

# IMPACT OF REPORT AUTOMATION

A case study

Bachelor's Thesis  
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Information and Service Management  
Spring 2020

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<b>Title of thesis</b>	Impact of report automation – A case study	
<b>Degree</b>	Bachelor's degree	
<b>Degree programme</b>	Information and Service Management	
<b>Thesis advisor(s)</b>	Johanna Bragge	
<b>Year of approval</b>	<b>Number of pages</b>	<b>Language</b>
2020	30	English

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**Abstract**

This thesis studies the impact report automation has on a case company. It will study the time saved, impact on day to day work and improved decision-making analysis. It will present previous research on the subject and aim to tie the results from this study to it. The data was collected through two interviews and a survey from 15 professionals. The research questions that this thesis hopes to answer are:

- What is the impact of automating a logistics report?
- What has been the general impact of automated reporting in the case company?

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**Keywords** report automation, data analytics, RPA, impact

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# **1 Introduction**

Report automation is a growing subject in many companies and touches on various trending topics like big data analytics, robotic process automation and business intelligence. The effects of report automation to companies have, however not been extensively studied, and this thesis aims to discover some of the answers. This is important because report automation changes the daily work of employees and brings new challenges to which companies have to be able to answer.

## **1.1 Research objectives and research questions**

The research objective of this paper is to find out the impact of report automation in the case company through a logistics report which will be automated, and studying the impact of past automated reports generally. It is intended to find out how it affects the day to day work of the knowledge workers who use the reports for analyzing the state of processes. The thesis also studies how much time it saves per week that the report is now generated automatically as opposed to manually as before and does the fact that the data can be refreshed daily impact the use.

The research questions that are hoped to be answered are:

- What is the impact of automating a logistics report?
- What has been the general impact of automated reporting in the case company?

## **1.2 Scope of research**

I will cover the impact the automating has on everyday work for the people who deal with the reports. How will it change their meetings, best practices etc. I will also estimate the time and costs saved with automated reporting processes. I will also study published research on the subject and compare how they refer to the results found in this study.

The best practices in creating a logistics report will be scoped out of the research. This includes the choice of information systems used, report structure and content. The report will be built based on instructions, common knowledge and previous examples. It would be possible to also study the differences and strengths of different leading and lagging indicators in logistics reporting and its analysis, but it will be left for future research.

### **1.3 Structure of the research**

The thesis is structured as follows. Chapter 2 is a literature review on past research on the subject. It will first define the basic terms used, in order to acquaint the reader with the subject. Then it will research the impacts of business intelligence and robotic process automation which are both relevant for the report automation process. After that it will go through the requirements for successful automation processes and a framework on intelligent automation. Chapter 3 presents the methodology of a case study, and also the interviews and surveys used to gather the data. It will also go through the background of the case company and the subject of the case study as well as the creation of the automated logistics report. Chapter 4 discusses the results found during research from both the viewpoint of a single report, but also more generally on automated reports in the case company's business unit. In Chapter 5 I discuss the results in light of previous research and also what implications this research has on theory and in practice.

## **2 Theoretical background**

Report automation touches many different subjects such as big data analysis, business intelligence and robotic process automation. They are all needed for automating the reports and the research will look at the situation from the different viewpoints. This allows for a more comprehensive analysis on the research questions.

### **2.1 Defining the basic terms**

Reporting is one of the most important functions within a company, but as a support process it is not as widely researched. Reporting is often seen more as something that companies must do rather than want to do, but some companies have reporting in their company culture (Hodinka et al. 2012). Reporting in this context can refer to reporting data analysis results which is most relevant to this thesis, but also all other kinds of reporting within a company.

The impact of report automation comes from its ability to convert big data with advanced analytical technologies into valuable and innovative insights about the state of processes (Davenport et al. 2012). Big data is defined as large volumes of varied data that is generated, captured and processed with high velocity (Laney, 2001). Even though big data analysis (BDA) has been a popular topic in recent years, most research on it focuses on how it can be used to improve tactical organizational capabilities, but very few studies focus on its impact on organizational value (Grover et al. 2018). Chiang and al. (2018) also state that analyzing data without creating value offers no benefit to the company, whether the data is big or small. Based on this, the thesis will concentrate on the added value of automated big data analysis with advanced analytical technologies by analyzing the impact it has on the workplace.

Big data analysis is tied strongly with Business Intelligence (BI) solutions. Business Intelligence and Analytics (BI&A) refers to a variety of technologies, techniques, systems and applications that help companies analyze data in a way that improves its ability to make business decisions (Chen et al. 2012). The difference between the two is that big data emphasizes the data aspects such as data collection, storage and analytics while BI focuses more on data analysis, visualization and applications for business decisions (Liang & Liu 2018).



The automation of reporting that is implemented in the case study of this thesis can be defined as an RPA project based on the definition given by Kirchmer and Franz (2019): “Robotic process automation (RPA) is a set of tools or software program that operate on the user interface of other application software systems in a way a human would do.” RPA is also used as a broad term for tools that operate on the user-interface of an information system similarly like a human would do and automates the process in an “outside-in” way. Unlike traditional automation processes in information systems in RPA automation the information system itself is not changed, and the system just automates processes done with the system (van der Aalst et al. 2018). In this case the automation built between the different database systems and final reports which allow automatic refreshing can be defined as an RPA system.

## **2.2 Effect of business intelligence**

The effects of BI systems such as the report in this case study should be assessed both at an organizational and operational level according to Mohammed et al. (2008) who found these two to be related. In one of the most highly cited papers on BI and Big Data (BD) (Liang & Liu 2018) Chen et al. (2012) state that BI has the unprecedented ability to recognize new business opportunities. Ain et al. (2019) report that BI is undoubtedly critical for organizations, but come with their challenges in system adoption, usage and implementation success.

Božič and Dimovski (2019) found an association with increased innovation ambidexterity to explain the previous results in research that BI&A use contributes positively to firm performance. They also suggest that firms need to take practical implications such as build up employees’ technological, human and relational skills and improve the information transfer by boundary-spanning individuals. This would allow the company to take full benefit of the BI&A solutions.

## **2.3 Effect of RPA**

RPA has already been proven to significantly improve efficiency through the reduction of human workforce and replacing it with digital workforce. Often the impact of implementing RPA processes can increase efficiency by 40% or more and combined with other benefits, like the reduction in human errors in data input, analysis and calculations the actual benefits can be even higher (Kirchmer, 2017). RPA processes also reduce costs

on top of increasing efficiency and in a study done in 2016 by Lamberton et al. they estimated that the effect of reducing manual operations costs can be 25 – 50% or more. Syed et al. (2020) found in an extensive literature review they did on RPA that based on past research RPA can be found to cut costs on human-related spending by 20-50%. They also found RPA to reduce the cost of transaction processing by 30-60% and save 30-70% of time in the process cycle, task handling and waiting time.

However, even though there are undeniable benefits to implementing RPA processes as stated above, it has proven to be hard for companies to implement the processes successfully. According to recent statistics as many as 30-50% of RPA initiatives fail completely (Kirchmer & Franz 2019). Marjanovic (2005) reminds that even though automation processes have a lot of advantages, knowledge-intensive processes cannot be always fully predefined causing automation to not be possible or desired for these processes. Companies have to therefore be mindful of where to and how to implement RPA processes in order to get the most value out of them.

## **2.4 Report automation**

Even though automation of different kinds has been a subject of extensive research for the past decades, research on report automation is scarce. Most research on the subject focuses on the data collection and analysis phases (Syed et al. 2020). Reporting however has also other phases such as visualizations, usability and sharing of reports. Coombs et al. (2020) found in their study three big gaps in current literature relating to intelligent automation processes which were: guidance regarding how organizations determine which jobs and tasks to automate, how organizations decide which level of automation to apply and how workers are affected by and respond to automation.

Hartley and Sawaya (2019) researched the effects of digital transformation on supply chains and deemed that with the ability to make data-driven decisions in every part of the supply chain is soon reality. In this thesis the point of the case study is exactly to get more real-time information on the warehouse part of the company's supply chain process. Hartley and Sawaya (2019) highlight the fact that digitalization and automation are more of a marathon than a sprint, big change cannot come instantly. The organizations in their study were focused on updating and deploying mature information technologies such as their ERP systems for example. These are a prerequisite to reap the future benefits of automation processes.

Report automation was concluded to save working time in a study done by Kovacs et al. (2019). Even though the study was conducted in the field of medicine they specifically researched the effect of report automation and its impact so it can partly be derived also into the field of this thesis. They found out that 95% of respondents in their survey deemed that report automation saved their working time for other tasks. All together the staff was also happy with automated reporting processes.

## **2.5 Requirements of successful automation**

Automation processes of different kinds are complex and as stated above as many as 30-50% of new RPA initiatives fail completely (Kirchmer & Franz 2019). There are studies on what requirements should be met for the automation processes to be able to be successful. Fletcher et al. (2020) found that on an organizational level in all their case studies it was essential for companies to assess employee satisfaction as well as online monitor necessary Key Performance Indicators (KPI's). They also reported that employee training and guidance was a critical requirement in successful automation processes. Forster et al. (2020) also researched the importance of user education to the success of driving automation.

Data inconsistency represents also a challenge to many companies and their ability to derive meaningful data analysis. Data often comes in too many forms, is incomplete or completely lacking, or has too many errors (Inmon and Linstedt 2015). The problem is usually the data architecture under which the data is acquired and handled not the applications and systems that leverage the data. Valid data is an important requirement for valid automated data analysis reports and must be properly handled or it can hinder the development of the whole industry (Coito et al. 2019).

Syed et al. (2020) also point out that even though the positive effects of RPA are clearly defined and researched in past literature there are also a lot of requirements that the company has to face in order to gain the benefits. They highlight the needed organizational characteristics like business drivers, nature of existing technology and degree of RPA maturity, but also the needed process/task characteristics. They also bring out the need for employee level capabilities and adaptivity and this is also present when researching the impact of automated reports within the case company in this thesis.

## 2.6 Framework for Intelligent Automation

Coito et al. (2019) came out with a novel framework for Intelligent Automation and many of the theories of this framework can also be used in this thesis. Intelligent automation is referred to as a combination of artificial intelligence (AI) and automation (Accenture 2016; Deloitte 2014 as cited in Coito et al. 2019). It is used as a broad term and the framework by Coito et al. (2019) focuses on data aspects of automation which makes it interesting in light of this thesis. They point out that the successful development of a framework for intelligent automation relies on how effectively all the features of the data acquisition and management problem are accounted for.

In their framework they give the following features for Intelligent Automation:

- Interoperability
- Virtualization
- Visualization
- Traceability
- Decentralization
- Real-Time
- Modularity
- Level of access
- Knowledge Management

And for the data they give features on the following aspects:

- Quantity
- Frequency
- Variety
- Complexity
- Quality

## **3 Methodology and case company**

### **3.1 Methodology**

This thesis has been conducted using the case study method. The case study method allows in-depth and broad research of complex issues in a real-life setting (Crowe et al. 2011). As the objective of this research was to understand the practical effects of report automation a case-study was the primary choice. Doing case studies has a long history in social sciences and business research but is fairly new in software engineering and it has to be ensured that the research done is thorough enough (Runeson et al. 2012).

According to Hancock and Algozzine (2017) case studies are constructed of the following steps:

1. Scientific Inquiry
2. Qualitative and quantitative research
3. Identifying past literature
4. Research design
5. Informative interviews
6. Gathering information and observations
7. Document analysis
8. Derive meaning from data
9. Communicating results

These steps will also be followed in this thesis in order to be able to derive a thorough look on the research question.

The case study for this report will be done on the Finnish department of a multinational corporation. The company is in the industrial manufacturing business and reporting in the unit is done to look at past performance and also monitor future performance. Especially one logistics report will be automated from a PowerPoint presentation where data is manually entered bi-weekly from multiple data sources into an automated PowerBI report which requires minimal manual labor.

Information will also be gathered by interviewing two managers from the case company on their thoughts and opinions on report automation. A survey will also be conducted with 15 professionals who use the automated reports in their work. These results will

then be analyzed based on past research and the impact of report automation will be tried to explain as thoroughly as possible.

### **3.2 Background on the case company**

The company that the case was done for is a large multinational corporation in electronics manufacturing with over 145 000 employees in 100 countries. In Finland it has two different locations and over 5000 employees altogether. They wished to stay anonymous for the research, so some data will be withheld.

As the company is large it has been divided into business lines. The business line that this study was conducted on is mainly in Finland. These products produced are needed to operate electric motors more efficiently and are used widely in different sectors. More specifically this study was conducted in the after-sales department of the before mentioned business-line. The department is responsible for all the after-sales operations like warranty, spare parts and small-scale production. The customers are usually other branches within the company which order their needs from our department.

### **3.3 The subject of the case study**

The case was to automate one of the logistics reports of the department. I was responsible for the automation process and have done similar work in the case company for a year. There is a logistics team within the operations development team, and they are responsible for managing logistics. The actual logistics of the company have been outsourced to an external company and the team co-operates with them to manage and further develop logistics processes. The outsourcing was done in the summer of 2018 and there were operational difficulties at the start. Back then they had almost daily meetings with representatives from both companies in order to manage and improve the processes. During these meetings a report with the most important leading and lagging key performance indicators (KPI) was built with data collected manually and presented on a PowerPoint presentation. This took anything from 1-3h per meeting (Operations Development Team Manager 2020). As the processes have evolved the meetings have been reduced to being biweekly and this has also reduced the refreshing of data to be biweekly. There has been a need to automate the report in order to both reduce manual labor and get more up to date data.

The report has included data for both leading and lagging indicators and the data comes from different data sources and from the different Enterprise Resource Planning (ERP) systems used by the two companies. This is one of the reasons why the report has been conducted by hand until now because combining the different data sources is complicated.

### 3.4 Creating the automated report

Creating the automated logistics report was started in February 2020. First the past reporting method was introduced and then researched what the requirements and desires for the new report would be. Then research was done on what is possible to automate completely and what would remain manual with as little work as possible. See Figure 1 for more detailed steps of the process.

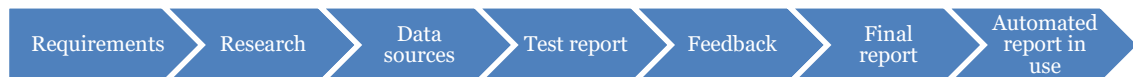


Figure 1. Chart of the report automation process

#### 3.4.1 Data sources

The challenge of the particular report was that the data that was required on the report comes from multiple different data sources within both companies. Most of the data comes from the case company's own ERP system and this data can be imported with SQL and then use in the reporting tool automatically. This allows to refresh the data automatically as often as is needed, for example every 15 minutes. However, some data comes from the logistics company's own ERP system and this provides a challenge for the report. It is not possible to access their ERP system with our SQL server due to data privacy restrictions.

However, manually collecting the data is not purposeful. A solution for this was that the logistics company's ERP system sends the data to a dedicated person's email automatically every Monday as a csv file. From this file I then simply copy-paste the data on to an online Excel. This takes less than 5 minutes of work time altogether, so the manual work is reduced significantly. The online Excel is then used as a data source in the report and thus allows automated refreshes even though the actual data is of course automated only on Mondays.

### 3.4.2 Microsoft Power BI-tool

Microsoft Power BI was released in 2015 and is a reporting tool to visualize data, share discoveries and collaborate in new intuitive ways (Ferrari and Russo 2017). Power BI was first introduced at the case company in 2017 and since then has become the main reporting tool for all reports. The advantages of it include the ability to use and combine multiple data sources and automatically refresh the reports so the data is always correct (Microsoft Power BI 2020). Power BI is used to create and distribute the reports for our whole unit.



## **4 Results**

This chapter will first go through the impact of the single automated logistics report, both the positive and negative aspects. Then the results from automated reporting generally will be presented. Especially the survey and interview results. In the end, also the challenges will be discussed as they are an important part to understand the whole picture.

### **4.1 Automated logistics report**

A logistics report was automated during the Spring of 2020 for this thesis to be able to study its impact on our logistics team. Creating the report had its own challenges, but in this chapter the report will first be generally introduced, and the choices made during automation explained, then it will be observed what its impact was mainly through interviews.

#### **4.1.1 The final report overview**

The final report can be seen below in Figure 2. It was decided to be built in a dashboard style. A dashboard is created to have all the important information easily readable at the same time (Vilarinho et al. 2018). The report was decided to be divided clearly into two halves with the lagging and leading indicators on different sides, since they tell a different story. The report was visually built with the intent that it would be easy for any end-user to read and understand the necessary information.

The information on the frequency of data refreshes was added to every visual because it is critical to understand how current the data is when analyzing the report. Even though it might not be the most visually pleasing, its utility to the end-user is huge and is the main reason why the texts were added. In other reports it might not be so crucial if all the data comes from only one source with a regular refresh interval, but in this report data from different data sources with widely different refresh intervals had to be acquired.

## Logistics report

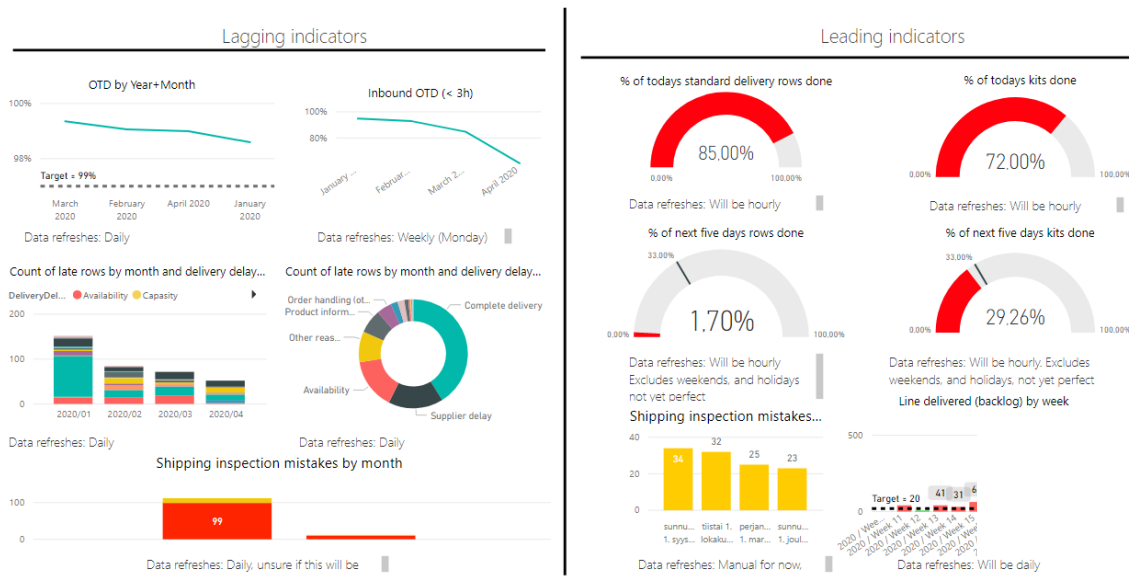


Figure 2. A screenshot of the automated logistics report with anonymized data

### 4.1.2 The impact of the automated logistics report

The logistics report has provided a more comprehensive look at the most important Key Performance Indicators (KPI's) and their trends. The previous manual PowerPoint report was just a snapshot from the specific moment and couldn't provide the data with as much meaning and depth. The report will be used to go through the KPI's during the biweekly meeting with the logistics company. Before the report was created during the meeting and it lasted around 3 hours. It is hard to estimate how much time the automated report will exactly save, but it will eliminate the need to search for the data during the meetings, making them significantly faster for all participants (Operations Development Manager 2020).

On top of the working time saved by the new automated report it will also allow the logistics team to be more proactive and react to possible changes in the data that can be seen now as the refresh interval is much more frequent. The team can now daily take a quick glance about the report and then act accordingly if needed. This allows them to also see possible danger spots ahead of time through the leading indicators and start preparing for them before they show as bad numbers in the lagging indicators.

There are however some negative aspects to the new report as always. The only slightly significant is that it is not as easy to write action notices to the report base during the

meetings as it was when the report was a PowerPoint presentation. This however is not as significant and altogether the benefits of time saved, better analysis and business decisions far outweigh the negative aspects.

## 4.2 Automated reports generally

On top of the single automated logistics report and its impact it was also researched more broadly how the reports impact the business unit. It was found that during the three years the reports have been used, they have become invaluable. Many could not imagine working without them anymore and the old reporting habits were seen as ancient and inefficient. The results on the impacts were collected through observing, interviews and a survey done in the teams that at least somewhat frequently use the reports.

### 4.2.1 Survey results and general opinion

The survey had 15 answers and was conducted in the studied business units within two teams who use the reports frequently. As Figure 3 shows the answers were quite evenly spread, but the majority uses the reports at least weekly.

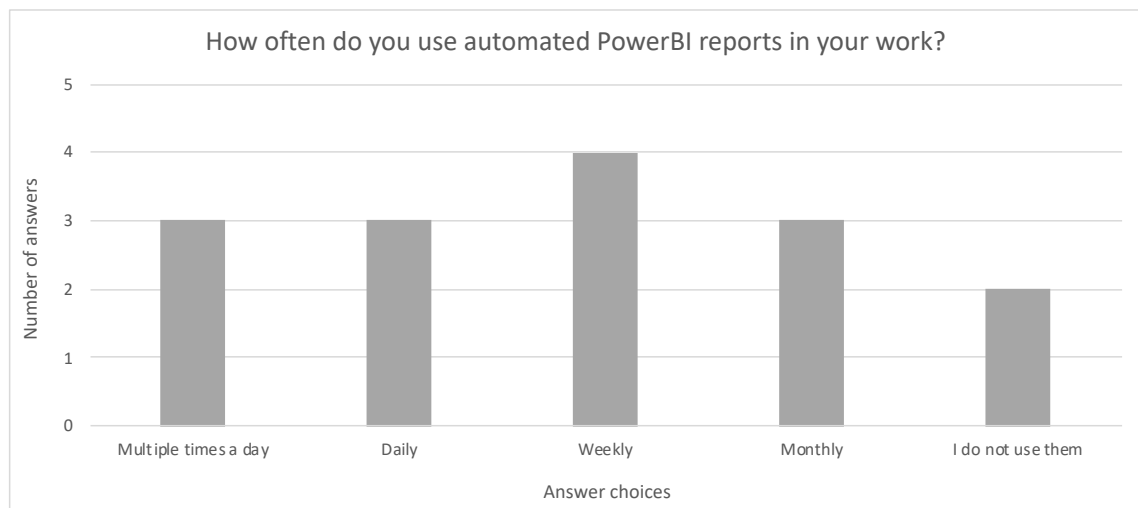


Figure 3. Frequency of using automated Power BI reports

General opinion on the reports was very positive, but there were improvement points also seen. As the report maker myself I do not always see or understand the difficulties that end users might have with the reports. However, the Customer Service Manager described the automated reports in an interview (2020) as “her new best friends” and

said that “they are from another stratosphere”. They have changed the whole way of doing analysis, spreading information and making data-based business decisions in the business unit.

When assessing the general opinion on the report and how employees themselves assessed that it impacted their work the results were that 10 out of 15 people thought that the reports free working time for other tasks. Nine out of fifteen people thought that the reports make their daily work easier. Almost half of them (7/15) thought that the reports help them analyze data and make more meaningful business decisions. This is very important as reporting, in general, is done to help make more informed decisions based on the data that the reports give. However, the result 7 out of 15 is not the highest possible, but there are also people on the teams who do not use the reports as was shown above and some users might only see the benefits as saved time and not improving decision making otherwise.

Two people out of 15 thought that the reports were difficult to understand and difficult to use. No one thought that the reports were complicated and unnecessary. This gives a good indication that altogether the employees are happy with the automated reports and most feel that they help them to do their work more efficiently and better.

Table 1. Answers to selected survey statements regarding PowerBI reports

Power BI reports... (choose all that apply)	Results	
	Number who chose	Percentage of total (15)
The reports free working time for other tasks	10	66.67%
The reports make my daily work easier	9	60.00%
The reports help me analyze data and make more meaningful business decision	7	46.67%
I would like to know more about Power BI	6	40.00%
I would like to learn myself to make Power BI reports	2	13.33%
The reports are difficult to understand	2	13.33%
The reports are difficult to use	2	13.33%
I feel like I can use the reports up to their full potential	1	6.67%
The reports are complicated and unnecessary	0	0.00%

#### 4.2.2 Time saved

Generally, the most obvious benefit of automation is the manual work time that is saved. Automated reports save working time after they are initially done in almost all the steps of reporting. The data collection and refreshing are done automatically and for most cases does not require any labor from humans. Accessing the report is fast as it can be shared through a website and the report is always up to date and does not require any work from the end-user unlike the traditional excel reports. Also, the need for data

validation before use is mostly removed as the process is automated and if nothing in the information system changes there technically are no possibilities for errors.

There are multiple steps in the process where automation saves time. One important point is the end-users as their main task is not to create or modify the reports, but just to use them as a basis for their daily work. The Customer Service Manager (2020) estimated that before the automated reports, 30% of her working time went doing Excel reports. Now the time has been reduced to 5% as the automated reports require much less manual work from her to be able to get the same or better information out of them. This is a significant drop in working time which is then saved to other tasks. She also estimated that a similar drop from 5% of working time to 1% can be seen in all of her 16 team members. Cumulating this over time, the cost-savings and increased efficiency are significant. This also means that the actual users have to hardly use any time with the reports as they are able to get everything they need, very fast.

In the survey, 12 people out of 15 deemed that the reports save their working time. After that they were asked to estimate the working hours per week that the automated reports saved them. The average of answers was 4,75 h/week and the median 1,5. This becomes 199,5 hours per year (calculated with the average) and 63 hours per year (median answer). Calculations shown in Table 2 below. Even though there is a gap between the two they both are significant time savings and when these can be generalized to all the employees the cost savings are significant. The work year was calculated as having 46 weeks, because employees have generally 6 weeks of vacation during the year.

Table 2. Results from the survey on work time saved and calculations on them

Work time saved per person per year (number of answers = 12)			
	h/week	h/month	h/year (work year = 10,5 months)
Average answer	4,75	19	199,5
Median answer	1,5	6	63

#### 4.2.3 Better analysis and less errors

Automated reports come with other benefits than saved working time as well. One of them is the ability to make more in-depth reports which can portray more data in an insightful way. And by combining data from different data sources the same report is able to show more KPI's at the same time making analyzing easier. As shown in Table 1

seven out of 15 people agreed that the automated reports help them analyze data and make better business decisions.

Errors in data analysis are common and can have severe consequences when decisions are made based on the data. With automated reports generally the end-user does not have to build the report or retrieve the data himself which reduces the chances for errors. Before with manual excel reporting, when everyone at least refreshed the data manually themselves before using it or even built the whole report from start to end there was always the possibility of errors. With automated reports the biggest chance for errors is when the report builder builds the report, or the data refresh automation is created. Of course, if an error goes unnoticed in these stages the consequences are worse as it shows faulty data to all end-users without them knowing. It is also possible for errors to occur in other faces of automated reporting, but these would not lead to faulty data.

#### 4.2.4 Challenges

Even though both the managers interviewed, and the survey respondents all gave very positive thoughts about the automated reporting processes and on their impact, there were some negative aspects identified. The Customer Service Manager (2020) thought that her employees were not able to use the reports to their full potential due to lacking knowledge on the software and how the reports work. Also, in the survey only one person answered that they feel like they can use the reports up to their full potential, so the manager's thoughts were well reflected in the answers of the employees. The feeling that the reports are complicated or difficult to understand can bring up frustration and resistance towards them.

Moreover, automated reports implemented with Microsoft PowerBI of course have their own limitations which are different from those of previous reporting methods. This can sometimes bring up negative responses when some things are now harder to implement the same way than before. One example is that it is not easy or possible for users to write text on to the reports which would then show to the next users.

The automated reports are also more difficult to make and implement which has resulted in only a few people in the whole organization who know how to make them. This poses a challenge because these key employees get busy and it is hard for other employees to help them with their tasks. Also, in the case company there were a few key employees

who worked in report automation who quit and after that it was hard for anyone to understand how the current reports worked and how they could be fixed.

So, the reports have created an environment where more than before knowledge is only in the hands of few. Before it was easy for employees to just create their own reports as needed, but now the actual creation of the reports is more complicated and has to go through other people. The benefits can only be seen after the report creation is done. This can pose threats to the company and frustration in employees.

## 5 Discussion and conclusions

The key findings of the research were that report automation has significantly changed and improved reporting processes. The impact of the new reporting processes has been much larger than one would originally think. It affects the whole process of how reporting can be done in the company, as well as bringing considerable cost savings.

Automated reporting processes could be accounted for significantly saving working time for employees in the case company. Depending on the role of the employee the effects are different, but even in general employees who just use the reports to monitor processes, the savings could be calculated to being 60 – 200 work hours per year. The time savings are even greater for those who were previously in charge of creating manual reports, where a reduction from 30% to 5% of working time was detected.

The automatic reports also change the way reports can be used in daily work life and how business decisions can be made. As the automated reports show up to date data constantly without any or very little manual labor, the end-users can review the reports much more frequently and base decisions on real-time data. It gives the possibility to be more proactive and react to signs earlier and possibly stop from escalating and showing up as poor results in the lagging KPI's. Reports can also be used by more people as they are easy to access to the user and do not require work on their part. Automated reports also give the possibility to analyze more data, more frequently which can bring out new metrics and KPI's to monitor. These can give a more full-rounded picture of the process and help monitor and measure its success.

Reports also affect the employees of the business: it alters their working habits and changes the way reporting is done for them. And as one of the main objectives is to be able to share data with more people to make decisions based on it, it is crucial to monitor what employees think about the new tools. In this research the overall consensus could be sensed that people were really happy with the new reports. They felt like it had significantly changed reporting in a positive way. There were, however, also feelings that the automated reports came with their own challenges. Creating the reports was now more time consuming and in the hands of a small number of people. There were also feelings that the reports full potential was not reached and that the big picture of the new reporting tools was missing.



## **5.1 Implications to research**

Previous research on the subject was a little scattered, but this thesis confirms and fills in some of the gaps in it. Coombs et al. (2020) have found a gap in automation research on how the employees are affected and respond to the changes. The results from this thesis elaborate on the main changes it has on employees and how they have responded to them.

Mohammed et al. (2008) came to the conclusion that the effects of business intelligence solutions should be assessed both on an organizational and operational level. The results from this thesis strongly coincide with it, because report automation definitely affects both. On the operational level it means that end-users have to use less time to do reports and have more correct and up-to-date data to use. But it also has implications on the organizational level as the whole reporting process changes and it brings a need for new employees for new tasks and possibly even a unit to coordinate the reporting which was before just done within divisions.

Kirchmer (2017) found that RPA processes could increase efficiency by 40%. Even though the research in this thesis did not explicitly focus on the increased efficiency, it can be deduced that the effects in the case company are probably in the same ballpark. This can be seen through the time savings that were estimated by the employees themselves, but on top of that comes all the other time savings in the company. These would include not needing to refresh data manually, only creating the report once, no need to validate data and decrease in chance of human errors.

## **5.2 Implications to practice**

The results found in this research have some practical implications as well. Generally, it can be said that automating reporting processes has significantly increased operational efficiencies and abilities to make data-driven decisions. Automated reports could be implemented in many different companies and organizations. Most companies have probably already started some processes related to it, but they should focus on getting meaningful data, measuring required KPI's and having the reports refresh automatically. This is crucial for getting the other benefits found in this research.

Companies and organizations should also focus on having enough employees who know how to use the software and tools to minimize risks. They should also focus on training

the end-users on how to use the reports to help them get the most potential out of the new reporting ways. This is also important in order to keep the employees' opinions on the new processes positive and forward-looking. Employees' opinions should also be monitored in some way in order to be able to find out if there are problems they are facing and would like to be addressed.

The organizations should also from the beginning start building an architecture for data management and reporting. This would make the process a lot smoother down the road and solve a lot of the problems which could be seen in the case company of this research. Problems can arise if each team and division start building their own reports without collaboration or management. It leads to situations where work is done multiple times, information systems are unnecessarily burdened, and information becomes scattered and is not easily accessed by end-users.

### **5.3 Limitations and future research**

The limitations of this study mainly come from the fact that the impact was studied only through one case company. To get more comprehensive results it would have been good to study multiple companies of different sizes, industries and locations. However, the company that was studied was quite typical in many respects for example the industry and production are not rarities. But the fact that only one company was studied leads to other limitations of the research.

Another limitation of the study is that it is quite time sensitive. The impact of reports, both positive and negative are only relevant for the current time. Because processes are continuously improved also in this company, the result would have been different a year ago or two years in the future. A longitudinal study could have given a more well-rounded answer, but on the other hand the research questions were related to the impacts of report automation at the moment and which the current research did answer. Also, even though the results could have been different in different time periods the main findings would have probably been similar as they were partly similar as past research had found.

Another limitation is the number of people whose opinions were asked. There were two more in-depth interviews conducted with the team managers and the other employees were asked to answer a survey. If it would have been possible to interview all of the 15 employees some of the results could have been presented in more depth. Some of the data was also written based on my subjective experience in being an employee of the case company and responsible for creating the automated reports used. I do have a year's

worth of work experience, which possibly allows me to see and understand the implications better than a total outsider would have been able to see, but it still is a subjective viewpoint. However, my experience was mostly used to understand what research should be done and how it would be wise to collect information, it was not used to write the results found for example.

Future research would need to be conducted in the areas that explain more the results that were found in this research. The reasons behind why automated reports have these impacts and what and how different attributes influence them. Another field of research could also focus on how the impacts could be measured within companies and thus be able to find the best practices in report automation. Also, the challenges found in this research, for example data management in big organizations, could be researched in order to find the best ways of organizing it in order for the organization to be able to reap the most benefits out of different automation processes.

## 6.0 References

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Interviews:

Operations Development Manager, Case Company. (6.3.2020)

Customer service Manager, Case Company. (8.3.2020)

## Appendices

### Appendix 1: Interview questions

#### Logistics report

- *What has the reporting process been like in the past?*
  - o *How much working hours will be saved?*
- *Where did the need for automating it come from?*
- *What benefits does the new report bring, other than time savings?*
- *Are there negative aspects to the automated report, what are they?*

#### Generally:

- *How has the report automation changed every day work life?*
- *Have they helped you in your personal work? If they have, could you elaborate on how.*
- *What is your opinion about PowerBI?*
- *What are the biggest challenges or negative aspect of the current automation reporting?*
- *How has it effected your teams work?*

### Appendix 2: Survey questions

The survey questions were as follows:

- *Which team do you work in?*
  - o *Operations Development*
  - o *Customer Service*
  - o *Other*
- *How often do you use Power BI reports in your work?*
  - o *Multiple time a day*
  - o *Daily*
  - o *Weekly*
  - o *Monthly*

- I don't use them
- *Power BI reports... (choose all that are correct)*
  - The reports make my daily work easier
  - The reports free working time for other tasks
  - The reports are difficult to understand
  - The reports are difficult to use
  - The reports help me analyze data and make more meaningful business decisions
  - The reports are complicated and unnecessary
  - I would like to learn myself to make Power BI reports
  - I would like to know more about Power BI
  - I feel like I can use the reports up to their full potential
- *I estimate that Power BI reports saves my working time for other tasks*
  - Yes
  - No
- *If you answered "Yes" to the previous question, please estimate how many hours of work per week (h/week) Power BI reports save you:*
- *How do Power BI reports impact your work (positive or negative)?*
- *General comments or feedback on Power BI reports*
- *General comments about this little survey or to Jasmin's thesis project*