# Bachelor thesis

Improving cost tracking and allocation methods at “Emons Group”

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Emons Group


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# Preface

Dear Reader,

The report below consists of the Bachelor' thesis "Improving cost tracing and allocation methods at "Emons group". This document concludes the research conducted at "Emons Group", which is written with the purpose of fulfilling the graduation requirements of the Industrial Engineering and Management Bachelor program at the University of Twente.

I would firstly like to thank Marcel Wouterse and Thomas Massop, the supervisors from "Emons Group" who provided the data, facilities and valuable guidance throughout the completion of the assignment. Moreover, I would also like to express my gratitude to the employees of the company for their cooperation and time spent on the interviews and conversations held.

Secondly, I would like to thank my first university supervisor Sebastian Piest. I would not have been able to complete the assignment without his assistance. Furthermore, I would like to convey my appreciation to my second supervisor Dr. Ipek Seyran Topan for the support provided not only during the thesis but also throughout the study years.

Lastly, I would like to thank my friends and family for their support.

This level of success would have not been achieved without their instructions and counsel.

I hope you enjoy reading my Bachelor's Thesis!

Kevin Kamberi

Enschede, August 2021

## Management summary

Emons Group is a logistics company which provides transportation services and operates in 10 different countries of Europe. The problem the organization was facing was the lack of a general overview of tasks performed by different departments. Therefore, a development team was formed which consisted of 5 students investigating 5 departments. I was given the task to look into the Back office of the company which dealt with invoices.

## Problem definition

In order to discover possible obstacles the department was facing, interviews were conducted with the management team and the employees. Based on this conversations, the problem at hand was the inability to properly calculate the costs of providing services. This issue became visible only after Brexit took place, implications of which will be also treated in the thesis. The core problem was "Insufficient information whether the accounting practices are implemented correctly". Consequently, to tackle this stumbling block, the whole billing process will be taken into consideration to suggest possible improvement policies. The main Research question is:

- "What cost tracking and allocation method could be implemented to improve the billing process?"

## Methodology

In order to provide an answer to the previously mentioned research question certain steps were taken. Firstly, data was required to be gathered in order to build knowledge. For this purpose two methods were selected: Academic and Non-academic Research and Interviews. Interviews were used to envision what the current situation looks like from the employees perspective and what are the methods that the billing department is currently using. Furthermore, research was conducting on automation, accounting, cost tracking etc. to build the fundamental and find solutions according to already established literature.

Afterwards, a systematic approach was chosen, more specifically the "Managerial Problem Solving Method(MPSM)" which consists of seven steps. The problem was thoroughly analyzed in order to arrive at a conclusion.

## Results

The root of the problem was firstly discovered, which was lack of a proper communication channel between departments, a secure storage of data and insufficient information regarding the effects Brexit has on international trade.

To tackle these problems, three solutions were presented. Criteria was established together with its importance. The solutions were scored according to the measurements, receiving a final score. The one which scored the highest was labelled as the most optimal cost tracking and allocation improvement method. In this case, the policy with the highest score was a fully automated invoicing system where all the employees could send, receive and fill in data without the need of interaction. Moreover, as security is an a very important issue, a secure storage is suggested through cloud-based software.

## Conclusion

The new policy will further automate the billing process and establish a mutual communication channel between different departments. Employees will be able to properly communicate and work out documents together through their own computers rather than spending time meeting or calling. As

communication will be improved, estimating costs and generating invoices will become less complicated.

# Contents

# 1.Introduction

The following sections will serve as an introduction to the Bachelor Thesis. In section 1.1 the company where I am currently interning will be introduced. Afterwards, the context will be briefly described in section 1.2, together with the research motivation in section 1.3, problem description and research objectives in sections 1.4 and 1.5 respectively. Section 1.6 will introduce the Research Design and section 1.7 the Research Questions. Lastly, the Deliverables and the Plan of approach will be explained in sections 1.8 and 1.9.

## 1.1Emons Group

This chapter will introduce "Emons Group", the organization I had the pleasure to work with and write my Bachelor Thesis.

"Emons Group" is a private, family-owned group of companies founded in 1943 that operate in ten different countries in Europe. The sector they operate in is the logistics industry by providing transportation services. Emons group consists of three companies:

1. Van Huët Glass Logistics which is specialized in the transportation of glass
2. 2WIN/Emons Cargo dealing in normal cargo with double deck trailers
3. Hofman's niche in champost logistics

Emons group vision does not only include providing the best services for the less expensive price, but also including the environmental aspect by supplying with the lowest possible $CO_2$ emissions. The main goal is: "Building a healthy company based on sustainable logistics niche products and a high quality service". This is achieved through innovative and sustainable concepts which differentiate the organization from its competitors. The organization is mostly known for the "2WIN" double decker which transports 64% more volume with one trip, saves costs and 40% $CO_2$ emissions(Emons Cargo 2WIN, 2021).

## 1.2 Context Description

The following paragraph will provide an explanation of the activities performed at the organization , to provide context for the continuation of the assignment. Section 1.2.1 will introduce the initial phase called the "Investigation phase" while section 1.2.2 consists of the stakeholder analysis.

Emons Group was on the verge of constructing and implementing a new internal technological system in Lbase which is a smart logistics software. The goal of this system is to assist and facilitate the tasks and responsibilities of employees of different departments. The figure below exhibits the process flow from the point when sales receives an order until the billing process and includes all the departments. Moreover, it also introduces the programs used by every department to perform their responsibilities.

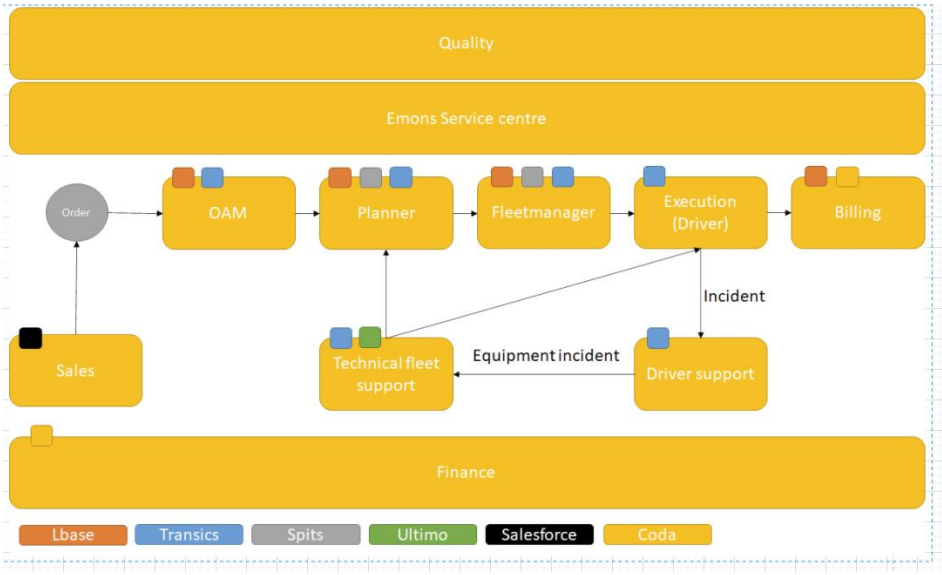


*Figure 1: Process flow(Image retrieved from company supervisor)*

To ensure efficiency and effectiveness of the new system, a general outlook was required, in order to determine which business activity could benefit from this innovation and how it could be improved overall. To provide and draft this overview of processes a development team was formed consisting of five students investigating five departments. A flow chart illustrating all the phases of activities performed is depicted below:

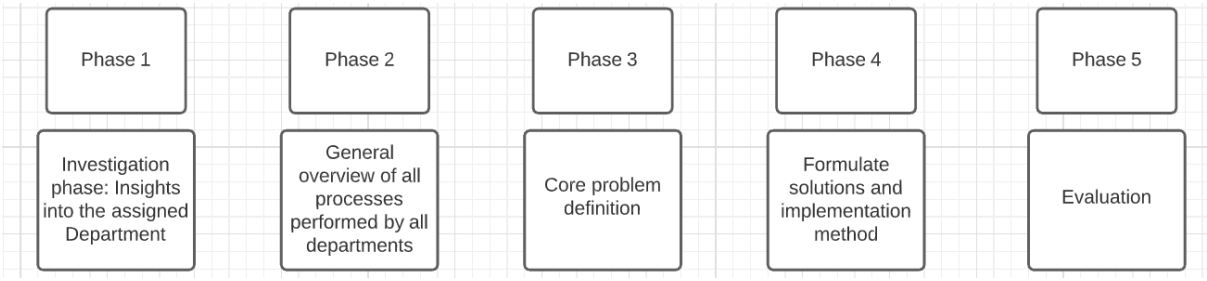


*Figure 2: Flow chart of activities*

### 1.2.1 Investigation Phase

Phase 1 of the project is a pre-liminary research which was conducted before defining the core problem treated in the thesis. I was assigned to look into the "Billing Department" and find possible problems this department was facing. Therefore, Interviews and conversations were held with the employees (Appendix 1, Figure 27). The first step was to map out the tasks each employee was responsible for throughout the week together with the subtasks. Below a complete overview of the "Back office" can be seen:

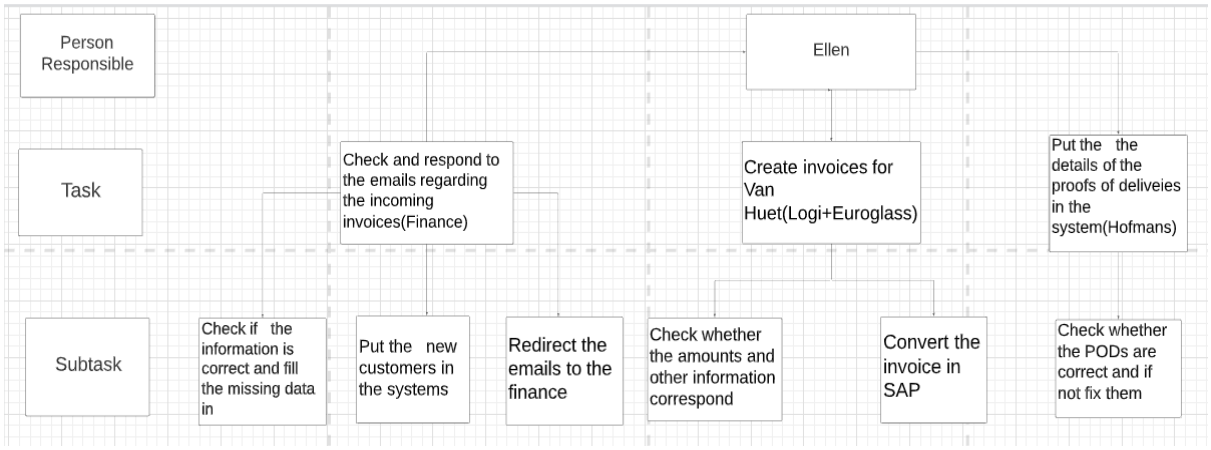


*Figure 3: Flow chart (Tasks and Subtasks of one of the employees)*

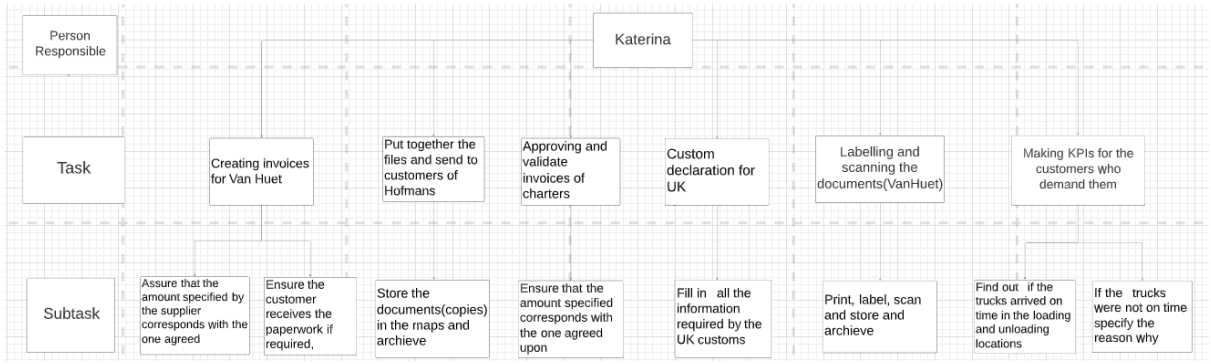


*Figure 4: Flow chart (Tasks and Subtasks of one of the employees)*

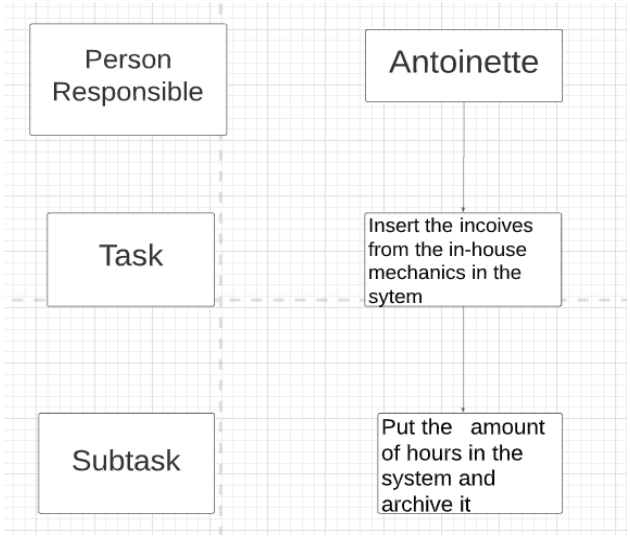


*Figure 5: Flow chart (Tasks and Subtasks of one of the employees)*

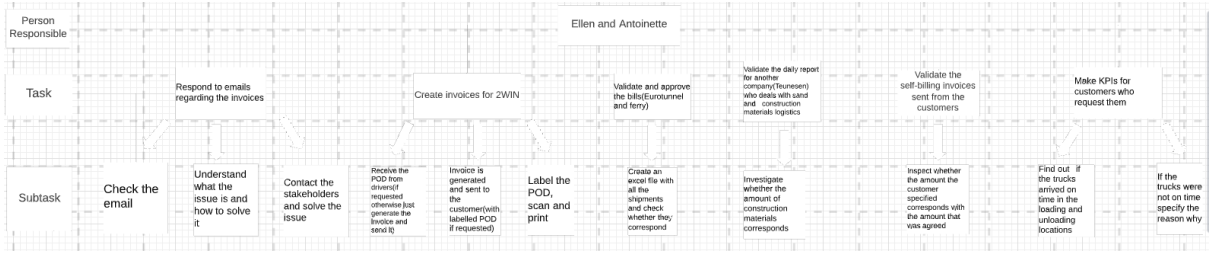

*Figure 6: Flow chart (Tasks and Subtasks performed by two of the employees)*

After determining all the tasks, a thorough analysis was performed on each responsibility in order to establish the triggers(Figure 6 and 7), what software programs are used to complete them(Figure8), other departments which are involved(Figure 9) and attributes allocated(Figure 10 and 11).

| Task | Triggerstart |
|---|---|
| Respond to emails regarding the invoices | Email is received from customers |
| Create invoices for 2WIN | The shipment was delivered 1 day ago(2WIN) |
| Validate the self-billing invoices sent from the customers | Credit note is sent(self-billing) |
| Validate and approve the bills(Eurotunnel and ferry) | Invoice is received from the clients regarding the ferry and Eurotunnel |
| Insert the incoives from the in-house mechanics in the sytem | The forms with the hours filled in are received |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | The paperwork from Teunesen is received |
| Make KPIs for customers who request them | Customer demands the KPIs |
| Check and respond to the emails regarding the incoming invoices(Finance) | Email is received from the suppliers |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Receive through whatsapp the PODs from the drivers |
| Create invoices for Van Huet(Logi+Euroglass) | Delivery was performed one day ago(Logi+Euroglass) |
| Creating invoices for Van Huet | Email is received from suppliers |
| Put together the files and send to customers of Hofmans | Delivery was performed last week until 2 days before(Van Huet) |
| Custom declaration for UK | Files from Hofmans are received |
| Approving and validate invoices of charters | Customer from Germany that ships to UK needs to provide the docments electronically |
| Labelling and scanning the documents(VanHuet) | Invoice from charters are received and scanned |
| Making KPIs for the customers who demand them | Customer demands the KPIs |

*Figure 7: Tasks and their Trigger-start*

| Task | Triggerend |
|---|---|
| Respond to emails regarding the invoices | Email from clients is responded |
| Create invoices for 2WIN | Invoice is sent to the customer and archieved |
| Validate the self-billing invoices sent from the customers | Credit notes are validated and approved(self-billing) and invoice is generated(sometimes in a special program) |
| Validate and approve the bills(Eurotunnel and ferry) | Invoices of the ferries and Eurotunnel are validated and are aggregated in an excel file |
| Insert the incoives from the in-house mechanics in the sytem | The total hours are put in the system and the "administration" is closed |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | The amounts of material corresponds(Teunesen) and the paperwork is sent to Van Huet Germany |
| Make KPIs for customers who request them | The KPIs are prepared and sent to the client |
| Check and respond to the emails regarding the incoming invoices(Finance) | Invoices of Logi+Euroglass are mailed or delivered by post |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Finance department receives the email and the clients are put in the system |
| Create invoices for Van Huet(Logi+Euroglass) | The details are in the system and Hofmans representatives receives the paperwork |
| Creating invoices for Van Huet | Invoice of Vaun Huet is submitted in the customer's system and send the email with the invoice |
| Put together the files and send to customers of Hofmans | Files are aggregated and delivered |
| Custom declaration for UK | Custom declaration is complete |
| Approving and validate invoices of charters | Invoices of charters are approved |
| Labelling and scanning the documents(VanHuet) | Perform a final check and send to the customer if necessary |
| Making KPIs for the customers who demand them | KPIs are complete and send to the customer or put in the system |

*Figure 8: Tasks and their Trigger-end*

| Task | Software |
|---|---|
| Respond to emails regarding the invoices | Mail and Lbase |
| Create invoices for 2WIN | Lbase, Adobe, Excel and Mail |
| Validate the self-billing invoices sent from the customers | Lbase, Mail, Adobe and Excel |
| Validate and approve the bills(Eurotunnel and ferry) | Icenter, Excel and Lbase |
| Insert the incoives from the in-house mechanics in the sytem | Ultimo |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | Mail |
| Make KPIs for customers who request them | Excel, Mail, Transics, Spits and Lbase |
| Create invoices for Van Huet(Logi+Euroglass) | Lbase, Excel and Adobe |
| Creating invoices for Van Huet | Lbase, Websites of the customers, Excel |
| Put together the files and send to customers of Hofmans | Word |
| Custom declaration for UK | The customs website, Lbase and Spits |
| Approving and validate invoices of charters | Icenter and Excel |
| Check the emails for Finance regarding the incoming invoices, check the info, put the new clients in tnhe system | Coda, Mail, FCI and Foxit Phantom |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Whatsapp and Mimis |
| Labelling and scanning the documents(VanHuet) | Lbase |
| Making KPIs for the customers who demand them | Excel, Spits, Lbase,TXConnect and Websites of the customers |

*Figure 9: Tasks and the programs used to perform them*

| Task | Department |
|---|---|
| Respond to emails regarding the invoices | Billing(Back-office) |
| Create invoices for 2WIN | Billing(Back-office) |
| Validate the self-billing invoices sent from the customers | Billing(Back-office) |
| Validate and approve the bills(Eurotunnel and ferry) | Billing(Back-office) |
| Insert the incoives from the in-house mechanics in the sytem | Billing(Back-office) |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | Billing(Back-office) |
| Make KPIs for customers who request them | Billing(Back-office) |
| Check the emails for Finance regarding the incoming invoices | Finance and Billing(Back-office) |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Operatios of Hofmans and Billing(Back-office) |
| Create invoices for Van Huet(Logi+Euroglass) | Billing(Back-office) |
| Creating invoices for Van Huet | Billing(Back-office) |
| Put together the files and send to customers of Hofmans | Billing(Back-office) |
| Custom declaration for UK | Billing(Back-office) |
| Approving and validate invoices of charters | Billing(Back-office) |
| Labelling and scanning the documents(VanHuet) | Billing(Back-office) |
| Making KPIs for the customers who demand them | Billing(Back-office) |

*Figure 10: Tasks and the departments involved*

| Taskname | State | Repetitiveness | Level of Thinking | Personel needed |
|---|---|---|---|---|
| Respond to emails regarding the invoices | Continious | Repetitive daily | Medium level of thinking | No extra personel needed |
| Create invoices for 2WIN | Continious | Repetitive daily | High level of thinking | No extra personel needed |
| Validate the self-billing invoices sent from the customers | Continious | Repetitive weekly and monthly | High level of thinking | No extra personel needed |
| Validate and approve the bills(Eurotunnel and ferry) | Continious | Repetitive weekly | High level of thinking | No extra personel needed |
| Insert the incoives from the in-house mechanics in the sytem | Discrete | Repetitive weekly | High level of thinking | No extra personel needed |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | Continious | Repetitive weekly | Low level of thinking | No extra personel needed |
| Make KPIs for customers who request them | Continious | Repetitive weekly and monthly | High level of thinking | No extra personel needed |
| Check and respond to the emails regarding the incoming invoices(Finance) | Continious | Repetitive daily | Medium level of thinking | No extra personel needed |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Continious | Repetitive twice per week | Medium level of thinking | No extra personel needed |
| Create invoices for Van Huet(Logi+Euroglass) | Continious | Repetitive: monthly, daily, weekly, twice per week | Medium level of thinking | No extra personel needed |
| Creating invoices for Van Huet | Continious | Repetitive daily and twice per week | Medium level of thinking | No extra personel needed |
| Put together the files and send to customers of Hofmans | Discrete | Repetitive wekly | Medium level of thinking | No extra personel needed(extra person already) |
| Custom declaration for UK | Discrete | Repetitive daily | Medium level of thinking | No extra personel needed(extra person already) |
| Approving and validate invoices of charters | Continious | Repetitive wekly | Medium level of thinking | No extra personel needed(extra person already) |
| Labelling and scanning the documents(VanHuet) | Continious | Repetitive weekly and twice per week | Medium level of thinking | No extra personel needed |
| Making KPIs for the customers who demand them | Continious | Repetitive daily | Medium level of thinking | No extra personel needed(extra person already) |

*Figure 11: Tasks and the attributes*

| Taskname | Level of Preparation | Involvement | Extra information | Deadline | Office |
|---|---|---|---|---|---|
| Respond to emails regarding the invoices | Medium prepration required | No involvement | >5min info required | Soft deadline/internal deadline | Can be performed outside office |
| Create invoices for 2WIN | Medium prepration required | No involvement | >5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Validate the self-billing invoices sent from the customers | Medium prepration required | No involvement | >5min info required | Deadline present | Can only be performed in the office |
| Validate and approve the bills(Eurotunnel and ferry) | Medium prepration required | No involvement | >5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Insert the incoives from the in-house mechanics in the sytem | Medium prepration required | No involvement | >5min info required | Deadline present | Can only be performed in the office |
| Validate the daily report for another company(Teunesen) who deals with sand and construction materials logistics | Low prepration required | No involvement | <5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Make KPIs for customers who request them | Medium prepration required | No involvement | >5min info required | Deadline present | Can only be performed in the office |
| Check and respond to the emails regarding the incoming invoices(Finance) | Medium prepration required | Involvement | >5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Put the the details of the proofs of deliveies in the system(Hofmans) | Medium prepration required | Involvement | >5min info required | Deadline present | Can only be performed in the office |
| Create invoices for Van Huet(Logi+Euroglass) | Medium prepration required | No involvement | >5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Creating invoices for Van Huet | Medium prepration required | No involvement | >5min info required | Soft deadline/internal deadline | Can be performed outside office |
| Put together the files and send to customers of Hofmans | Low prepration required | No involvement | <5min info required | Soft deadline/internal deadline | Can only be performed in the office |
| Custom declaration for UK | Low prepration required | No involvement | >5min info required | Deadline present | Can be performed outside office |
| Approving and validate invoices of charters | Medium prepration required | No involvement | <5min info required | Deadline present | Can be performed outside office |
| Labelling and scanning the documents(VanHuet) | Low prepration required | No involvement | No extra information required | No deadline present | Can only be performed in the office |
| Making KPIs for the customers who demand them | Low prepration required | No involvement | <5min info required | Deadline present | Can be performed outside office |

*Figure 12: Tasks and the attributes*

This analysis contributed to a better understanding on how the organization operates and more specifically how the process invoices operates.

### 1.2.2 Stakeholder Analysis

In this section a stakeholder analysis will be performed. It is important due to the fact that it enables to fully comprehend the requirements set by the stakeholders, and gain their support. This analysis facilitates the outlining and establishment of conveyance with the stakeholders in proportion to their impact and regard to the project. It provides proper arguments to the continuation of the venture in case opposition is anticipated(Lucidchart Blog, 2021).

#### 1.2.2.1 Participatory stakeholder analysis

This review aids finding all the relevant interveners and their role, responsibility, relationships, interests and influence. There are three types of stakeholders to be taken into consideration(A. Van der Laan, 2019):

1. Communities: Individuals who deal with the issue directly and communicate with problem-solvers. In the case of this thesis this group consists of employees, drivers, customers and outsourcing firms.
2. Problem solvers: The group of people responsible for coming up with solutions, innovations and drive the project or business forward. This category includes the management team of Emons group and the employees tasked with solving the problem the organization is facing.
3. Policy and decision makers: the Entities who have the higher control and have influence on decision-making. This group of stakeholders consists of the CEO of the company and the board of directors.

The methodology from A. Van der Laan constitutes 3 stakeholders but there is a fourth entity which should be included: Environment. As a logistics company, Emons is always striving to provide eco-friendly services which cause less detrimental effects or benefit the ecosystem.

There are various of methods to identify and establish stakeholder. Another classification could be divided into 3 categories:

1. Internal: Employees, Managers, Shareholders, Investors. However, according to the knowledge I possess, Emons group is a family owned company and the shareholders and investors entity does not apply.
2. External: Suppliers, Customers, Media, Creditors, Competitors, Business Experts
3. Interface: Government, Society, Environment

#### 1.2.2.2 Stakeholder Prioritization

In order to prioritize the stakeholders, the latter will be analyzed according to their influence/power and interest on the project. The following scheme depicts the stakeholders and their position on the grid:

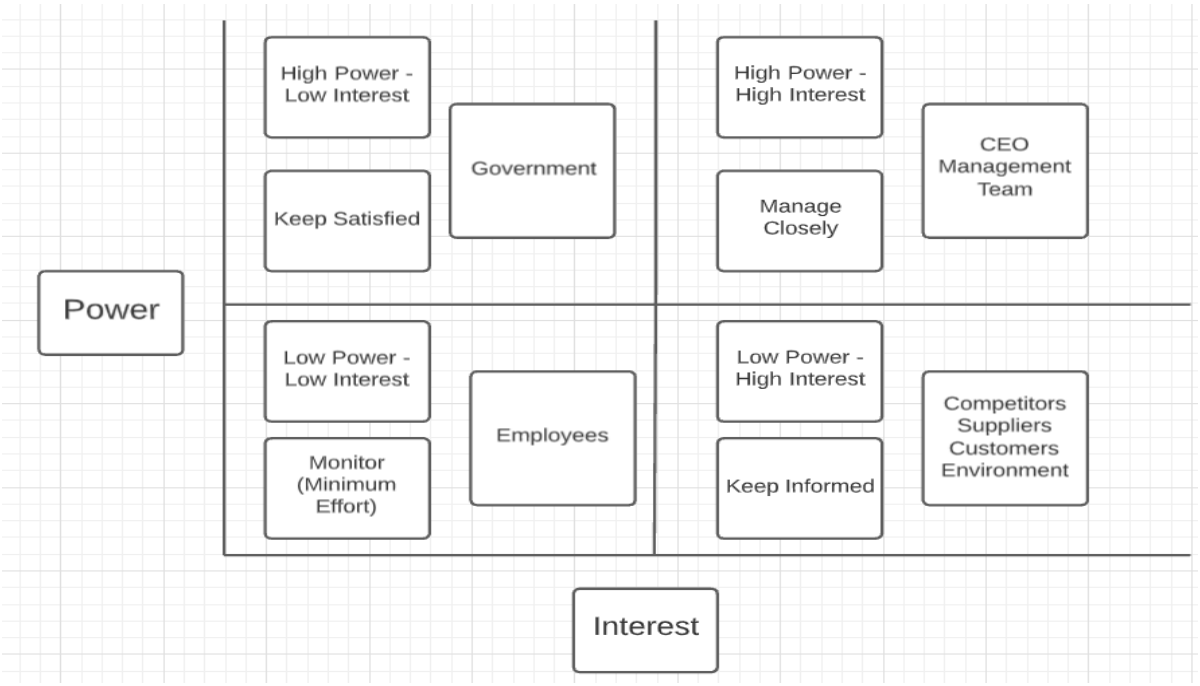


*Figure 13: Power/Interest Grid for Stakeholder Prioritization(Mind Tools, n.d)*

- High Power-Low Interest: This entity is required to be satisfied and the organization should comply with its regulations, however their interest is rather low.
- High Power-High Interest: This is the group of individuals whose opinion and perspective matter the most. Their interest must be protected and managed closely.
- Low Power-Medium Interest: These individuals influence on the decision-making is indirect as their opinions and suggestions are considered but not always taken into account. However, as employees, they fancy the continuation and the financial health of the business.
- Low Power-High Interest: This type of stakeholders have no direct influence on the activities of the organization, nevertheless have high interest. More specifically, they are not the ones who deal with decision making themselves, but need to be considered. Suppliers and customers depend on your services and financial situation, whereas competitors can take advantage of the hardships to increase their market share or conduct a hostile takeover. Environment can also be included in this section of the grid.

## 1.3 Research Motivation

This chapter will elaborate on the motivation of the research. To be more specific, the reasons that drive the project to take place.

As was mentioned in section 1.2 a general overview of the tasks performed daily from different departments was required to provide further assistance when implementing the new Lbase system. Therefore this overview was drafted and presented to the management team.

Emons Group conducts business in the UK even after Brexit was finalized. Due to the latter phenomenon, international trade between countries that Emons operates in, and the UK became more demanding, not only monetarily but also in the customs scope. The amount of paperwork, labor and resources required increased, thus incurring more costs. If these costs are calculated accurately, they can be added on the invoices sent to the customers.

Integrity is one of the most important features when it comes to the accounting system (Paychex, 2020). In this article, it is further emphasized that the righteousness of the information depends on the quality of the data entered. There are various accounting errors which can have minor and substantial consequences. Income and expense can be over or underreported which can result in overpaying taxes or tax evasion which is illegal and punishable by law. When items are not communicated correctly, the amount of cash flow can be overstated. Moreover, correction takes time and increases labor costs, as more employees are required. Additional fees and interest can result because invoices are being paid past due date. Expense and income should be equal when are reported in the accounting system. If expense or income are wrongly recorded, this may result in issues. Lastly, fraud could be detected in the form of embezzlement. If the information does not match or add up, further investigation might be required.

Therefore, it is essential that accounting errors are prevented or corrected as soon as possible. The most common consequence every manager fancies to avert is extra costs or illegal activities. For the sake of the assignment, I will be focusing on proper calculation of extra costs and proper communication between departments.

## 1.4 Problem Description

After the completion and presentation of the general overview the problem identification phase began(Figure 1). Based on the conversations I had with the employees of the Back-office, and my responsibility to investigate the department, there were a few minor issues which could require intervention. Subsection 1.4.1 will explain the problem identification phase while subsection 1.4.2 will introduce the core problem.

### 1.4.1 Problem Identification

Based on the conversation with the management team, the most pressing issue the billing department was facing which required immediate interference is: Inability to properly calculate the extra costs of their services. These costs include:

- Fuel
- Extra costs customs declaration export/import
- Recharge of digital customs clearance
- Digital customs clearance
- Extra parking costs
- Communication order info
- Formulating KPI dashboards
- Trip monitoring
- Waiting hour tariffs
- Shorter lead-time costs
- UK surcharge(Not Brexit related)
- Capacity surcharge
- Pallet exchange

First of all, as mentioned in section 1.2, in the beginning of the project I conducted interviews and formal conversations with the employees of the back-office. Their main task was to validate and forward invoices to the customers. This task includes manual work and communication with other departments, which could have been optimized through a software. According to my observation and interviews conducted, there is not an appropriate computer program which facilitates the storing and accurate estimation of all the extra costs. This increases the difficulty to properly asses the amount of money which are actually spent to provide services. Extra fees and tariffs are invoiced in fixed amounts which can result to be inaccurate. The policy of the company is to bill a fixed amount which is assumed to be correct. However, according to the person in charge of the project[1], if these amounts are inexact, in the longer run, they could add up to tens of thousands of euros. The methods being used by the organization could be further optimized with the implementation of this technology. Consequently, the major issue that arises is the lack of certainty. The management is not informed whether the amounts invoiced are accurate or not, increasing the ambiguity and uncertainty.

Another matter worth pointing out, is the fact that different divisions within Emmons are responsible for establishing the amount of some extra costs. Besides the back-office, departments responsible for assigning extra costs are Sales and Customer service. Assigning variable costs can prove to be a demanding task. Tracking down and the employees responsible for cost assigning has proven to be really challenging. There is a relatively large amount of extra costs, and many departments are involved, thus proper communication is difficult and is performed manually. However, if the back office could be able to communicate with Sales and Customer Service via a shared software, cost assigning would

[1] Marcel Wouterse

become less burdensome. According to my observation, the lack of a shared system leads to insufficient communication between departments of Emons group.

(RQ4)Finally, the last issue emerged on January, 2021 when Brexit new policies were implemented. As mentioned in section 1.3 costs and formalities increased. Goods imported plunged by 29% together with the additional formalities and estimated costs of taxes (A. Sandford, 2021). The author also states that some small business even had discontinued their dealings with organization in the EU because of post-Brexit rules that came into place. Emons employees also mentioned the fact that there are other logistics companies who stopped conducting business with the United Kingdom, but the organization itself decided to continue. The amount of paperwork, labor and resources required increased, thus incurring more costs. However, the actual amount of extra fees is difficult to calculate, since the phenomenon is relatively new and employees are not fully informed on the practices that have been adjusted. Therefore, the amount of money that should be invoiced could be miscalculated.

### 1.4.2 Core Problem

Based on personal observation and interviews with the management team and employees of Emons Group, improved billing methods and structures could facilitate appropriate invoiced figures to customers, ensuring transparency and preventing unnecessary tariffs. The core problem the company is facing is: "Insufficient information whether the accounting practices are being implemented accurately and properly". More specifically, whether the methods of cost tracking and allocation could be further improved and developed.

This problem is classified as an "action problem", which deals with situations where there is an inconsistency between norm and reality and action is required to take place(H. Heerkens & A. van Winden , 2016). To further elaborate the problem the 4x Whys method was used and can be seen below:

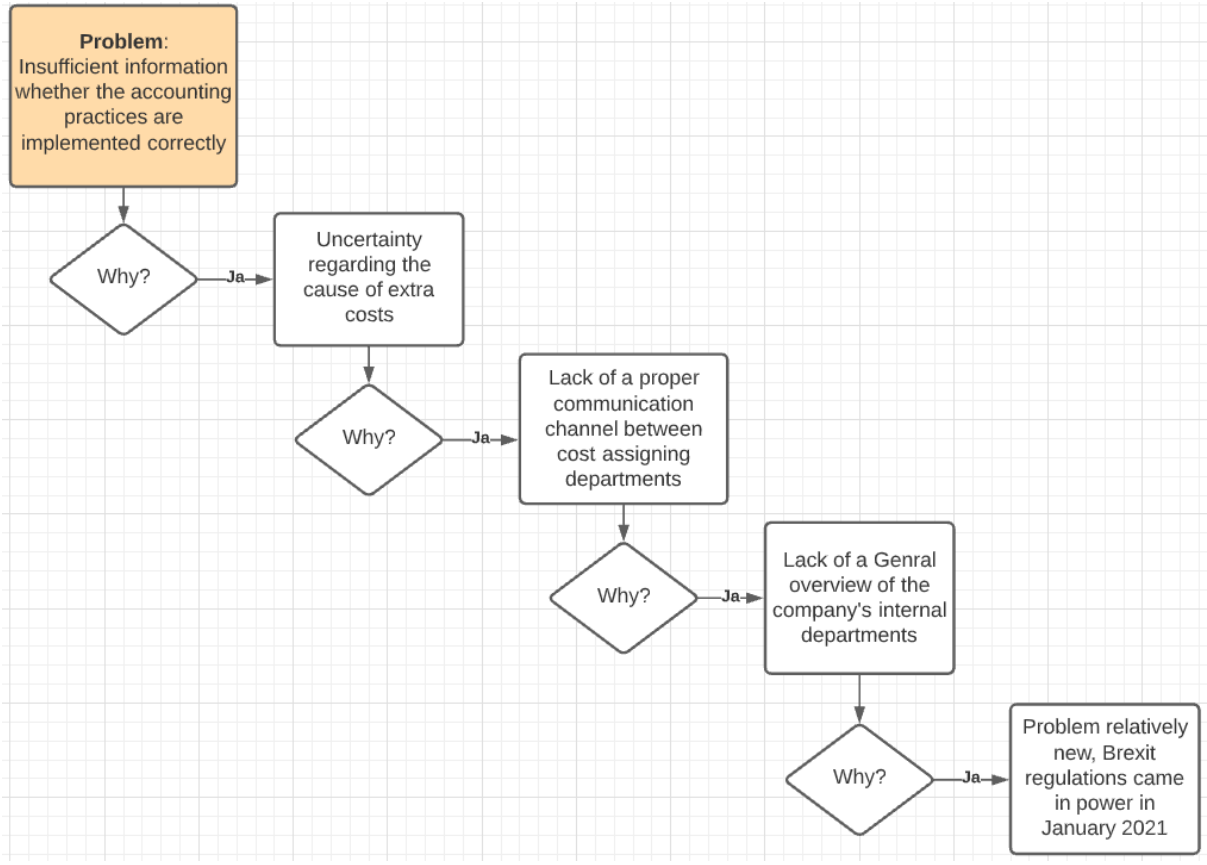


*Figure 14: 4x Whys diagram*

The figure below depicts the Problem Cluster:

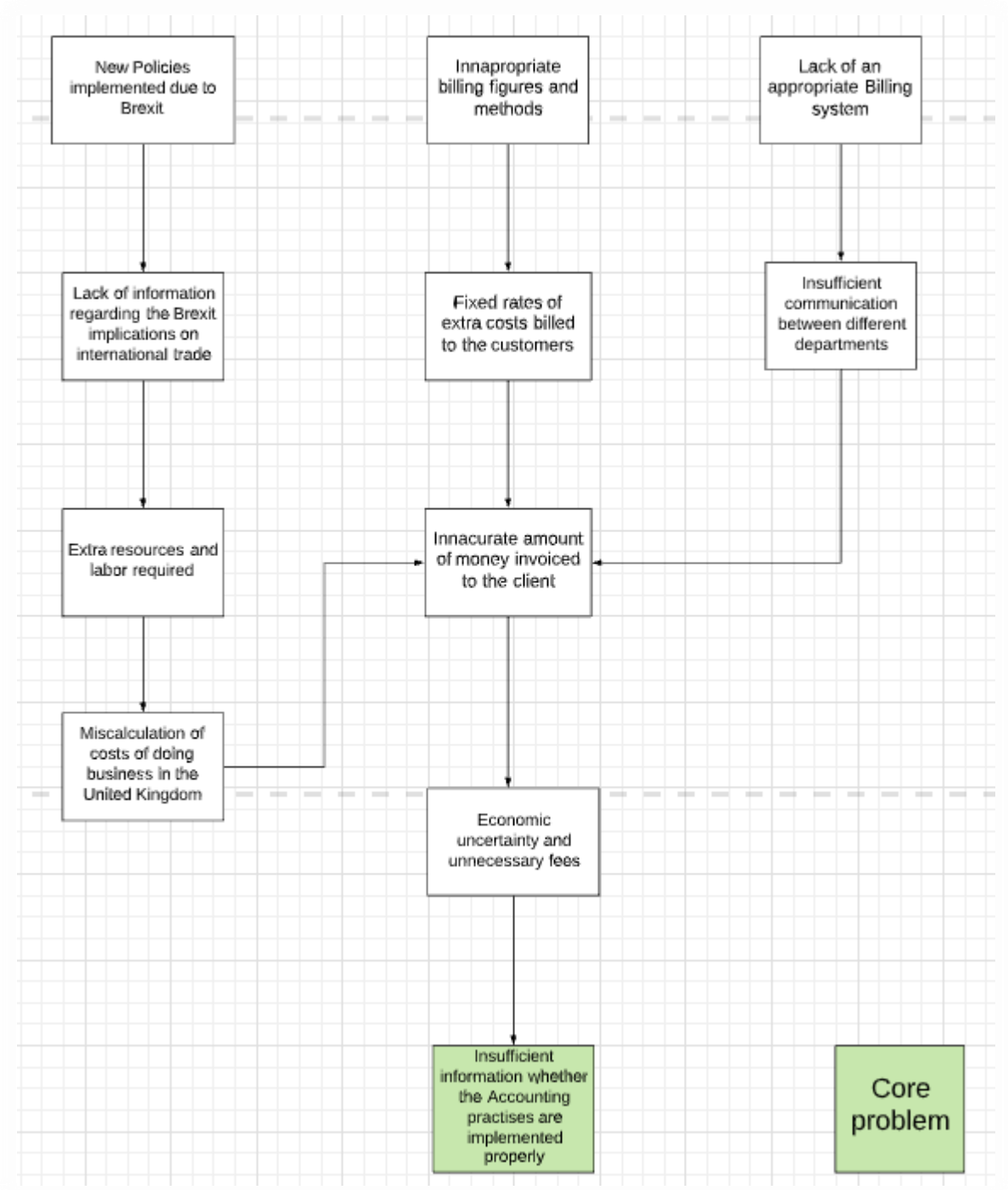


*Figure 15: Problem cluster*

### 1.4.3 Difference between Norm and Reality

In this section a comparison between norm and reality will be displayed and applying real data taken from Emons database. These data are retrieved from the new system the company was implementing in Lbase exhibiting the extra costs of conducting business in the United Kingdom.

The reality will represent what extra costs are increased and should be billed to the customer and norm the total amount before Brexit. This analogy aims to further exhibit the fact that proper billing methods should be implemented to optimize the process and prevent inaccuracies. Both the norm and reality will be expressed in amounts, allowing appropriate analysis and establishment of inconsistencies. After having personal meetings with the management team, I came to the conclusion that they are focused on preventing unnecessary fees in order to maximize profit. The Billing department is responsible for formulating and sending invoices to the customers. If the extra cots mentioned in section 1.4.1 are assigned accurately and properly that the general goal is achieved. Consequently, adequate assignment of extra costs can lead to prevention of unnecessary tariffs.

As mentioned previously, before Brexit took place, because of the European Union regulations, international trade required less paperwork, labor and expenses. The figures below display the amount of extra costs incurred travelling from UK to EU and vice versa. This data consists of trips in February 2021 and all the costs are extra and only incurred due to Brexit.

The norm before January would have been €0 but in reality in only one month extra costs increased to 112,649+27,368= €140,017. The difference is significant posing a recently discovered issue within the organization. These extra costs should be properly calculated and presented to the customer order to include them in the invoices.

X

*Figure 16: Extra costs of travelling from UK to EU (Confidential)*

X

*Figure 17: Extra costs of travelling from EU to UK (Confidential)*

## 1.5 Research Objectives

Research objectives state the envisioned goal of the research conducted on a certain topic. More specifically, they represent what is presumed to be accomplished by a project or research(Research Objective(s), n.d). The following section will elaborate on the specific objectives of the project.

The first research objective is to get a general overview on accounting and its fundamentals. To be even more precise, the main objective is to gather data regarding cost allocation and tracking method which can be implemented effectively in a logistics company. More specifically, cost accounting is the subsector which deals with this sort of activities. Furthermore, the information should contain both qualitative and quantitative data on how a company monitors, oversees and assigns extra costs and how could these methods be improved. Finally, after determining the most optimal practice, or formulating a new or adjusted method, the implementation technique needs to be specified along with the benefits and drawbacks it will bring. This is the most important objective for Emons and the research since it provides the foundation and deals with the most important problem.

The second research objective is about the internal communication between cost related departments of Emons group. The goal is to improve the communication between these divisions such that all the stakeholders are properly informed regarding the latest policies and regulations and adjustments are made accordingly. This objectives is the second in terms of importance as it contributes to solving the

core problem. Moreover, improving the communication between departments is one the aims of the Lbase system.

Lastly, the project strives to get information regarding the implications Brexit has brought upon international trade between the UK and the countries within the EU. Since January 2021, new policies were introduced and applied when it came to importing and exporting goods in the Great Britain. Due to the fact that these regulations are relatively premature, Emons is unsure about the amount of extra costs that incur because of this phenomenon. As the company continues to conduct business in UK, it is important to get information on what this phenomenon has brought upon and how to prevent unnecessary costs.

### 1.5.1 Research scope

Research scope represents a clarification on the research information and depth of implementation which was taken into account and examined. Furthermore, it displays the extent to which a research subject is analyzed(Scope of the study, 2016).

Firstly, in this case the general scope of my research is the field of accounting. What is accounting and its subsectors, its fundamentals and implementation methods. When it comes to subsectors, the one which will have the most emphasis on, is "Cost accounting". Furthermore, my research will focus mostly on how can the extra variable costs be calculated properly and efficiently through the practices of accounting in Emons group. Moreover, one part of the research will include the phenomenon of Brexit, and the implications it has brought to international trade. Emons does a great deal of business in the UK, so this topic is of significant importance.

Secondly, the scope contains which cost allocation methods ought to be implemented and the benefits they could bring to the company. What will change in the organization and how will this implementation proceed is also part of the research extent. In the end, a conclusion and recommendations will be presented.

## 1.6 Research Design

Emons Group is facing an issue which is classified as an "action problem". Consequently, the problem solving approach that will be utilized is the "Managerial Problem Solving Method" from the book called "Solving Managerial Problems Systematically by H. Heerkens & A. van Winden (2016). This method consists of seven steps, namely:

1. Defining the problem
2. Formulating the problem solving approach
3. Analyzing the problem
4. Formulating(alternative) solutions
5. Choosing the solution
6. Implementing the solution
7. Evaluating the solution

There are two types of frameworks, namely systematic and creative. The systematic approach searches feasible solution in a piecemeal manner. On the other hand, the creative method has no general structure. However, it is a "high risk high reward" framework and could lead to failure. MPSM implements both these approaches together, as complements of each other. It is a general method, adaptable and applicable in all fields of competence. It has no limit when it comes to the time or place of implementation. Moreover, this methodology takes into consideration the fact that the problem at hand is in an organization context, leading to a tailored recommendation. Consequently, MPSM is able to adequately analyze and propose solutions to the problem Emons is facing. Also, problems are dealt in

terms of variables making less difficult to explore, tailor down and solve. By solving each step at a time, a systematic solution is presented at the end.

Managerial Problem Solving Method allows for implementation even without having built particular knowledge on each step, rather a general outlook is sufficient. This framework does not separate designing and research, rather they go side by side. It facilitates knowledge building through research and problem solving through design (H. Heerkens & A. van Winden, 2016). Data from the literature found will be used to provide an answer to these questions.

A theoretical framework is constructed by principles, interpretations and already established theories which are used for a specific research project(Lynham, S. A, 2002). It must display a comprehension on how the concepts and definitions that are relevant for this research study, relate in a broader scope of knowledge. Furthermore, the theoretical perspective maintains and supports the assumptions of the research. In order to gather data Research was conducted and Interviews. Section 1.6.1 will elaborate on the data gathering method and 1.6.2 Validity and Reliability.

### 1.6.1 Research and Interviews

The method used to collect information was research. Research is the activity of using various procedures to look into certain topics in detail striving to establish new knowledge about it. There are various research categories based on different criteria. This time, the data was not company related, rather topic oriented. After receiving the core problem and the subject of my thesis, I started looking into them. This procedure is the most favorable, since it is the best tool for knowledge-building and aids when it comes to understanding different subjects(L. Zarah, 2021). Research provides in depth information together with analysis and arguments to defend its statements. By doing so, it increases credibility and introduces new ideas and perspectives. Also, conducting research allows for the scope to be narrowed down and supplies the latest information(E. Soken-Huberty, 2021). Therefore, I came to the conclusion that this was the most optimal method of data gathering.

Firstly, to gather data regarding accounting and its policies objective research on the web was conducted. Objective research aims drawing theory to generate practical knowledge(DiscoverPHDs, 2020). The same article suggested that the best research method for determining the root of the problem is Explanatory as it establishes cause and effect relationships. Implications of Brexit new regulations were found on the official websites of European Union and The United Kingdom. All the remaining Research questions were answered through academic literature, using scholarly databases. More information will be provided in chapter 3. Lastly, to draft the general overview of the organization and improving the internal communication Interviews were held with the employees of the Billing department but also the management team.

Interviews are organized conversations between two individuals where one asks questions and the other responds. The aim of interviews is to acquire knowledge regarding one or more specific topics from the respondent(Virginia Tech, 2018). Data had to be gathered regarding the tasks and responsibilities of the employees of the “Back office”. For this purpose interviews appeared to be the most optimal method, due to the fact they provide the best flexibility. Follow-up questions could be asked, specific inquires could be treated more explicitly and the conversation feels more natural since it is physical and interpersonal. Furthermore, the order and the manner the questions are asked are controlled by the interviewer and non-verbal behavior of the respondent could be observed and analyzed(Sociology Group, 2017). Moreover, interviews allow accurate screening and the interviewers possesses total control of the discussion (S. E. DeFranzo ,2021). Misinterpretations or errors can be rectified with ease during an interview, and rapport could be established between the examiner and interviewee. This augments mutual understanding and collaboration. In most cases interviews are less time consuming

and inexpensive (The Business Communication, 2021). The Interview constructed for the employees of the "Billing" Department can be found in Appendix 1. There were three interviews held and afterwards communication continued less formally. I would send any follow-up questions via email or visit when I was in the organization's headquarters.

### 1.6.2 Validity and Reliability

The scientific value and adequacy are evaluated through validity and reliability. The next chapters will introduce these two concepts in depth.

Validity refers to the accuracy of the method implemented for measurement(Fiona Middleton, 2020). There are three types of validity(H. Heerkens & A. van Winden (2016):

- Internal Validity: This type is responsible for ensuring that the measuring instrument has been constructed in an appropriate manner and whether it properly estimates what is required.
- External Validity: Deals with the extent that the research can be applied to other groups rather than the research population.
- Construct Validity: The last validity type deals with abstract concepts. Furthermore, it ascertains the adherence of a unit to already established theory and knowledge(Fiona Middleton, 2020).

Validity should be considered in the early stages of the research. It is fundamental that the data collected are accurate. However, ensuring reliability, does not mean that the information is valid. Only the converse[2] is true. In order to ensure validity a proper data gathering method is required to be selected. I decided to use interviews, since it appeared to be the most optimal method to retrieve data from the employees responsible for each task. To reduce repetitiveness, proper argumentation for interview selection can be found in section 1.6. One of the threating factors of validity is bias. The employees may express their personal opinions. To prevent this, questions were formulated aiming to reduce it by standardizing the questions. However, completely diminishing bias seemed to be impossible at the moment due to time constraints and lack of proper resources. Another limitation would be the knowledge the candidates have on the topic. Some of the questions might not receive an answer simply because the interviewee does not possess the expertise. In this case the question was asked to the person responsible(as advised by the employees) or the management team.

Furthermore, researching in trustworthy academic sites published by the university was the second method used to ensure validity. Databases such as Scopus and FindUt were utilized.

Reliability is the extent to which a research procedure provides substantiality and constituency in the outcomes(Diana Ridley, 2012). There are three types of reliability:

- Test-retest: Deals with consistency across time. More specifically whether the same results are yielded if the measurement is repeated.
- Interrater: Measures consistency across the observers, whether different raters submit equivalent findings.
- Internal consistency: estimates the constancy of the measurement, if the same results are obtained by different segments constructed to measure the same artefact.

Ensuring reliability in a research project can prove to be a challenging task. It is essential that the results of data collecting are precise, coherent and duplicable. The methods should be applied consistently and the conditions are required to be standardized so that the effect of external factors is diminished(Fiona Middleton, 2020).

[2] If a measure is valid it is also reliable

To ensure reliability in interviews, questions were formulated to be as direct as possible and straight to the point. Moreover, the questions were constructed in such a way that their goal was to not leave room for interpretation to increase consistency in answers. Bias is also a limitation when it comes to reliability. However, this was not an obstacle as the interview purpose was to get information on the current situation and possible problems.

When it comes to general research, the key words used are specified and carefully selected to ensure relevant and consistent results. Most relevant keywords were selected and searched in the databases mentioned in Appendix 3. After being narrowed down, based on their topic and relevance their abstract was carefully read. More information can be found in chapter 3: "Systematic Literature Review". A certain number of articles were fully scanned, the unrelated were omitted and the final result was 8 academic journals.

## 1.7 Research Questions

According to H. Heerkens & A. van Winden (2016) a "knowledge problem" is an explanation of the research population, the variables and the relations that need to be examined and analyzed. These problems can be expressed in terms of questions. The later as classified as knowledge questions, which are inquiries about knowledge and what it means when possessing knowledge(Theory of Knowledge, 2019). In order to solve the issue the organization is facing the problem needs to be tailored down into smaller inquires which will be solved systematically. The table below will include the Knowledge questions, MPSM step or chapter of the thesis it belongs to and the data gathering method.

| Research Question | Number/Type | MPSM Step/Thesis Chapter | Data Gathering Method |
|---|---|---|---|
| What is the core problem the organization is facing? | RQ1 | 1.Defining the problem | Interviews and Conversations |
| Why is Emons group facing this obstacle? What has caused this problem? | RQ2 | 3.Analysing the problem | Interviews and Explanatory Research |
| Why were not previous attempts successful? | RQ3 | 3.Analysing the problem | Interviews |
| What are the implications that Brexit has brought upon freight transportation between UK and countries within the EU? | RQ4 | Problem Identification | Research |
| How can communication between different departments responsible for cost assigning in the workplace be improved? | RQ5 | 4.Formulating possible solutions | Research and Conversations |
| What is accounting? | Sub-question(SQ)1 | Literature Review | Research |
| What is cost accounting? | Sub-question(SQ)2 | Literature Review | Research |
| What are the three accounting rules? | Sub-question(SQ)3 | Literature Review | Research |
| What cost tracking and allocation method could be | Main RQ | 4,Formulating possible solutions | Research and Conversations |

| | | | |
|---|---|---|---|
| implemented to improve the billing process? | | | |
| What are the advantages and drawbacks to the possible solutions? | RQ6 | 4.Formulating Possible Solutions | Research |
| What are the criteria that require fulfillment for a policy to be the most optimal? | RQ7 | 5.Choosing a solution | Research and Conversations |
| How can the selected policy be implemented in the company? | RQ8 | 6.Implementing the solution | Conversations and Research |
| How can the implementation be evaluated? | RQ9 | 7. Evaluating the solution | Research |

*Table 1: Research Questions*

## 1.8 Deliverables

There are certain deliverables which were required by the University and the company.

- Excel file containing all the tasks, triggers, attributes of the Back-office which is exhibited in section 1.2.
- Flow chart mapping out each employee responsible for each task and subtask(section 1.2)
- Improved policy of cost tracking and allocation.
- Conclusion and recommendations for improvement.

## 1.9 Plan of Approach

In this section, the Thesis structure will be described.

The approach applied to perform the assignment is an adjusted version of the methodology provided by the University of Twente(BSc Thesis and Graduation Guide, 2020):

1. Introduction which address the following issues: company introduction, context description, research motivation, problem description, research objective, research (sub) questions, deliverables and plan of approach
2. Context analysis: Current situation
3. Literature review: elaborates and takes into discussion existing theories implemented on the research topic. More specifically, the most important research question will be used to find relevant literature.
4. Solution design which is present alternative solutions and policies.
5. Conclusions and recommendation describes the personal opinion about the findings and possibilities for organizational implementation.

## 1.10 Conclusion

The chapter starts with an introduction of the company. A development team was formed to investigate 5 departments of the organization and discover possible problems. The department I was assigned was the “Back-office” which deals with invoices. The problem this department was facing was: “Insufficient information whether the accounting practices are being implemented accurately and properly”. To solve this problem the MPSM will be used and the Research Questions were defined. Lastly, the deliverables of the project and the plan of approach are determined and stated.

# 2.Context Analysis

This section will elaborate briefly on the manner the "Billing" department operates currently and how the tasks and processes are being performed at the moment.

## 2.1 Current situation

The Back office of Emons Group consists of three employees who are responsible for different tasks as displayed in section 1.2. The most important obligation is generating and sending invoices to the customers. The amounts have to be verified and validated before a bill is forwarded. When starting to do business with a new or potential customer a price list is requested. Emons employees have drafted this price list and it is displayed below:

X

*Figure 18: Tariffs and fees established by Emons Group(Confidential)*

Nevertheless, there are certain companies who disagree with the amounts established. Therefore, they settle different figures in their tenders and the organization has to either comply or lose them as a customer. Below the tender of a customer is shown:

X

*Figure 19: The tariffs and fees established by the customer(Confidential)*

As mentioned in section 1.4.1 besides the "Back-office" there are other departments within Emons are assigned to calculate extra costs. When it comes to fuel, the following procedure is established based on the agreement that was defined by Emons and the customer company:

X

*Figure 20: Fuel pricing procedure(Confidential)*

Besides the fact that a mutual communication channel is not implemented(mentioned in section 1.4), another issue is the fact that certain tasks are performed manually, and take up nearly a third of the working hours of two of the employees of the "Billing" department. In order to validate and generate an invoice the drivers have to physically deliver the "Proof of Delivery" to the company's reception, where it is then taken, labelled, scanned and sent to the customer. This process is very time consuming and requires no expertise[3]. Consequently, in my opinion it would be beneficial to optimize the procedure.

## 2.2 Conclusion

In order to provide their services, Emons Group has drafted a tender which displays the costs. However, there are companies who have formulated their own tenders with different prices. Based on both these documents an agreement is made by the customer and Emons.

[3] Employees perception

# 3.Systematic Literature Review

This chapter will introduce the methodology used to perform the Systematic literature in section 3.1, Research questions taken into account in section 3.2 , inclusion and exclusion criteria in section 3.3 databases used in section 3.4, search strings in section 3.5, summary matrix in section 3.6 and integration of theory in section 3.7.

## 3.1 Framework

The framework selected is an adjusted version of the one presented by the University and labelled as "Systematic Literature Review". According to Noort(2021) there are six steps required to perform a Systematic Literature Review:

1. Define the Main Research Question and Sub-questions
2. Define the inclusion and exclusion criteria
3. Define the databases used and why
4. Formulate the search terms
5. Listing the number of search results
6. Providing the Summary Matrix

## 3.2 Research Questions

In section 1.7 of the assignment the Research questions were defined. As mentioned, answering these questions requires extensive research and possesses great importance when it comes to the thesis. In this section the main question will be introduced and the systematic literature review will be performed.

The question: "What are the most optimal and feasible policies of cost tracking and allocation?" was chosen due to the fact that the subject it treats, is the basis of my research and facilitates completion of the thesis. This question will represent the most important research inquiry and will include the best policies of cost tracking and allocation in theory. Besides the latter, the Sub-questions will be taken into account when choosing the search strings. The answer to these questions is provided below:

SQ1: A business is an organization in which initial funds including data, information and exertion are allocated and refined to supply products and services to potential customers(Carl S. Warren, 2019). The types of enterprises can be on the basis of size, employees, Investments, revenue etc. Accounting or accountancy is the estimation, development, and conveyance of financial and non-financial data about economic establishments such as enterprises and businesses(Needles, Belverd E.; Powers, Marian, 2013). Accounting has also been defined as the manner in which corporations communicate, more specifically the "Language of Business" by Perry Bishop Lane, a highly decorated accounting professor. It computes the economic performance of an entity and communicates the results to the shareholders and people responsible including investors, creditors, administration and regulators(Department of Accounting, n.d).

SQ2: Accounting is divided into numerous fields of finance and the one which will be taken into consideration is cost accounting. The latter is classified by the Institute of Management Accountants(IMA) as a structured group of methods for recording and conveying estimations of the costs of producing products or providing services. Furthermore, cost accounting is associated with and sometimes labelled as managerial accounting, which involves the management team of a corporation to assist in the decision making process together with strategy composition and application. This process recognizes, accumulates, percept and conveys financial data, utilized by the executives of a company to facilitate their plan and vision (IMA, n.d). There are four types of cost accounting (Alicia Tuovila, n.d):

1. Standard costing where default costs are designated instead of the actual, based on efficiency of usage of resources and labor. Nevertheless, the company has to perform payments conditional on the real costs so assessing the difference between standard and actual costs is called variance analysis. The variance can be favorable(actual<standard) or unfavorable(actual>standard) based on the difference of the assigned fees.
2. Activity-based costing (ABC) recognizes overhead[4] costs from each department within a corporation and allocates them on products and services. The activities utilized to facilitate this allocation are called cost drivers. Therefore, this method tends to be more accurate when it comes to creating a cost overview and profitability.
3. Lean Accounting practiced to enhance financial policies within a company. It follows the philosophy "lean manufacturing " which is minimization of waste and increased productivity.
4. Marginal costing represents the effect the cost of a product has, when manufacturing amount is increased by one additional unit. This accounting method is used by the managerial team for short term economic decisions. Furthermore, another application of this procedure is to consider new potential markets and products, or the impact of new economic activities such as marketing campaigns.

SQ3: In the accounting world, debit[5] and credit[6] are what matter and what make a company's books revolve. They are both equal but opposite entries in the journals where business transactions are initially recorded. There are five main types of accounts that are influenced by credit and debit(Rules to follow, 2021):

1. Assets: Supplies and resources owned by an individual or corporation that posses economic value and can be converted into money
2. Expenses: Fees that incur or required by doing business operations
3. Liabilities: Amount of money or resources owned to another person, financial institution or business(debt, monthly expenses etc.)
4. Equity: the difference between assets and liabilities
5. Revenue: Income earned from providing services or sale of products

First rule of accounting is: "Debit the receiver and credit the giver". This means that the person who provides a service or product should be reimbursed for the time, effort and resources spent. This rule comes more to play when it comes to personal accounts. If an individual provides, they should be credited. If they receive, then they should be debited.

The second rule of accounting is: "Debit what comes in, debit what goes out". This rule is used when it comes to real or permanent account. They are not closed when an accounting period is over, rather their balance is carried over to the next quarter. Real accounts can be in the form of an asset, equity or liability account. In the case of a coming resource, the account is debited. Consequently, when something goes out of the corporation, the account is credited.

In the case of accounts which close at the end of an accounting period, also known as nominal or temporary, the third and last rule of accounting is implemented. These accounts deal with revenue,

[4] Business expenses not related to manufacturing goods or providing services
[5] Amount of money removed from an account
[6] Amount of money that goes in one account

expense, gain and loss accounts. This rule states that the account has to be debited if the business records and expense or loss. If an income or gain needs to be signified, the account has to be credited.

## 3.3 Inclusion and exclusion Criteria

According to Lippincott Williams & Wilkins, (2007) inclusion criteria are delignated as the key attributes of the target population that the researches will utilize to find an answer to the research question. These key words were selected before diving into literature. Their relevance is explained through the publications found, if possible and through general knowledge and importance they carry for the project. On the other hand, on the same article it is stated that exclusion criteria are defined as features of the potential literature who meets the inclusion criteria but have additional characteristics that might interfere with the prosperity of the study or increase their probability to achieve unfavorable results.

| Number | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| 1 | The article is published in English. | The article does not treat the topic and is irrelevant to the research. |
| 2 | The literature is within the discipline of Business, Management and Accounting | The paper does not contribute to solving the problem or does not provide an answer to the Research questions |
| 3 | The paper builds knowledge on the topic or answers the Research questions. | |

*Table 2: Inclusion and exclusion Criteria*

## 3.4 Databases

After coming up with the key search terms, the following step is to conduct research in scientific databases. The later contain scientific and scholarly articles written by reliable authors, researchers and experts who possess broad knowledge on various fields. Furthermore, for the sake of the assignment powerful search tools are required with the ability to narrow results(EBSCOpost. ,s.d.).

Due to the fact that I am a student of Industrial Engineering and Management in the University of Twente I decided to use as my first search tool the database "FindUT" which is the online library of the University. It not only provides articles published by the staff of the university but from various researchers and experts. Furthermore, I came to the realization that finding relevant journals proved to be challenging using this database since it provides a relatively small number of articles in the selected subjects: Business, Management, Economics and Accounting.

To be able to find more academic literature, the database "Scopus" seemed most appropriate due to the fact that it is one of the two big commercial, bibliographic databases that cover scholarly literature from almost any discipline. Beside scientific and research articles, this database also provides academic journal rankings and author profiles(Paperpile, n.d). Scopus is also easy to access and use, offering ease when researching the topic required. However, full accessibility can be provided by institutional subscription only which requires payment. Nevertheless, Scopus could be used to locate relevant literature. Fully accessing the journal or article can be done through other methods and databases.

## 3.5 Search Strings

The table below exhibits the search terms used to find relevant papers. I decided to use the most important terms of the topic of my thesis. The scope appointed was : "Title, Abstract, Key Words" in order to have a variety of papers and then narrow down based on the subjects(section 3.4). In total there were 1629 articles which fitted the scope based on the subjects and scope selected. The title of each literature determined whether they were applicable for the thesis. Based only on the title only, 115 papers were taken into account for further investigation. The duplicates were removed and the abstract was carefully read. From the information from the abstract the articles were determined whether they were relevant. The remaining 28 articles were skimmed through, and in the end 8 articles were deemed "relevant" and utilized to draft solutions to the issue Emons Group is facing.

| Database | Date of search | Search String | Scope | Subject | Number of entries |
|---|---|---|---|---|---|
| Scopus | 5/8/2021 | "Invoice" and "Process" | Title, Abstract, Key words | Bussiness, Management and Accounting | 70 |
| FindUT | 5/8/2021 | "Invoice" and "Process" | Title, Abstract, Key words | Bussiness & amp; Economics | 3 |
| Scopus | 6/8/2021 | "Billing" and "Process" | Title, Abstract, Key words | Bussiness, Management and Accounting | 145 |
| FindUT | 6/8/2021 | "Billing" and "Process" | Title, Abstract, Key words | Bussiness & amp; Economics | 294 |
| Scopus | 6/8/2021 | "Cost" and "Tracking" and "Logistics" | Title, Abstract, Key words | Bussiness, Management and Accounting | 57 |
| FindUT | 6/8/2021 | "Cost" and "Tracking" and "Logistics" | Title, Abstract, Key words | Bussiness & amp; Economics | 3 |
| Scopus | 7/8/2021 | "Cost" and "Allocation" and "Logistics" | Title, Abstract, Key words | Bussiness, Management and Accounting | 297 |
| FindUT | 7/8/2021 | "Cost" and "Allocation" and "Logistics" | Title, Abstract, Key words | Bussiness & amp; Economics | 8 |
| Scopus | 7/8/2021 | "Variable" and "Costs" and "Logistics" | Title, Abstract, Key words | Bussiness, Management and Accounting | 511 |
| FindUT | 7/8/2021 | "Variable" and "Costs" and "Logistics" | Title, Abstract, Key words | Bussiness & amp; Economics | 9 |
| Scopus | 8/8/2021 | "Cost" and "Accounting" and "Logistics" | Title, Abstract, Key words | Bussiness, Management and Accounting | 218 |
| FindUT | 8/8/2021 | "Cost" and "Accounting" and "Logistics" | Title, Abstract, Key words | Bussiness & amp; Economics | 14 |
| Total | | | | | 1629 |
| Total after narrowing down(from title) | | | | | 115 |
| Duplicates | | | | | 5 |
| Irrelevant | | | | | 82 |
| Exluded after skimming through | | | | | 20 |
| Relevant | | | | | 8 |

*Table 3: Search Strings*

## 3.6 Summary Matrix

The following table will introduce the literature found and a summary to further explain their relevance and contribution.

| **Article name** | **Author and contributors** | **Type of content** | **Subject** | **Contribution** |
|---|---|---|---|---|
| Examining the links between logistics outsourcing, company competitiveness and selected performances: the evidence from an emerging country. | Afum, E et al. (2021) | Journal article: International Journal of Logistics Management | The mediation effects of time-based competitiveness, cost-based competitiveness and customer performance between logistics outsourcing and financial performance. | Solution number 2 |
| Logistic supply chain management and economic security of the enterprise. | Vlasov, M. P. (2020) | Journal article: International Journal of Supply Chain Management | Formalization of the process of interaction between an enterprise and suppliers | Building Knowledge |
| Environmental sustainability initiatives adopted | Froio, P. J., & Bezerra, B. S. (2021) | Journal article: | Determination of the main environmental | Building Knowledge |

| | | | | |
|---|---|---|---|---|
| by logistics service providers in a developing country | | Journal of Cleaner Production | sustainability initiatives practiced by some Brazilian Logistics Service Providers (LSP) and identify future projects and programs | |
| A process analysis of global trade management: an inductive approach | HAUSMAN, W. H. et al.(2010) | Journal article: Journal of Supply Chain Management | Description of a process model for Global Trade Management (GTM) that contains sufficient detail on cross-border trade processes to estimate the benefits of Information Technology-Enabled Global Trade Management. | Solution Number 1 |
| Architectures for E-Business Systems. Electronic bill presentment and payment. | Purba, S. (Ed.). (2001) | Book | Automation of Business processes. Presents the architecture on automation. | Solution Number 1 |
| Aggregating Bills and Invoices on Cloud for Anytime Anywhere Access: A Sustainable System. | Jain, S., & Asadullah, A.M. (2012) | Conference Paper | Automatic storage system which can save invoices at the targeted location as soon as they are generated. | Solution number 1 |
| Blockchain Based e-Invoicing Platform for Global Trade. | Narayanam, K. et al. (2021) | Conference Paper | Introduction of a blockchain-based e-invoice generation system. | Solution Number 2 |
| Development of a maturity model for electronic invoice processes. | Cuylen, A., Kosch, L., & Breitner, M. H. (2015) | Research Paper | The digitalization of invoice processes to provide the opportunity for companies to pare down expenses, optimize administrative tasks, and increase efficiency and competitiveness. | Solution Number 1 |

*Table 4: Summary Matrix*

Some of these articles were used to build knowledge rather than coming up with possible solutions for the problem at hand.

## 3.7 Conclusion

The framework of the Systematic Literature Review was established. Furthermore, the Main Research question is taken into account together with sub-questions. Inclusion and exclusion criteria are determined to ease the process of finding relevant literature. Additionally, the databases which will be searched on are selected and the search string in accordance to the questions and the topic of the thesis. Finally, eight academic articles are chosen and a summary matrix is provided.

# 4.Solution Design

This chapter will follow the "Managerial Problem Solving Method" presented in section 1.6 by performing and elaborating each step. The problem will be readdressed in section 4.1. Furthermore, the problem solving approach will be introduced in section 4.2. A short analysis of the problem will be performed in section 4.3. Possible solutions to the problem will be explained in section 4.4. Section 4.5 establishes criteria and determines which solution is the most optimal. Implementation and evaluation phase are performed in section 4.6 and 4.7 respectively.

## 4.1 Defining the problem

This is the first phase of the framework. This step requires the definition of the problem/s the company is facing. The problem cluster is designed, together with the variables that describe the issue. This step is performed thoroughly in section 1.4. The Knowledge problem linked with this step aim to introduce the topic of the project. Furthermore, answering these question determines the scope and the direction of the research project(RQ1).

The core problem is "Insufficient information whether the accounting practices are implemented correctly". However, this issue will be tackled by answering the following Knowledge question: "Can the cost tracking and allocation methods be improved in order to reduce costs and ensure transparency"?

## 4.2 Formulating the Problem-Solving Approach

This step drafts the problem-solving approach which will be used to come up with a solution. Additionally, D3 method(Solving Managerial Problems Systematically by H. Heerkens & A. van Winden , 2016)is utilized to present activities and knowledge required:

Do: This step outlines the activities that are needed to be performed. Firstly, a problem solving approach is required to be drafted. For this purpose the MPSM is going to be used. Preliminary research is conducted to find relevant articles regarding the topic. Systematic literature review establishes these scientific journals, which aid in building knowledge and discovering possible solutions.

Discover: The second aspect defines what information has to be perceived and comprehended. Data on the best methods of cost tracking and allocation is compulsory. Moreover, knowledge regarding accounting practices is essential.

Decide: The final feature is about selecting the proper method among the other options. This step also requires the acceptance of the management team of Emons Group.

## 4.3 Analyzing the problem

The management problem is examined into depth and the details that were lacking are filled in. The root of the problem is searched for and determined. Subsequently, if previous solutions were implemented and failed, the cause of failure is analyzed. The answer to RQ2, RQ3 and RQ4 is provided below:

(RQ2)One of the reasons the company is dealing with this issue is the phenomenon of "Brexit". Because adjustments and new regulations took place, costs increased in various manners. More documentation was required, more employees as well. Thus augmenting resources and labor costs. Because of the policies in custom in the UK, in some cases the trucks have to be properly checked. Consequently, waiting times incur, and uncertainty as well. Since all these new regulations and costs were put in motion in January, the management team started to notice that calculation errors are likely to happen. They was uncertainty about how much these costs added up and what should be billed to the customers. Nevertheless, a general overview of all activities was lacking as many business process were disorganized to a certain extent. This problem existed even before Brexit, but was only noticeable after.

(RQ3)To my knowledge there have not been any previous attempt on trying to improve cost allocation and tracking methods. Their main focus has been on developing a control tower. Nevertheless, at the moment Emons group is developing a new Lbase system where all the departments are able to communicate and use the same platform. Personally, I am not informed on what stage the organization is and what is about to change.

## 4.4 Formulating (alternative) solutions

This step requires brainstorming to propose solutions or alternatives. Data from the literature found is processed and used to suggest new policies of cost tracking and allocation methods. This chapter answers the Main Research Question and RQ6.

Business process optimization requires implementing technological systems that provide communication between different organizations, but firstly internally. Electronic document interchange(EDI) enables firms to send and receive digital documents(Purba, S. (Ed., 2001). It also allows for communication with other platforms and software. However, according to the same book, EDI is expensive to set up and maintain and does not provide access to additional information which is essential when it comes to conducting logistics business. Security is another issue which should be ensured for the internal and external data.

According to Husman, W. H. et al. Global Trade Management(GTM) includes and describes the procedures which support trading activities between countries. Beside importers and exports, GTM involves governments and facilitates procuring, planning, regulations, logistics, inventory management and monetary agreements. IT-GTM is the technology that can be implemented by logistics companies to enhance the trade between them and their customer. This highly automated software connects the company with the customers and their partners digitally while being easily accessible. This system should provide communication channels, database integration, document generation, transparency, quality management and auditability.

Digitalization of business affairs cuts down operational costs, optimize processes and achieves transparency. In the recent times implementing information systems is used to increase efficiency and provide competitive advantage. One activity which could benefit from digitalization is invoicing. E-invoices are both cost and time efficient due to the fact that they diminish the need for manual labor, decrease input errors and resource costs(printing, transportation, paper etc.)( Cuylen, A., Kosch, L., & Breitner, M. H. ,2015).

The task of labelling and scanning the “Proof of deliveries” requires a lot of paper. As mentioned in section 2.1 it takes more 30% of the time of the employees of the back office. Therefore, first solution I would like to present is having a fully automated platform where all the departments can communicate, put and receive data which eliminates the need for paper and physical interaction. Currently, extra costs are calculated by Sales and Customer service and are communicated via paper to the back office which is responsible for assembling all the information together, validate it and the invoice is directed to the clients. This method is effective, but is disorganized and time inefficient. Therefore, this process can be simplified by having one platform where all the costs are noted down and filled in by the entities accountable. These departments could be granted accessibility and the process could become faster, less expensive and uncomplicated. This program will consist of all the possible extra costs that could incur, and after being calculated employees will be able to fill in the amounts together will the statement. After all the necessary information is complete the invoice is generated containing all the amounts. This ensures transparency and facilitates proper communication between departments. Besides an internal software, Emons could develop and apply IT-Global Trade Management to increase the quality of the relationship and communication channels with foreign customers and partners(outsourced firms). This

platform can provide even more benefits when doing business with organizations in the UK since it includes the customs and government regulations.

Archiving and allocation of bills is essential for a business as it ensures transparency and information regarding the monetary situation of the company. One possible solution makes use of cloud storage, which is a framework of computer data storage maintaining digital information in logical pools. It can be accessible via the Internet or private network(IBM Cloud Education, 2021). A separate cloud storage could be created where all the invoices are stored. This includes the ones who are sent and received. The cloud ensures accessibility at ease and reduces the possibility of losing the documents(Jain, S., & Asadullah, A.M. ,2012). The files can also be divided into different categories such as: Sent and Received Invoice which are further separated into Paid and Outstanding Bills. This enables the employees to keep track of all the bills sent and received, providing an overview of the financial situation of the organization.

Secondly, one option could be to further outsource some of the transportation functions to other firms in order to reduce uncertainty. Logistics outsourcing is hiring and transferring the tasks to a third party which operates in the same business sector. Afrum et al.(2021) explains that outsourcing enables firms to ameliorate risk management by reducing it and provides value to the firm's business. Furthermore, the same article states that it reduces costs, and uncertainty is managed by utilizing the economies of scale the other company provides. The authors further explain that customer responsiveness and flexibility are enhanced together with the supply chain competitiveness. By having access to other companies capability of providing logistics services, internal operational efficiency is increased, lead times are shortened and delivery timeliness is improved. However, the latter is debatable between scholars and researchers. According to the same paper, companies who outsource incur less costs compared to those who do not. On average through logistics outsourcing inventory costs is reduced by 8.2% and logistics assets costs by 24.6%. Furthermore, firms can save up to 11.8 % in logistics costs and overall costs become 56% less. Nevertheless, outsourcing might sometimes bring hidden costs that offset the reduction and makes the process unprofitable and pointless. Afrum. E et al.(2021) clarify that there was found a positive correlation between outsourcing and better financial performance. Additionally these firms use their profit to further expand.

Outsourcing also has certain drawbacks. Customer satisfaction might decrease since they might reject doing business with a third party and require Emons's services. Furthermore, Emons Group has also developed sustainable concepts which incur less detrimental effects on the environment, concepts which other companies may not have. Outsourced firms may not be very efficient which results in delays. In case of irregularities, customers will contact Emons representatives, and they will contact the firms which makes communication burdensome and challenging.

One possible agreement between Emons and the third parties is that the outsourced company determines the costs of the services and the management team decides whether that amount is agreeable. This way the organization does not have to explicitly calculate the extra costs. Another method would be to establish a maximum amount, pay after the service is done and request invoices from the firms. These bills will be carefully reviewed whether they are within the amount agreed and accurate. Lastly, Emons Group could calculate the cost of the service, determine the profit margin and hire the firm which accepts that payment.

The third solutions I would like to present utilizes the blockchain technology to support e-invoicing. Blockchain is a type of database, which collects and stores information in "blocks". After achieving full capacity blocks are chained with each other creating the network of blockchain. The new data which enter the system is stored in a new block which is again chained and so on(Luke Conway, n.d). This

technology is decentralized, meaning that it is not controlled by a single entity. Individuals doing transections are not required to know or trust the anyone else. Every person receives a ledger which contains the same data for anyone. If a ledger is corrupted or altered in any way, it is rejected from the network. This makes it unhackable and incorruptible(Amazon Web Services, n.d). For the blockchain to function nodes are needed, which are open-source, cross platform runtime that enable service to be provided(Deen Newman, 2021). Nodes are also used to view all transactions made in the network. This can also be done via a blockchain explorer which is part of a software that retrieves and arranges data. Since all the transactions and information can be traced, transparency is ensured. Even if the data are somehow stolen, the culprit may stay anonymous but the documents are traceable and retrievable.

TradeLens is a decentralized supply chain platform supported by the blockchain, that allows real time information sharing on the status of the freight( Narayanam, K. et al, 2020). Narayanam, K. et al have developed and introduced the idea of a blockchain based e-invoicing incorporating TradeLens. This systems contains 5 essential attributes:

1. Contract Management which specify the rates of conducting business and providing services. All the costs are included and recorded in the network after all parties agree. If a contract is near expiration alerts are generated and the system can also renew it.
2. Invoice generation. After the agreements are made invoices are digitally generated and transacted to the customers.
3. Dispute Management. Before the payment is made, both the customer and the supplier are able raise disputes on the invoices in case of irregularities and reconcile.
4. Integration with other platforms. The blockchain solution is able to communicate with other software via ERP systems or API[7] interfaces.
5. Alert notification. Every time an invoice is sent or paid a notification is issued to provide proper information.

As mentioned before all the transaction and exchange of information can be traced. This makes auditing less difficult. All the information is securely stored and easily accessible. This technology can also be implemented internally within the organization. Department can share their files in blocks where the data is received and processed.

However, this rather innovative solutions also has certain drawbacks. The main challenge associated with the technology is the lack of awareness and information on how blockchain operates(V. Grewal-Carr; S. Marshall, 2016). Even though in 2020, the illicit share of all cryptocurrency activity fell to just 0.34%, according to "Chainanalysis" there is a strong belief that blockchain and cryptocurrency are "only used by criminals"[8]. The same article introduces another issue which is the fact that different organization are developing their own blockchain, thus reducing efficiency as the ledgers cannot operate outside their own blockchains. Implementation of blockchain constitutes of placing your trusts in a decentralized network rather than an institution. Some organizations might not feel satisfied with this fact. According to William Mougayar (2015) a blockchain is about 80 per cent business process change and 20 per cent technology implementation. The aggregate cost of speed and effectiveness of the blockchain is relatively high and differs for different blockchains. This phenomenon occurs because every node performs the same tasks on its own copy of the data to be the first one to find a solution. For the Bitcoin network, for example, which uses a proof-of-work approach in lieu of trusting participants in the network, the total running costs associated with validating and sharing transactions on the public ledger are estimated to be as much as $600 million a year and rising(W. Mougayar, 2015) . The author states that this figure does not include costs of procuring the mining hardware. A certain mass of nodes

[7] Application Programming Interface. It simplifies interaction between software
[8] Based on personal observation, social media and articles read previously

is required at the scale of the entire network. Consequently, the blockchain applications must harness the network effects to provide value and implementation needs to be carefully considered and analyzed. Moreover, another possible problem of this solution is the fact that blockchain is not regulated. It reduces oversight and is much less resilient to unpredicted situations. Because of the transparency blockchain offers, the issue of privacy also arises.

## 4.5 Choosing the solution

In this step the answer of RQ7 will be provided where the solutions presented with be compared through criteria, to determine which one is the most optimal policy to implement. The criteria will be carefully selected and weighted from 1 to 10(1 being least important) based on the importance they carry. Additionally, every solution will receive a score of 1 to 5(1 being the worst and 5 the best) for every measure. Based on the score the most optimal policy will be selected for implementation.

The criteria that will be used to determine which method to recommend are:

1. Cost reduction. Many organization's end goal when implementing new policies is to decrease the costs of providing their services. The proposed solution should also offer financial value to the company and cut down or even prevent unnecessary fees. This is the most important criteria, thus obtaining the weight of 10.
2. Resources required. Implementation of a new policy or improvements of business processes requires capital and resources. Before committing to a project it is important to ensure that you are not overextending and the budget is used inventively. This criteria deals with the amount of resources that should be invested when one of the new projects is carried out. The weight it receives is 7.
3. Time. Project usually are drafted with a schedule which outlines the time frame. During the implementation process conducting business may be challenging as the focus is on the venture. The time frame should be taken into account in such manner that it is affordable for the continuation of the organization and does not corrupt the ability to provide services. However, all great things take time. Consequently, I have decided that the weight should be 6.
4. Expertise required. Business processes may change and new expertise could be required by the employees. However, training staff can become costly, time consuming and unpractical. This fact should be considered when presenting or undertaking a new system. The employees of Emons group already possess experience using different computer programs. The weight in this is case is 6.
5. Data security. Automation of processes requires data storing and security. Some documents will be labelled as confidential and should remain inaccessible. Nevertheless, all the materials should be unpublished unless the organization decides to make them public. Due to the fact that this criteria has great importance the weight contains the value of 9.
6. Improvement to brand awareness/Customer perspective. The project might introduce a new technological era for Emons group. This criteria deals with how the company is perceived by established and potential clientele. Also, how the new policy will affect the brand image. As a family owned company, customer's perspective has great importance for Emons. This measure is important and its weight is 8.
7. Risk. Some project carry greater risk and this should be taken into account before implementing a new policy or project. The policies or solutions do not pose a great amount of risk, thus the weight attributed is 5.
8. Feasibility. Feasibility measures the degree of the practicality that the project brings. Whether the policy can be conveniently performed or done. The criteria is significant and the weight is 7.

In order to properly weight criteria input from the company is required. After the criteria establishment phase, their importance is determined by the management team.

The graph below exhibits the comparison between every solution according to the grade they receive and the weight attributed. The formula for calculating the total is:

- $\sum$ (criterion weight/total weight) $*$ score

The scores received are preliminary and not final. Their intent is to display the manner that the solution will be chosen according to the criteria.

| | | RATINGS | | | |
|---|---|---|---|---|---|
| Criterion | Weight | Automated system | Outsourcing firms | Blockchain solution | |
| Cost reduction/prevention | 10 | 4 | 4 | 4 | |
| Resources required | 7 | 3 | 4 | 3 | |
| Time | 6 | 3 | 5 | 2 | |
| Expertise required | 6 | 3 | 4 | 3 | |
| Data security | 9 | 4 | 1 | 5 | |
| Customer perspective | 8 | 5 | 1 | 2 | |
| Risk | 5 | 3 | 2 | 3 | |
| Feasibility | 7 | 4 | 5 | 2 | |
| Total | 58 | 3.72 | 3.17 | 3.12 | - |

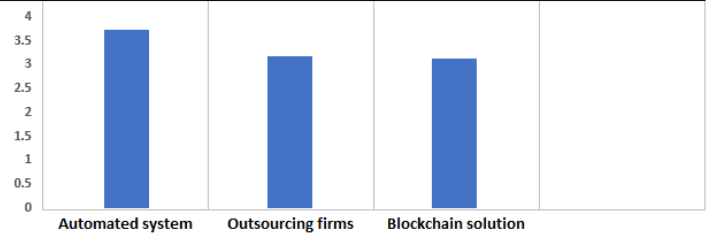


*Figure 21: Decision Making Criteria(Someka)*

As can be seen from the graph above the solution which scores the highest is "Automating the billing system".

## 4.6 Implementing the solution

In this step an implementation plan is constructed. Systematic approach is provided to describe activities and possible obstacles. After formulating an improved policy, the feasibility of it needs to be indicated. If the organization is unable to apply the theory than the solution will only exist on paper. Section 4.6.1 will explain the personnel required while section 4.6.2 will calculate and estimate the budget and resources. In section 4.6.3 the solution design will be introduced.

The project is drafted with the resources and personnel required. The timeline is established which determines the length of the project. A budget is determined and the allocation of it. Extensive planning and preparation are essential to ensure the success of the new system. Before full implementation, any issues should be addressed first. The IT department(or outsourced firm hired to code and develop the program) together with the "Back-office" and other departments are critical stakeholders. This chapter will provide an answer to RQ8.

### 4.6.1 Personnel

It is estimated that the personnel required to work on the project consists of five individuals: three IT experts, one accountant or employee who works in the "Billing" department and one from the management team. The manager and the accountant determine the functionalities of the program and

what it should consist of. Afterwards, they will communicate their decisions to the IT team which are responsible for designing it. If bottlenecks occur or some functionalities cannot be incorporated in the software, the manager is notified from the IT experts and adjustments are made. The timeline of this project is two months for designing the program and one month for fully incorporating it in the business and train the employees. Staff training needs to be organized. Before fully implementation, the customers might also have to be informed.

### 4.6.2 Budget

The budget will include the salary of the people who are currently working in the project, additional resources that might be required, the costs of the software and additional hidden costs. The average salary of an IT expert in the Netherlands is €4.256[9] per month, €3.295[10] for an accountant and €5.956[11] for a manager. Only including the salaries the sum for three months is:

- 3*2*4256 + 2*3295 + 2*5956 = 25536 + 6590 + 11912 = €44.038

However, the salaries of the accountant and the manager might not need to be included but for this estimation I have decided to incorporate those amounts as well. The team consisting of IT experts can also be outsourced from another company, and in that case their fee has to be paid. Due to the fact I have no information regarding this amount, I will continue with the initial estimation. Besides the salary, the licenses of the software need to be paid. The solution presented consists of a cloud based software. The starting, additional and overall costs are exhibited below:

| **Basic tier pricing** *(Base price)* | **Higher tier pricing** *(Base price)* |
|---|---|
| **$30-$100** per user per month | **$200-$500** per user per month |

*Figure 22: Cloud-based software starting costs(360Connect, 2020)*

| | |
|---|---|
| **Software training** | $1,000 – $3,000 |
| **Software license** | $1,500 – $3,500 per user |
| **Annual upgrades and maintenance** | $1,500 – $3,500 per year |
| **IT/Tech Support** *(optional)* | About $200 per hour |

*Figure 23: Cloud-based software additional costs(360Connect, 2020)*

[9] Information Technology Specialist Salary in Netherlands | PayScale
[10] Accountant Salary in Netherlands | PayScale
[11] Salary: Manager in Amsterdam, Netherlands | Glassdoor

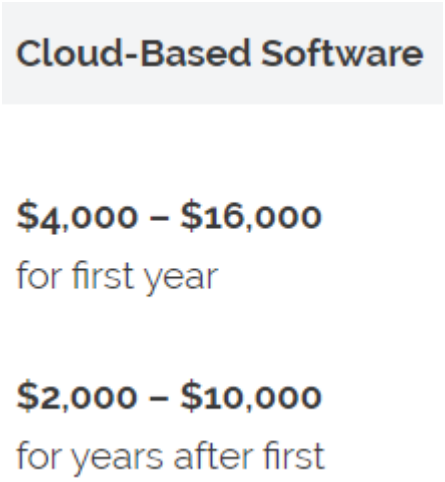


*Figure 24: Could-based software overall costs(360Connect, 2020)*

I have estimated that the costs of implementation of the cloud-software is $1000 per month(data retrieved from overall costs):

1.000 * 3 = $3.000 or €2.542,7 (per three months)

Besides the could-based software, the communication architecture and invoice generator is required. As previously mentioned in section 1.2 Emons Group is on the verge of implementing a new technological system in Lbase. Due to the fact that I was unable to retrieve data on the pricing of the Lbase system I decided to use another platform as an estimation for the price of a new billing platform called "Logisense" which charges $2.499 per month[12].

- 2.499 * 3 = $7.497 or €6.354,2 (per three months)

Moreover, based on personal information on companies who have implemented SAP software solutions, the price of applying their services can vary from $500.000 - $3.000.000[13]. Emons Group can either purchase the solutions monthly or permanently.

Staff training is required and needs to be taken into account when implementing the new system and estimating the budget. On average, in 2018 companies in the Netherlands spent €950[14] per employee on education and development. 950 : 12 = €79,2 per month per employee. In total, there are five employees who are required to undergo training: three from the "Back office", one from "Sales" and one from "Customer Service". Based on my estimation the duration of the training will be one month:

- 5 * 79,2 = €396

Moreover, when working on a project there also hidden costs such as electricity, consultancy, licenses for smaller parts of the projects, technological equipment, software, etc. I have estimated that for this project an amount of €10.000[15] is sufficient to cover the hidden costs.

Therefore the total budget for the project is approximately(for three months only):

[12] Platform Pricing - LogiSense
[13] Information retrieved from my parents who work in companies who have implemented SAP solutions
[14] • Netherlands: expenditure on education & development per employee | Statista
[15] Information retrieved from my parents

€44.038(salaries) + €2.542,7(Cloud-based software) + €6.354,2(Logisense solution) + €396(employee training) + 10.000(hidden costs) = €63.330,9

### 4.6.3 Solution Framework

Moreover, the new system needs to be designed. For this purpose the communication and storage architecture will be explained. Data from two literatures were taken.

**Communication Architecture**

The products that will be elaborated are given the name Product X and Y(Purba, S. (Ed.), 2001). A systems architecture that offers business and technical solution will be constructed. First of all an architecture(Product X) which handles Electronic Data Interchange(EDI) messages is selected through various interfaces and communication channels. Additionally, online access to the Enterprise Resource Planning(ERP) and other internal databases should be granted(Product Y). To make sure that the architectures function, these products should ensure a secure and encrypted file transfer mechanism, simple integration with other platforms and support for EDI through Internet or Local Area Network (LAN).

Proper communication can be achieved using the following protocols on the internet:

- HTTP: For online delivery of information
- Sockets(SL): To transfer messages

The server of Product X handles the HTTP communication, and facilitates the process of sending and receiving. Product Y is responsible for processing the message. This architecture enables communication and transferring data securely and reliably.

All the data that enters the system goes through a firewall first for security. Data security prevents unauthorized users from entering the system, mishandling the information and/or sharing restricted material. There are two type of security which need to be taken into account:

1. Enterprise systems security from outside intrusion
2. Data security for the messages communicated via the Internet

There are certain steps that can be taken to ensure data security:

1. The firewall should offer limitation on IP and PORT addresses and protocols allowed. Moreover, it should provide user authentication and abstraction of Server IP.
2. Authentication of the whole layers of the application(Front-office, Back-office and operating system).
3. Data should be encrypted and be transferred through secure channels.

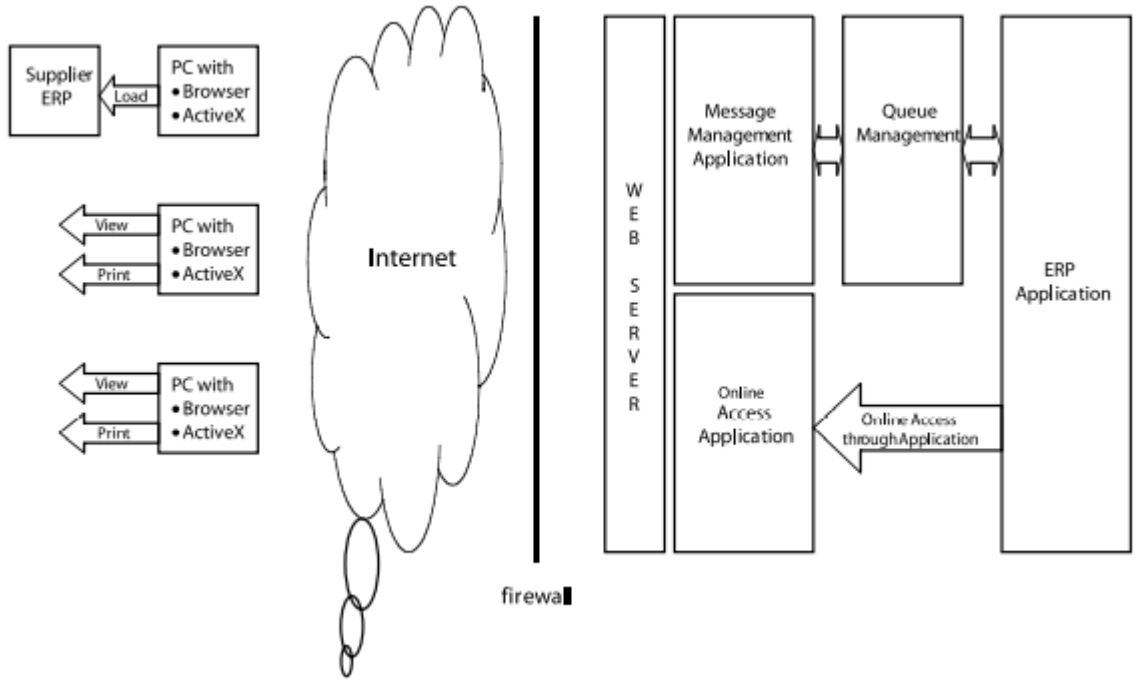


*Figure 25: Firewall(Purba, S. (Ed.), 2001)*

**Data Storage**

Implementation of a data storage cloud requires a server component which can handle the storing process for any cloud. The organization will register the end point URL and private key of its financial entities. If transactions will have to take place the user will have to enter the private key. A simple user interface can be created together with the storage space for the financial products. The aggregate component facilitates the connection between different location within the cloud. It makes use of Storage Factory to aggregate all the billing data and put them in one place. Therefore, all the invoicing information can be located in one cloud bucket even if the system malfunctions(Jain, S., & Asadullah, A.M., 2012)

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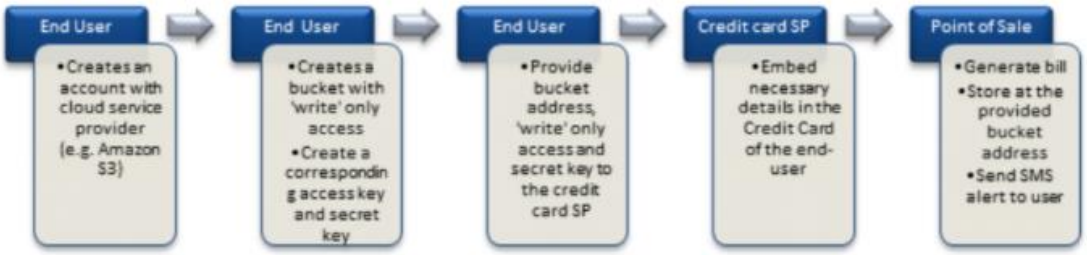


Figure 1. Process Flow Diagram

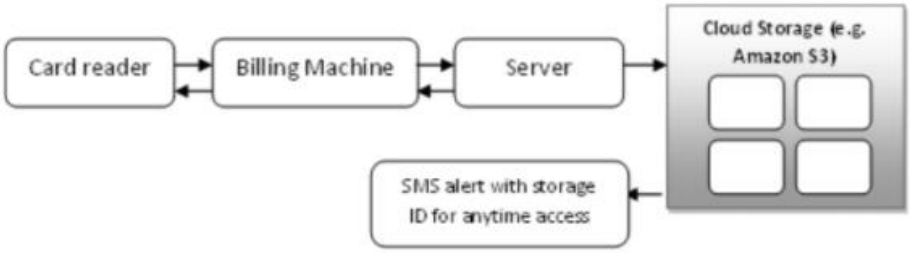


*Figure 26: Architecture Blocks(Jain, S., & Asadullah, A.M., 2012)*

## 4.7 Evaluating the solution

Evaluation is not always welcomed by the stakeholders since it costs time and money. However, in many cases it can prove to be essential when deciding innovative policies. Therefore, incentives need to be presented so that this phase can be performed. This chapter provides an answer to RQ9. The evaluation phase will consist of a survey drafted by the management team to gather information regarding the perspective of the employees on the new system. Section 4.7.1 will introduce the framework used to evaluate the solution presented. Section 4.7.2 will draft the survey and the timetable.

### 4.7.1 Framework

The methodology used to evaluate the solution is written by Venkatesh et al.(2003) and is called "User acceptance of information technology: Toward a unified view". This paper takes into consideration eight individual models and comes up with a unified one called "Unified Theory of Acceptance and Use of Technology(UTAUT) with four core determinants and four other moderators of key moderators. According to the same article, UTAUT outperformed the eight individual models. The research model can be seen below:

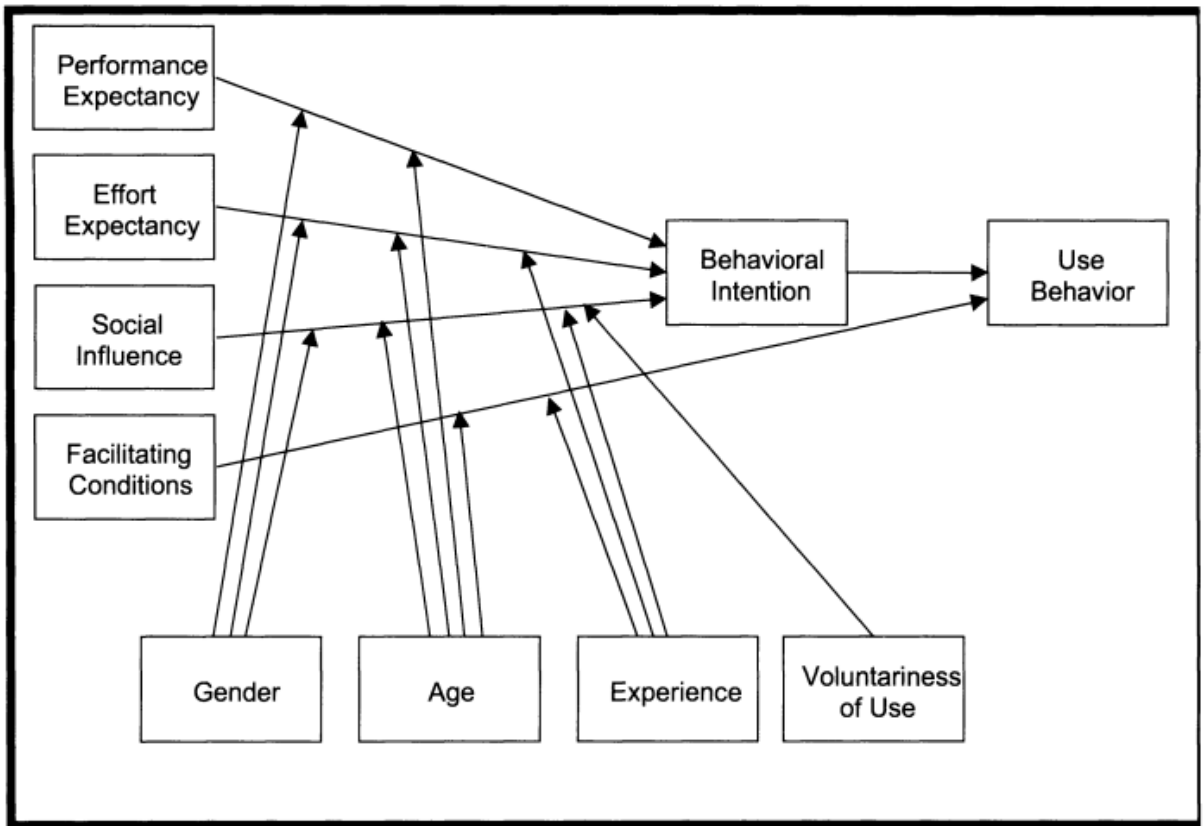


*Figure 27: Research model of UTAUT(Venkatesh et al., 2003)*

- Performance Expectancy: The degree to which an employee considers the new system as helpful to them to increase their performance.
- Effort Expectancy: The extent of difficulty perceived and associated with using the new system is perceived.
- Social Influence: The degree of employee's perception that other individuals who have certain importance to them, suggest using the new system.
- Facilitating Conditions: The extent to which an employee considers that the architecture inside the organization is able to support the system.
- Behavioral Intention: The degree of positive or negative influence the system has on the employees.

More information can be found in Appendix 2.

### 4.7.2 Survey

The survey will ask questions regarding the constructs. The inquiries are written below:

- Performance Expectancy:
  How helpful do you find the new "Billing system" to the employees?
  1. Useless. Does not provide any value to the employee.
  2. Not helpful. Might be valuable in some aspects but implementation was not beneficial.
  3. Neutral. The new system has the same characteristics as the old one.
  4. A little helpful. Implementation was beneficial to the employee.
  5. Very helpful. The new system has relatively increased the performance of the employee.

  What do you find beneficial/not beneficial:_____
  _____

How helpful do you find the new "Billing system" to the company?

1. Useless. Does not provide any value to the company.
2. Not helpful. Might be valuable in some aspects but implementation was not beneficial.
3. Neutral. The new system has the same characteristics as the old one
4. A little helpful. Implementation was beneficial to the organization.
5. Very helpful. The new system has relatively increased the performance of the company.

What do you find beneficial/not beneficial:
_____
_____

- Effort Expectancy:
  What degree of ease do you associate using the new system?
  1. Very difficult
  2. Difficult
  3. Neutral
  4. Easy
  5. Very Easy

  If the answer is 1,2 or 3 please provide what do you find difficult:_____
  _____

- Social Influence:
  To what degree does the social environment(Management team, colleagues, CEO etc.) influence the employee to use the new system?
  1. No influence at all
  2. Neutral
  3. Some Influence
  4. A lot of influence by the social environment

  If the answer is 3 or 4, in what manners does the environment influence you:_____
  _____

- Facilitating Conditions:
  To what extent could Emons Group facilitate the implementation of the new "Billing" system monetarily(maintenance and updates included)?
  1. Affordable for the company
  2. Affordable but some costs needed to be reduced
  3. Not affordable, adjustments needed to be made(shortages, loans etc.)

  To what extent could Emons Group facilitate the implementation of the new "Billing" system technologically(maintenance and updates included)?

  1. Already existing technology used
  2. Combination of existing and new technology

3. New technology implemented

- Behavioral Intention:
  What is the perspective of the employee towards the implementation of the new system?
  1. Very dissatisfied
  2. Dissatisfied
  3. Neutral
  4. Satisfied
  5. Very satisfied

  What are the incentives for the answer:
  _____
  _____

- What could be improved in the new "Billing" system?

_____
_____
_____

The survey is drafted with the purpose of evaluating the implementation of the new "Billing" system within Emons Group. To reduce bias and ensure trustworthy answers, anonymity should be ensured. Even though the questions only mention the employees, the survey is aimed at both the employees and the management team. It should be distributed within the organization one month after the implementation to have an overview on the initial perspective towards the system. The answers could be used to provide more training sessions if difficulties occur.

The second time should be after six months, after the employees have had time to adjust and train. This time workshops could be organized to receive personal opinions and what could be improved overall in the system. Customer perspectives could be retrieved and taken into account.

Lastly, the same survey should be given to the individuals of the company one year after the implementation, to have a final insight on how it is perceived from within the organization after all the adjustments.

# 5. Conclusion and recommendations

This chapter will conclude and summarize steps taken to provide a solution to the problem that Emons Group was facing. Section 5.1 will address the issue the organization was facing together with the Main Research question. Additionally, section 5.2 surveys the limitations of the project , section 5.3 elaborates and presents recommendations. Lastly, contribution will be described in section 5.4.

## 5.1 Conclusion

The aim of the research conducted is to solve the problem that the company is facing. In sections 1.7 the Research Questions were determined and elaborated upon. Throughout the thesis the answers have been provided. This section will readdress the Main Research Question:

- What cost tracking and allocation method could be implemented to improve the billing process?

In order to provide an answer to this question the MPSM was used. For each step, Research questions were formulated and answered. First of all the problem was defined and analyzed. Moreover, the problem solving approach was constructed and three possible solutions presented:

- Automating the billing system which suggest having only one platform where all the stakeholders have access and can communicate. Furthermore, a cloud-based software is used for invoice storing.
- Outsourcing firms which recommends hiring other logistics organizations to provide their services to Emons customers.
- Blockchain solution that supports e-invoicing using the innovative technology.

These solutions were compared to each other based on eight criteria established and the most optimal solution was “Automating the billing system”. An implementation plan was provided which included the personnel, budget and resources required, Lastly, an evaluation framework was introduced together with a survey, to get insight on how the management team and organization perceives the solution.

## 5.2 Limitations

This chapter introduces and describes the limitation the research faced in order to determine where possible improvements could be made.

The first and most important limitation is time. The time is scarce and the project has to be complete within 10 weeks. However, the recommendations can form a basis for future projects inside the company, or implemented in the business processes.

Another limitation is the fact that my background does not have strong technological foundations, and comprehending and analyzing findings could prove to be relatively challenging. However, this was overcome through hard work and effort.

Lastly, the current ongoing pandemic of Covid-19 is also a limitation. The virus has restricted the ability to have face-to-face meetings with the supervisors, company visitations and physical interactions. Consequently, delays may occur and communication could prove to be inadequate. Nevertheless, this limitation is taken into consideration by the university and company, thus measures were taken beforehand.

## 5.3 Recommendations

The first recommendation would be to incorporate all the individual work of the development team to create a general overview of the whole processes of providing a service: since the order is made from the customer, until the customer has paid their invoice. This way the management team can fully understand how the company operates and optimize the processes which are facing obstacles. Further

studies need to be carried out in order to fully understand where bottlenecks occur. This makes future project less challenging and provides internal transparency.

Secondly, another suggestion would be to automate processes which are time consuming when performed manually or that could easily be done through a computer program. For example, as mentioned in section 4.4 the task of labelling and scanning the "Proofs of Delivery" takes a third of the employees time. Through automation, this process can be optimized in such manner that labelling and scanning are no longer required and the documents can be validated and sent digitally to the customer. This will save time, money, paper and enable employees to carry out more important assignments. Further research in the innovative field of blockchain could would be useful to consider for future projects.

## 5.4 Contribution to theory and practice

### 5.4.1 Contribution to theory

A systematic literature review was performed within this project on the methods of cost tracking and allocation methods. The solutions presented were incorporated from the academic literature found together with the arguments provided.

Another theoretical contribution was the usage of interviews to gather information regarding the processes and tasks of each department.

### 5.4.2 Contribution to practice

The contribution to practice consists of solving an "action problem" by following the "Managerial Problem Solving Method". Each step of MPSM is performed individually, and answers different Research questions related to the step. This framework finds the root of the problem and solves it in a systematic manner. Additionally, the framework chooses one solution through criteria and provides an implementation and evaluation method.

Moreover, the research aims to provide value to the company. The main goal is to reduce costs without negatively affecting the quality of the service. The solution proposes an improved method of billing through automation. Also, the project constructs the fundamentals needed to design a complete overview of the processes. Through automation, many tasks are facilitated and a proper communication channel between different departments is established.

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# Appendix

## Appendix 1: Interview questions

| | |
|---|---|
| 1 | What are the tasks you are responsible for and for which larger process? |
| 2 | In which companies do you operate in? |
| 3 | How many hours per week do you spend on each task? |
| 4 | What are the platforms used to generate invoices? |
| 5 | How are invoices kept track of? |
| 6 | What kind of information do the invoices cosist of? |
| 7 | What happens when there are irregularities(rejected or denied claim)? |
| 8 | Who deals with cost assigning? |
| 9 | What are the triggers of each task(triggerstart and triggerend)? |
| 10 | What are the subtasks of each task? |
| 11 | Which departments are involved in performing each task? |
| 12 | What are the attributes of each tasks? |
| 13 | How atre extra costs determined? |

*Figure 27: Interview Questions*

## Appendix 2: Evaluation Constructs

| Construct | Definition | Items |
|---|---|---|
| Perceived Usefulness (Davis 1989; Davis et al. 1989) | The degree to which a person believes that using a particular system would enhance his or her job performance. | 1. Using the system in my job would enable me to accomplish tasks more quickly.<br>2. Using the system would improve my job performance.<br>3. Using the system in my job would increase my productivity.<br>4. Using the system would enhance my effectiveness on the job.<br>5. Using the system would make it easier to do my job.<br>6. I would find the system useful in my job. |
| Extrinsic Motivation (Davis et al. 1992) | The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions | Extrinsic motivation is operationalized using the same items as perceived usefulness from TAM (items 1 through 6 above). |
| Job-fit (Thompson et al. 1991) | How the capabilities of a system enhance an individual's job performance. | 1. Use of the system will have no effect on the performance of my job (reverse scored).<br>2. Use of the system can decrease the time needed for my important job responsibilities.<br>3. Use of the system can significantly increase the quality of output on my job.<br>4. Use of the system can increase the effectiveness of performing job tasks.<br>5. Use can increase the quantity of output for the same amount of effort.<br>6. Considering all tasks, the general extent to which use of the system could assist on the job. (different scale used for this item). |

*Table 5: Performance expectancy: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*

| Construct | Definition | Items |
|---|---|---|
| Relative Advantage (Moore and Benbasat 1991) | The degree to which using an innovation is perceived as being better than using its precursor. | 1. Using the system enables me to accomplish tasks more quickly.<br>2. Using the system improves the quality of the work I do.<br>3. Using the system makes it easier to do my job.<br>4. Using the system enhances my effectiveness on the job.<br>5. Using the system increases my productivity. |
| Outcome Expectations (Compeau and Higgins 1995b; Compeau et al. 1999) | Outcome expectations relate to the consequences of the behavior. Based on empirical evidence, they were separated into performance expectations (job-related) and personal expectations (individual goals). For pragmatic reasons, four of the highest loading items from the performance expectations and three of the highest loading items from the personal expectations were chosen from Compeau and Higgins (1995b) and Compeau et al. (1999) for inclusion in the current research. However, our factor analysis showed the two dimensions to load on a single factor. | If I use the system…<br>1. I will increase my effectiveness on the job.<br>2. I will spend less time on routine job tasks.<br>3. I will increase the quality of output of my job.<br>4. I will increase the quantity of output for the same amount of effort.<br>5. My coworkers will perceive me as competent.<br>6. I will increase my chances of obtaining a promotion.<br>7. I will increase my chances of getting a raise. |

*Table 6: Performance expectancy: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*

| Construct | Definition | Items |
|---|---|---|
| Perceived Ease of Use (Davis 1989; Davis et al. 1989) | The degree to which a person believes that using a system would be free of effort. | 1. Learning to operate the system would be easy for me.<br>2. I would find it easy to get the system to do what I want it to do.<br>3. My interaction with the system would be clear and understandable.<br>4. I would find the system to be flexible to interact with.<br>5. It would be easy for me to become skillful at using the system.<br>6. I would find the system easy to use. |
| Complexity (Thompson et al. 1991) | The degree to which a system is perceived as relatively difficult to understand and use. | 1. Using the system takes too much time from my normal duties.<br>2. Working with the system is so complicated, it is difficult to understand what is going on.<br>3. Using the system involves too much time doing mechanical operations (e.g., data input).<br>4. It takes too long to learn how to use the system to make it worth the effort. |
| Ease of Use (Moore and Benbasat 1991) | The degree to which using an innovation is perceived as being difficult to use. | 1. My interaction with the system is clear and understandable.<br>2. I believe that it is easy to get the system to do what I want it to do.<br>3. Overall, I believe that the system is easy to use.<br>4. Learning to operate the system is easy for me. |

*Table 7: Effort expectancy: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*

| Construct | Definition | Items |
|---|---|---|
| Subjective Norm (Ajzen 1991; Davis et al. 1989; Fishbein and Azjen 1975; Mathieson 1991; Taylor and Todd 1995a, 1995b) | The person's perception that most people who are important to him think he should or should not perform the behavior in question. | 1. People who influence my behavior think that I should use the system.<br>2. People who are important to me think that I should use the system. |
| Social Factors (Thompson et al. 1991) | The individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations. | 1. I use the system because of the proportion of coworkers who use the system.<br>2. The senior management of this business has been helpful in the use of the system.<br>3. My supervisor is very supportive of the use of the system for my job.<br>4. In general, the organization has supported the use of the system. |
| Image (Moore and Benbasat 1991) | The degree to which use of an innovation is perceived to enhance one's image or status in one's social system. | 1. People in my organization who use the system have more prestige than those who do not.<br>2. People in my organization who use the system have a high profile.<br>3. Having the system is a status symbol in my organization. |

*Table 8: Social Influence: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*

| Construct | Definition | Items |
|---|---|---|
| Perceived Behavioral Control (Ajzen 1991; Taylor and Todd 1995a, 1995b) | Reflects perceptions of internal and external constraints on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions. | 1. I have control over using the system.<br>2. I have the resources necessary to use the system.<br>3. I have the knowledge necessary to use the system.<br>4. Given the resources, opportunities and knowledge it takes to use the system, it would be easy for me to use the system.<br>5. The system is not compatible with other systems I use. |
| Facilitating Conditions (Thompson et al. 1991) | Objective factors in the environment that observers agree make an act easy to do, including the provision of computer support. | 1. Guidance was available to me in the selection of the system.<br>2. Specialized instruction concerning the system was available to me.<br>3. A specific person (or group) is available for assistance with system difficulties. |
| Compatibility (Moore and Benbasat 1991) | The degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters. | 1. Using the system is compatible with all aspects of my work.<br>2. I think that using the system fits well with the way I like to work.<br>3. Using the system fits into my work style. |

*Table 9: Facilitating Conditions: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*

| Construct | Definition | Items |
|---|---|---|
| Attitude Toward Behavior (Davis et al. 1989; Fishbein and Ajzen 1975; Taylor and Todd 1995a, 1995b) | An individual's positive or negative feelings about performing the target behavior. | 1. Using the system is a bad/good idea.<br>2. Using the system is a foolish/wise idea.<br>3. I dislike/like the idea of using the system.<br>4. Using the system is unpleasant/ pleasant. |
| Intrinsic Motivation (Davis et al. 1992) | The perception that users will want to perform an activity for no apparent reinforcement other than the process of performing the activity per se. | 1. I find using the system to be enjoyable<br>2. The actual process of using the system is pleasant.<br>3. I have fun using the system. |
| Affect Toward Use (Thompson et al. 1991) | Feelings of joy, elation, or pleasure; or depression, disgust, displeasure, or hate associated by an individual with a particular act. | 1. The system makes work more interesting.<br>2. Working with the system is fun.<br>3. The system is okay for some jobs, but not the kind of job I want. (R) |
| Affect (Compeau and Higgins 1995b; Compeau et al. 1999) | An individual's liking of the behavior. | 1. I like working with the system.<br>2. I look forward to those aspects of my job that require me to use the system.<br>3. Using the system is frustrating for me. (R)<br>4. Once I start working on the system, I find it hard to stop.<br>5. I get bored quickly when using the system. (R) |

*Table 10:Behavioral Intention: Root Constructs, Definition and Scale(Venkatesh et al., 2003)*