexus between green product and green process innovation
R24	2016	Leszczynski, Dariusz	Exploration of Key Success Factors that Influence Business Performance: The Experiences of Women Micro-entrepreneurs from Mazovia Voivodeship of Poland
R25	2018	Kazantsev, Nikolay	Exploring Barriers in Current Inter-enterprise Collaborations: A Survey and Thematic Analysis
R26	2017	Duc, Anh Nguyen	Exploring the outsourcing relationship in software startups: A multiple case study
R27	2019	Lee, Hsien-Da	Factors affecting successful crowdfunding
R28	2018	Joensuu-Salo, Sanna	Firm Performance among Internationalized SMEs: The Interplay of Market Orientation, Marketing Capability and Digitalization
R29	2017	Halse, Lise Lillebrygfjeld	Getting Ready for the Fourth Industrial Revolution: Innovation in Small and Medium Sized Companies
R30	2017	Hardwig, Thomas	How Small Medium Enterprises create an agile collaborative work culture
R31	2020	Moef, Alexandre	Identification of critical success factors, risks and opportunities of Industry 4.0 in SMEs
R32	2019	Adiwibowo, S.	Improving Indonesian Small Economies by Digitizing Traditional Shops: A Case Study of Mitra Bukalapak

APPENDIX 3. Literature review screened results list (continued)

R33	2016	Ferreira, Filipe	Industry 4.0 as Enabler for Effective Manufacturing Virtual Enterprises
R34	2020	Fechtelpeter, C.	Integrated technology transfer concept for fostering innovation in SMEs
R35	2019	Petrova, D.	Intelligent, innovative and sustainable industry in Bulgaria – prospects and challenges
R36	2015	Huijs, Maarten	Internationalization and Export of Software Products
R37	2017	Marhraoui, Mohamed Amine	IT innovation and firm's sustainable performance: The mediating role of organizational agility
R38	2016	Barkhatov, V.	Key Success Factors and Barriers for Small Businesses: Comparative Analysis
R39	2016	Esposito, Emilio	Knowledge management in SME networks
R40	2018	Knihova, Ladislava	Learning Transfer: A Bridge Too Far?
R41	2020	Nasiri, M.	Managing the digital supply chain: The role of smart technologies
R42	2015	Klöppel, R.	Micro-entrepreneurs today - Results of a survey of owner-entrepreneurs regarding subjective success factors in German micro-enterprises
R43	2016	Cretan, A.	Negotiation Coordination Model for Supporting Enterprise Interoperability
R44	2019	Kay, Rosemarie	Potentially Disruptive Innovations and Business Models: (How) Do Established SMEs Respond?
R45	2018	Els, C.	Redefining the role of SMEs in value creating ecosystems: Evidence from case studies
R46	2019	Del Giudice, M.	Shifting Wealth II in Chinese economy. The effect of the horizontal technology spillover for SMEs for international growth
R47	2019	Basri, Wael Sha Mohammed	Social media and corporate communication antecedents of SME sustainability performance A conceptual framework for SMEs of Arab world
R48	2019	de Godoi, Tatiany Xavier	Software Startups Success Factors Study under the Entrepreneurial Perspective
R49	2020	Hardwig, Thomas	Software-supported collaboration in small- and medium-sized enterprises
R50	2015	Kemayel, Lina	Success Factors of Lebanese SMEs: an Empirical Study
R51	2015	Strielkowski, Wadim	SUCCESS FACTORS OF RURAL SMEs: A CASE STUDY OF POLISH MICRO ENTERPRISES
R52	2018	Cunha, Adriana	Sustainable Manufacturing: The impact of Collaboration on SMEs
R53	2018	Elshourbagy, Heba M.	The Effect of Entrepreneurial Market Orientation on Firm Performance: The Case of SMEs in Egypt
R54	2019	Lee, Yan Yin	The Impact of Digitalization and Resources on Gaining Competitive Advantage in International Markets: The Mediating Role of Marketing, Innovation and Learning Capabilities
R55	2018	Elshaiekh, N.M.	The impact of information technology on SMEs in Oman
R56	2016	Pertiwi, Evelyn	The Influence of Omni-Channel Retailing on Indonesian SMEs Online and Offline Business Operations
R57	2018	Ahmad, K.	The mediating effect of knowledge of inventory management in the relationship between inventory management practices and performance: The case of micro retailing enterprises
R58	2018	Osarenkhoe, A.	The oxymoron of digitalisation - A study of critical factors
R59	2015	Persson, Anne	Towards a Generic Goal Model to Support Continuous Improvement in SME Construction Companies
R60	2017	Lampadarios, E.	Towards a new framework for SMEs success: A literature review

APPENDINX 4. Results matching into topics/categories

ID	Topic/category	Count	Matching results
C1	Industry 4.0 (topic)	12	R5, R9, R14, R18, R21, R23, R25, R29, R31, R33, R40, R52
C2	Company (size <= SME)	54	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R12, R13, R14, R15, R16, R18, R19, R21, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60
C3	Company (other size)	10	R10, R17, R20, R22, R25, R26, R27, R37, R45, R48
C4	Innovation (business model)	15	R4, R6, R9, R16, R18, R20, R27, R28, R29, R31, R33, R36, R44, R47, R56
C5	Innovation (other)	29	R2, R6, R11, R13, R14, R16, R17, R18, R23, R28, R29, R30, R32, R34, R35, R37, R39, R40, R42, R44, R45, R46, R48, R50, R53, R54, R55, R58, R60
C6	Business performance (any)	49	R1, R2, R4, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R23, R24, R27, R28, R30, R31, R32, R34, R36, R37, R38, R39, R40, R41, R42, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60
C7	Understanding success/failure of business	15	R2, R3, R8, R12, R13, R15, R17, R19, R24, R38, R42, R48, R50, R51, R60
C8	Networking (B2B)	25	R2, R6, R15, R17, R18, R19, R20, R22, R25, R26, R27, R28, R29, R33, R34, R35, R36, R39, R41, R45, R46, R47, R52, R60
C9	Collaboration (B2B)	21	R6, R11, R17, R20, R22, R23, R25, R26, R29, R33, R34, R35, R37, R41, R43, R45, R46, R52, R59, R60
C10	Framework/Model	25	R2, R5, R8, R11, R12, R13, R15, R16, R17, R18, R19, R20, R21, R22, R25, R27, R34, R36, R37, R43, R45, R46, R53, R59, R60
C11	Tech utilization (about using technology)	27	R1, R2, R4, R5, R7, R9, R11, R13, R14, R16, R18, R21, R24, R32, R33, R34, R37, R41, R46, R47, R49, R52, R54, R55, R56, R58, R60
C12	Entrepreneurial mindset	30	R2, R3, R4, R5, R8, R9, R12, R13, R14, R15, R16, R17, R18, R19, R20, R22, R24, R28, R29, R31, R37, R38, R42, R44, R48, R50, R51, R53, R55, R60
C13	Entrepreneuership (general)	47	R2, R3, R8, R10, R12, R15, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R48, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60
C14	Digitization/Digitalization	19	R4, R5, R6, R10, R13, R16, R20, R28, R29, R32, R34, R41, R44, R45, R49, R54, R55, R56, R58

APPENDIX 5. Interview structure

Section	Explanation	Questions/topics
Introduction	Introductions, explain aim of the interview, asking permissions	<ul style="list-style-type: none"> - Recording permission - Anonymity / name mentions permission
Background	Ask the interviewee about their background	<ul style="list-style-type: none"> - In what company do you work in / represent? - In what field(s) does this company operate in? - What is your role in the company? - How long have you been in the company? - How long have you been in the field? - Other prior experience? Business or other fields? - Education?
General success	Questions about general success of SMEs.	<ul style="list-style-type: none"> -What are current keys to success for companies, especially SMEs? - Which industries flourish right now? Why those? - How can SMEs overcome their current struggles caused by the pandemic? - Do you know companies in the IT field that are not doing well now? For what reason? - Export has taken a hit due to global situation. Advice on SMEs on this regard?
Digitalization related	Questions about digitalization and its role in SMEs.	<ul style="list-style-type: none"> -What role does digitalization play in the overall success of a SME? - What areas are important for companies now? Why these? - What would be required to succeed in digitalization?
Academic literature	Generic success factors mentioned in literature; asking opinions on them.	-----
Non-academic literature	Outlook provided by non-academic literature; asking opinions on success related things.	-----