PROCESS MAPPING, FIRST STEP TOWARDS BUSINESS EXCELLENCE
– A CASE STUDY AT GOLVET GÖTEBORG

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Abstract
Continuous improvement of processes is one important aspect of quality management and the way towards excellence. Companies are at different stages of business excellence, but the way is long, and the improvement process is never ending. For a company to start its journey towards business excellence, there are many means, guidelines and models to use but no single way that guarantees the success and no generic mean that can be extended to all types of companies. That’s why this paper tries to initiate process improvement journey at Golvet Göteborg by applying excellence models for process optimization and making a process map of warehousing to recognize improvement areas and act upon that. To do this, a literature review in areas of quality management and business excellence is conducted with focus on process management. By interviewing key persons at the company, a map of warehouse process is illustrated and based on that possible improvements are suggested to leadership.
## CONTENTS

1. **INTRODUCTION** ......................................................................................... 1  
   1.1 Background .......................................................................................... 1  
   1.2 Problem description ............................................................................. 2  
   1.3 Purpose and research questions ............................................................ 3  
   1.4 Limitations ............................................................................................ 3  

2. **FRAME OF REFERENCE** ........................................................................ 3  
   2.1 Quality Management and BPM .............................................................. 3  
   2.2 Process Purpose .................................................................................... 6  
   2.3 Process documentation ......................................................................... 7  
   2.4 Process mapping .................................................................................. 7  
      2.4.1 Flowchart ....................................................................................... 8  
      2.4.2 Process of Process Mapping ............................................................ 9  
   2.5 Process Streamlining ............................................................................ 11  

3. **METHODOLOGY** .................................................................................... 15  
   3.1 Qualitative Study .................................................................................. 15  
   3.2 Exploratory Research ......................................................................... 15  
   3.3 Case study ............................................................................................. 16  
   3.4 Method for analysis ............................................................................ 16  
   3.5 Data Collection ................................................................................... 17  
      3.5.1 Observations ................................................................................. 17  
      3.5.2 Interviews ..................................................................................... 17  
   3.6 Reliability and Validity ........................................................................ 18  

4. **EMPRICAL RESULTS** ........................................................................... 19  
   4.1 Case study at Golvet Göteborg ............................................................. 19  
   4.2 Quality management and BPM ............................................................ 19  
   4.3 Process purpose .................................................................................. 20  
   4.4 Process documentation ....................................................................... 20
1. INTRODUCTION
This paper tries to start continuous improvement of processes in Golvet Göteborg by creating the process map for warehousing as a reference for organization towards business excellence. Also, by documenting the activities and ways of working, this paper suggests some apparent improvement areas for further actions by leadership.

This study starts by a literature review of quality management, excellence models and finally process management. These concepts will be applied to the organization resulting to a map of warehouse process at Golvet. Output of the previous step will be then analysed for possible improvements.

1.1 Background
Quality Management has evolved during past decades and different excellence models has emerged in academic world that are widely used in many organizations around the globe. Organizations strive towards improvement, efficiency and effectiveness by applying aspects of quality management and through excellence models and guidelines. TQM and EFQM excellence model are very well-known examples of these guidelines and models. Yet there is no single receipt to solve the challenges in companies and improve their business, there is an apparent focus on process management in all quality approaches. Improving customer-oriented processes and lately even internal non-value-creation processes are emphasized in excellence models repeatedly.

Even though these models do not always provide the tools and methods for process improvement, there are other studies that has specifically focused on process improvement and process modelling suggesting tools, systems and solutions to keep track of processes, eliminate waste, standardize their ways of working and as a result optimize processes.

Working with continuous process improvement requires a detailed view of workflows in the organization. By mapping the processes including inputs, activities, outputs and connection between different steps, leadership will become aware of non-conformities and areas of improvement.

Quality Management came to notice as product quality during mass production period. At that time, i.e. ca. 1900-1940, activities of quality inspection focused only on the delivery of manufactured products without known failures (Weckenmann et al., 2015). First major change happened when the focus shifted from product quality to process quality. In process-oriented view, other aspects as time and cost came to notice. Second change resulted to system quality. It widened the focus from only value-creation processes to a system view there all other processes and their connection to customer values were considered. These processes include internal activities as a workflow. This finally resulted in issuing ISO 9000 sequences which defines the basics for quality management.
Weckernmann et al. (2015) explains that by recognizing the relationships between leadership, employee, processes, customer satisfaction and business results, Total Quality Management and Business Excellence Models, e.g. the European Foundation for Quality Management Model (EFQM Model) raised up.

TQM emphasizes continuous improvement of processes as one basic concept towards business excellence. Naidu (2006) defines ten activities for TQM continuous improvement. First activity is “Viewing all work as a process, it is associated with production or business activities” (Naidu, 2006, p50)

Process management involves planning and administering the activities necessary to achieve a high level of performance in a process and identifying opportunities for improving quality and operational performance and ultimately customer satisfaction. (Bhat, 2009)

The EFQM Excellence Model is a practical, nonprescriptive framework that enables organisations to: assess where they are on the path to excellence. (Samardžija & Kralj, 2010)

The criteria are divided into enablers and results (see Figure 2). Enablers are concerned with what organisations should do and how to do it, and results are concerned with achievements obtained by the company regarding all interest groups and with reference to general objectives. (Gómez et al., 2017)

EFQM emphasizes importance of processes as an enabler in above excellence model. The Processes, Products and Services enabler introduces the need to manage processes and the need for continuous improvement (Gómez et al., 2017)

It can be argued that the quality gurus, such as Deming, Crosby and Juran, did not actually develop any implementation framework. They devised some improvement steps and advice for management to follow, which were more of a prescription for companies to act upon (Yusof & Aspinwall, 2000). One of the improvement areas is for sure process improvement.

Way towards process improvement can start with process mapping. A process map visualizes tasks, inputs, outcomes and the links between them. This visualization provides an overview of not only single tasks and activities but also the effects of those on each other. Process mapping alerts to areas in which a change in processes will have the greatest impact on improving quality. (Anjard, 1998). the analysis and the reorganization of processes are essential prerequisites to improve the efficiency of operational procedures (Heinrich et al., 2007)

1.2 Problem description
To initialize process improvement as a criteria of business excellence, there is a need for visualized and documented process. journey towards improved processes and business excellence should start with reviewing and studying activities, inputs and outputs to find out what needs to be done. Company in research, lacks visualized and documented processes which makes it challenging to identify problems related to each process element. This leads company to difficulties for optimization and continuous improvement.
1.3 Purpose and research questions
Purpose of this study is creating a process map as a step for further improvements. using the tools and means in academic studies, it will visualize the warehouse process and come up with suggestions for improvements.

This research will address following questions:
A. What are the main activities, inputs and outputs in warehouse process?
B. Where in the process, major problems can be found?
C. What should be changed in the current process to make it more effective?

1.4 Limitations
This study focuses on “Service” assignments at Golvet and excludes “Projects”. The reason behind this selection is that Golvet stores mostly material for service errands in their own storage, and project related material is usually transported directly to the destination. As this study is focused on warehousing and the processes connected to it, it was most reasonable to exclude projects and keep service assignments in the scope.

Another reason for this selection is because service material is ordered more often and on a continuous basis. Project is a one-time job with specific material and supplies that are specifically ordered for that project and by the supplier. Although in service, there are some standard products that are ordered on continuous basis and stored in the warehouse for coming assignments.

Golvet has presence in three cities in Sweden but this study is focused on processes and storage in Gothenburg. It is mainly because Gothenburg is the headquarter and having the biggest variety of projects in Sweden.

This research is qualitative with limited number of interviews due to size of the company and people involved in warehouse processes.

2. FRAME OF REFERRENCE
Literature review for this study started with quality management theories and guidelines. As these guidelines emphasize process management but do not suggest ways to work separately with that, the study widened to process management, Business Process Management (BPM) and process modelling. Based on articles and books in that area, process mapping came up as the first and best step for the company in research to start continuous improvement of processes.

2.1 Quality Management and BPM
In business context quality is the definition of how good or bad a service or product lives up to its intended purpose. Kehoe (1996) means that quality can be understood as “Meeting customer expectations”.

The word Quality does not mean the Quality of manufactured product only. It may refer to the Quality of the process (i.e., men, material, machines) and even that of management. (Naidu, 2006). ISO 9001(2015) says that ‘the term “quality” can be used with adjectives such as poor, good or excellent'.

3
By these definitions, quality management can be interpreted as securing quality of product, processes and systems to assure customer satisfaction and keep company’s competitive position in the market, in the other word, business excellence. Continuous improvement in total business activities with a focus on the customer throughout the entire organization and an emphasis on flexibility and quality is one of the main means by which companies face up to competitive threats. (Dale et al., 2016)

Avery & Zabel (2002) track down modern quality movement to Britain and America. British statisticians contributed seminal work which led to the development of techniques for statistical quality control, while the applied work of Shewhart in 1924 (a physicist in the inspection department at Western Electric Company) was America’s contribution. (Avery & Zabel, 2002)

Studies and publishes of quality management: Armand V. Feigenbaum, W. Edwards Deming and Joseph Juran in multiple studies, planted the key ideas of quality management. Deming worked with Japanese on quality improvement and soon after, a big gap between Japanese business and American ways of working came to notice. While Japanese produced faster and better products, American struggled with quality of their products and started adapting the tested models from other side of the globe. “The first efforts at achieving a turnaround were based on the idea of participative management (borrowed from the Japanese) in which employees would be involved in improving work processes”. (Avery & Zabel, 2002, p1)

Quality circles, from Japan, were tried in US in 1970s as a management technique to solve quality problems. Quality circle consists of number of employees from same function who meet at intervals and discuss problems and improvements of their job. Although a very popular approach, it wasn’t initially successful in US, but the concept of employee empowerment and team work was necessary to set the stage for emerge of TQM in 1980s (Avery and Zabel, 2002)

Cole (1999), summarizes chronology of Quality fads to early 1990s, as illustrated in the table 1.
Late 1970s, early 1980s

- Quality control circles, El
- Statistical Process Control (SPC)
- Senior management commitment and leadership Competing gurus (Juran, Deming, Crosby)
- Need to break down functional isolation in favor of cross-functional cooperation (especially in new product-development); teams (quality improvement teams); self-managing teams (both within and across functions)
- QFD — concurrent engineering — Taguchi 19

Mid-1980s

- Customer focus
- Supplier collaboration
- Continuous improvement (Kaizen): process-improvement focus for all business processes
- Baldrige Prize (first awarded 1987)
- Partnering with customers (co-design) and suppliers Using Baldrige award protocol for company diagnostic 1990 customer satisfaction measurement
- Benchmarking

Early 1990s

- ISO 9000 System alignment (rewards aligned with desired outcomes, quality aligned with important business objectives)
- Policy deployment (quality integrated with strategic business plan)
- Deployment of annual objectives through all levels and employees
- Business process reengineering

Table 1 - Quality Fads, Beginning periods by Technique or Strategy (Cole, 1999)

Philip Crosby published his book “Quality is free” in 1979 with focus on different ways of approaching quality issues. He developed a fourteen-step quality improvement program. His theory together with Edwards Deming’s fourteen-point approach, Joseph Juran’s ten-point approach to quality management and Armand Feigenbaum’s focus on long-term commitment, had so much to do with development of TQM.

But what is TQM? In simple terms, it is the mutual co-operation of everyone in an organization and associated business processes to produce value-for-money products and services which meet and, hopefully, exceed the needs and expectations of customers. (Dale, et al., 2016)

A number of quality management concepts and tools are now available under the umbrella of TQM for managing quality to achieve organizational excellence. The choice of the tools depends upon the current quality status of the company, range of its operations and areas of weakness. (Lal, 2008)

Quality Management studies put a high focus on process management and continuous improvement of processes within the whole company to achieve business excellence.

In today's competitive environment, changing business processes is a route to survival in highly competitive international markets. Incremental change will no
longer suffice; therefore, the challenge is to redesign the process to maintain ownership while removing the non-value-added activities. (Garside & Joyner, 1996).

Japan was one of the pioneers in Quality and Process Management implementations in business while rest of the world struggled with issues and challenges. While new ideas and theories of quality management flourished in Japan, they were unknown to the rest of the industrial world. In 1970s American industry noticed loss of their competitive power to Japanese products. For around 20 years, American industries had tried to improve their business performance which was weakened by international competition specially from Japan. After a while, understanding gradually dawned on American managers: They were getting nowhere because they were applying task solutions to process problems. (Hammer, 1996)

There is a difference between task and process. While tasks are single activities done by single person, process is a group of tasks connected to each other that creates value for the customer at the end. A process is a series of activities (tasks, steps, events, operations) that takes an output, adds value to it, and produces an output (product, service, or information) for a customer. (Anjard, 2002).

To separate a company’s processes from any other forms of processes, the word business has been added to form the term business process (Andersen, 2007). Davenport describes a business process as “simply a structured, measured set of activities designed to produce a specified output for a particular customer or market”. Upper management provides the vision and direction, teams correct the problems, and individuals provide the creativity, but it is the processes within any organization that get things done (Harrington, 2012).

Hammer (1996) believes that problems that afflict modern organizations, are not task problems but process problems. Process was an unknown term to managers, they had never defined the processes or tried to improve them. TQM and process engineering advent were a turning point for American industries to focus on the right thing in order to improve.

2.2 Process Purpose
Each process shall have a clear purpose which is in line with organization strategy and vision. Process purpose, generated from strategies, will be broken down to process level and even to operation and team levels. Well-defined objectives set boundaries for the processes and what they should deliver.

business targets should be derived from overall business strategy. Based on these targets, operational process and team improvement targets will be defined (Trienekens et al., 2004)

Andersen(2007) emphasizes that business processes should be derived from Business strategy and stakeholder as shown in figure 1.
Process analysis is particularly useful in ensuring the accomplishment of business objectives relating to customer service, efficiency, effectiveness, and profitability. (Jacka & Keller, 2009)

2.3 Process documentation
Each process needs documentation and training materials (Hammer, 1996). One of the primary reasons for process documentation, is to standardize ways of working and provide consistency. Consistency increases efficiency (Ungan, 2006). It will even help the organization to become less individual depended and be able to secure back-up when needed.

The documentation consists of a narrative, flowchart, or some other description of the way the process works (Hubbard, 2005). Process map is a way of process documentation.

2.4 Process mapping
Process mapping is a graphic illustration of a process. Process maps are static models as they don’t describe dynamics of the system. They are also qualitative and provide little or no quantitative analysis. There are different uses to process maps and documentation, analysis and communication are some of those. (Harrel & Field, 1996)

“We can trace back the concept of process maps to the early 1980s when Porter introduced the value-chain model” (Malinova et al., 2015, p38).

Malinova et al. (2015) divides business processes in three different categories:

- Core Processes: those processes that directly create value for the customer and generate revenue are called core processes (Malinova et al., 2015), these processes are usually connected to each other sequentially
- Support processes
- Management processes

Both Support and management processes influence the value creation indirectly. Support processes provide resources to the core processes and enable them to
operate in the most effective and efficient way, such as human resource management, information technology, etc. (Malinova et al., 2015).

Process Mapping is identifying, documenting, analysing and developing an improved process. It visualizes work processes including activities, connection between them and inputs and outputs (Anjard, 2002).

Harrington (2012) explains business process hierarchy with system processes at top. Typically, the entire organization can be divided into 6 to 10 system processes, which can then logically be divided into major processes (Harrington, 2012). Major process can then be broken down to sub-processes. Sub-processes can then be divided to activities and tasks are on bottom of the hierarchy. Figure 2 summarizes Harrington’s description of process hierarchy below:

![Process hierarchy (Harrington, 2012)](image)

2.4.1 Flowchart
The flowchart is one of the oldest of all the design aids available (Harrington, 2012). It is a tool to visualize flow of events and activities within a process. There are many ways of drawing a flowchart, Andersen (2007) suggests most commonly used flowchart symbols as illustrated in figure 3.
Harrington (2012) makes a list of 9 different types of most common flowcharts as below:

- Block diagram
- American National Standard Institute (ANSI) flowchart
- Geographic
- Functional flowcharts
- Data flow
- Communication flow
- Knowledge flow
- Value flow
- Value stream

2.4.2 Process of Process Mapping

Jacka & Keller (2009) introduce step by step manual for process mapping. These steps are process identification, information gathering, interviewing and map generation, map analysis, and presentation.

2.4.2.1 Process Identification

Process mapping starts with discovering and identifying the process which is been reviewed. Hammer(1996) suggests identifying and naming processes as first critical step towards process centring. It is not always easy to do this step and it can be time consuming. A company that is not organized around processes may never have
identified the broad processes that help it achieve its objectives. (Jacka & Keller, 2009).

While Jacka & Keller (2009) define a separate step for information gathering, Dumas et al. (2018) defines process discovery as the act of gathering information about an existing process and organizing it in terms of an as-is process model.

Process should have objectives as it should have a clear trigger. Specific events can trigger different processes. Anjard (2002) introduces two points for process identification phase of process map project:

- determine the boundaries of the process to be improved and the goals to achieve;
- create a project plan outlining deliverable and target due dates (Anjard, 2002)

Dumas et al. (2018) on the other hand, introduces three main approaches to process discovery:

- Evidence-based discovery
- Interview based discovery
  - Document analysis
  - Observation
  - Automated discovery
- Workshop-based discovery

Table 2. summarizes strengths and weaknesses of each method of discovery according to Dumas et al. (2018).

<table>
<thead>
<tr>
<th>Method</th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Document analysis</td>
<td>• Structured information</td>
<td>• Outdated material</td>
</tr>
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<td></td>
<td>• Independent from stakeholders availability</td>
<td>• Wrong level of abstraction</td>
</tr>
<tr>
<td>Observation</td>
<td>• Context-rich insights</td>
<td>• Potentially intrusive</td>
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<td></td>
<td></td>
<td>• Stakeholders likely to behave differently</td>
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<td></td>
<td></td>
<td>• Only few cases and not all processes can be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>observed</td>
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<tr>
<td>Automated discovery</td>
<td>• Extensive set of cases</td>
<td>• Potential issue with data quality and level of</td>
</tr>
<tr>
<td></td>
<td>• Objective data</td>
<td>abstraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Data may not be available or be available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>only in part</td>
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<tr>
<td></td>
<td></td>
<td>• Data extraction and preparation is time-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>consuming</td>
</tr>
<tr>
<td>Interviews</td>
<td>• Context-rich insights</td>
<td>• Requires sparse time of stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time-consuming: several iterations required</td>
</tr>
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<td></td>
<td></td>
<td>before sign-off</td>
</tr>
<tr>
<td>Workshops</td>
<td>• Context-rich insights</td>
<td>• Requires simultaneous availability of multiple</td>
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<td></td>
<td>• Direct resolution of conflicting views</td>
<td>stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time-consuming: multiple sessions typically</td>
</tr>
</tbody>
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*Table 2 - strengths and weaknesses per discovery method (Dumas et al., 2018)*

Information Gathering
Information gathering occurs from the first moment you consider analysing any process and continues throughout the completion of Process Mapping. Also states that it could be challenging to find the right competence who has the holistic view over the whole process as most are involved in their area of operation. Finding the right person who can guide you through the process and provide the right information is the first thing to do when gathering data for this step. (Jacka & Keller, 2009)

**Interviewing and Map Generation**

Interviews conducted at this step with those involved in process. At this step everyone provides information not only about the tasks but names of other individuals that execute each task. Lots of input about possible improvement could be gathered at this step as those who are interviewed are the ones who do the tasks and know their jobs best.

You should try to finalize your Process Maps only after all interviews are completed. Each conversation has the chance of adding another action. (Jacka & Keller, 2009)

**Map analysis**

Analysis of the map is something that should be done continuously during the whole process of mapping, but when it gets to completion point, it is time to tie all the pieces together and make the perfect picture. (Jacka & Keller, 2009).

**2.5 Process Streamlining**

There are two major approaches for improving the product or services according to Flanigan (1995), process improvement and process reengineering. Process reengineering aims for radical changes with assumption that current ways of working are suspect, and you should start with a blank sheet, while process improvement aims for incremental changes. Flanigan (1995) highlights the importance of process selection to start improvement project. For your first project, pick a project where:

- Most people agree that the problem is one that needs to be solved
- The problem is tied to a process not a single individual
- The process has a definable, accessible customer
- The process fits in with your current responsibilities Goals can be attained in 9 to 12 weeks Goals and results can be objectively measured (Flanigan, 1995)

There are many tools and techniques for process improvement. Andersen (2007) suggests seven tools for process improvement including streamlining.

The streamlining approach takes the present process and removes waste while reducing cycle time and improving process effectiveness (Harrington, 2012). There are several techniques suggested for streamlining which could be used separately or all together. Example of tools which can be used for streamlining are:

- *Eliminating process step* (Bradley, 2015). It starts with identifying steps in the process that does not add any value. Eliminating a whole step is an easy and fast way to improvement. This is what Harrington (2012) describes as
Processing waste and Anderson explains as Value-added analysis. Andersen (2007) divides process activities into 3 categories: Real Value Adding categories (RVA), Business Value-Adding activities (BVA) and Non-Value-Adding activities (NVA). While RVA adds direct value for the customers and BVA activities are indirectly influencing the final value, NVA are out of no value and only costly. After an Added-Value analysis, the cycle time chart could look like as showed in figure 4 by Harrington (2012).

- **Bureaucracy Elimination** (Andersen, 2007). Bureaucracy is about process steps that are slow and inefficient. Therefore, one of the primary things to do in streamlining is to eliminate bureaucracy. If it is not possible to do that, the whole step should be eliminated as mentioned in first item.

- **Redundancy Elimination** (Andersen, 2007). Process map exposes the identical or similar activities which could create conflicts in the process and is also costly to maintain. Therefore, all duplicates including documentations attached to them should be eliminated and only show up in one step.

- **Process cycle time reduction** (Andersen, 2007). Critical processes are those who creates most value for customers and need to be executed fast and effectively. Long cycle times for these processes or activities, is costly and affect customer satisfaction negatively. Harrington (2012) describes a similar waste as wait-time waste which could be a result of issues like absentee people that are not backfilled, delivery delays, low inventory levels or delivery delays. Andersen (2007) suggest few actions to overcome this problem and reduce cycle times:
  
  - Performing activities in parallel instead of sequence
  - Change sequence of activities
  - Reduce interruptions, and
  - Improve timing (Andersen, 2007)

  There are many other techniques to reduce cycle time, but the above ones are some of the most important and easy to use items.

- **Creating and analysing a spaghetti diagram** (Bradley, 2015). Spaghetti diagram a simple way of showing movements of people and goods in a certain area. Any movement that does not add any value should be recognized and probably eliminated. Figure 5 and 6 illustrate examples of Spaghetti diagrams before and after process improvement. Harrington (2012) classifies this as motion-waste.
In addition to tools described earlier, Harrington (2012) mentions few more type of waste that should be eliminated for the sake of business processes streamlining. The streamlining approach takes the present process and removes waste while reducing cycle time and improving process effectiveness (Harrington, 2012).
Production waste: this can fall into two categories, too much production or too little production. Either results in waste creation and therefore should be escalated and handled.

Transportation waste: transportation is both internal and external. Internal transportation waste is similar to motion-waste which is described earlier while external transportation waste is about receiving the material from suppliers or shipping the material and product outside the plant/organization. Long distance to suppliers or delays regarding issues prior to shipping are some factors which lead to this type of waste.

Inventory waste: falls into two categories of excessive inventory and insufficient inventory. Excessive inventory results in problems like use of additional space, stock frequently being damaged, additional tracking, slowdown in cycle time and the money of organization being tied up (Harrington, 2012). On the other hand, insufficient inventory causes shipment delay and emergency work orders.

Error waste: refers to both administrative and production. It is impossible to eliminate errors completely, but the aim should be securing processes and controls that minimizes the risk of errors. Finding out where in the process errors usually occur is a useful input.

After the process flow is streamlined, automation and information technology (IT) are applied, maximizing the process’s ability to improve its effectiveness, efficiency, and adaptability (Harrington, 2012). Although Gray (2007) highlights that applying technology should be as an enabler to the process rather than ultimate solution to a poorly designed or insufficient process.
3. METHODOLOGY
This chapter focuses on choice of methods and the reasoning behind it. There are many ways of conducting a research and building a scientific basis for it. Choice of method lies in problem definition and how the researcher needs to approach it. Business research is a systematic way to collect information and get knowledge out of it with a methodology so that the derived knowledge can be used to make decisions (Sachdeva, 2008)

This section will cover number of important aspects related to structure of the research and analytical process to conduct this business research.

3.1 Qualitative Study
Whereas quantitative research is conducted with the purpose of numerical results, qualitative research aims for understanding the situation in depth. Bryman and Bell (2011) suggest qualitative research when the purpose is typically associated with generation rather than testing the theory. As Golvet has never done similar studies of their processes before, it is rather difficult to gain numerical data and conduct a quantitative research. Besides, this research focuses on in-depth study of processes and drilling down as-is processes which is of qualitative nature.

Qualitative researchers tend to collect data in the field at the site where participants experience the issue or problem under study. This up-close information gathered by actually talking directly to people and seeing them behave and act within their context is a major characteristic of qualitative research (Creswell, 2014). In quantitative research, researcher sits in driving seat and the set of concerns that s/he brings to an investigation, structures the research, but in qualitative research, the perspective of those being studied provides the point of orientation (Bryman and Bell, 2011). As this study is built around business processes at company in research, it is obvious that their perspective is the basis for the study. They are most aware of activities, what is important for their business and what needs to be addressed.

Qualitative techniques are used both at the data collection and data analysis stages of a research project (Sachdeva, 2008)

3.2 Exploratory Research
The objective of exploratory research is to gather preliminary information that will help define problems and suggest hypotheses to answer the research questions. Exploratory research is a type of research conducted because a problem has not been clearly defined. (Sachdeva, 2008). The purpose is mainly to achieve new insights and not necessarily a source for decision making. Even if qualitative exploratory research can make a hypothesis of “how” and “why”, it does not provide information about “how often” and “how many” which may be crucial for decision making. Also, the objective of exploratory research is the development of hypotheses rather than their testing (Kothari, 2004)

Logical reasoning and the logical process of induction and deduction are of great value in carrying out research (Kothari, 2004). Inductive reasoning moves from specific observations to broader generalizations and theories. Informally, we sometimes call this a "bottom up" approach while Deductive reasoning works from
the more general to the more specific. Sometimes this is informally called a "top-down" approach (Sachdeva, 2008). Whereas deduction entails a process in which: theory→observations/findings, With induction the connection is reversed: Observations→findings→theory (Bryman and Bell, 2011)

Using business process theories and published material together with documents and data provided inside Golvet, both deductive and inductive logics are used. Inductive process illustrates working back and forth between the themes and the database until the researchers have established a comprehensive set of themes. Then deductively, the researchers look back at their data from the themes to determine if more evidence can support each theme or whether it needs additional information. Thus, while the process begins inductively, deductive thinking also plays an important role as the analysis moves forward. (Creswell, 2014)

3.3 Case study
The basic case study entails the detailed and intensive analysis of a single case, some of best studies in business and management are based on this design. (Bryman and Bell, 2011). One type of this research design is single organization case study when just one company is subject of research. This study is designed as single case study.

A case study is to be conducted at Golvet with aim of identifying and mapping logistics and warehouse related processes. Reason behind selection of method is the conditions and nature of this study. According to Yin (2018) there are three conditions that determine application of different methods.

The three conditions consist of (a) the form of research questions posed, (b) the control a researcher has over actual behavioural events, and (c) the degree of focus on contemporary as opposed to entirely historical events (Yin, 2018). See table 3. Form of research questions, studying the current situation of company and not having control over actual events, makes case study proper choice of research method.

<table>
<thead>
<tr>
<th>Method</th>
<th>(a) Form of research questions</th>
<th>(b) Requires control over actual behavioural events?</th>
<th>(c) Focuses on contemporary events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>How/why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, What, Where, How many, How much?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>Who, What, Where, How many, How much?</td>
<td>No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>History</td>
<td>How, Why?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case study</td>
<td>How, Why?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 3 - Relevant situations for different research methods (Yin, 2018)

3.4 Method for analysis
Qualitative techniques are used both at the data collection and data analysis stages of a research project (Sachdeva, 2008). Strategy for qualitative data analysis provides a framework for analysis of data which is gathered through qualitative research. There are different approaches for analysing qualitative data. This study
is based on grounded theory (Bryman and Bell, 2011) which is usually described as iterative. It means that analysis starts after some of the data have been collected and the implications of that analysis then shape the next step in data collection process (Bryman and Bell, 2011). In this method data collection and data analysis stand in close connection to each other. Using this method, researcher collects data to find a pattern and theme, creates a structure or theme and gathers additional data which fits to designed structure.

In this study grounded theory is utilized as analysis method in initial data collection. It has then provided insights about what needs to be studied and how to structure further data gathering. After initial contacts with the company in research about their warehouse and storage issues, initial studies conducted that shifted the focus towards process identification as next step of data collection. Researcher has travelled back and forth between analysis, data collection and literature review iteratively.

3.5 Data Collection
Data refers to a collection of natural phenomena descriptors, including the results of experience, observation or experiment, or a set of premises (Sachdeva, 2008). Data may consist of numbers, figures, text or images and can be collected by different methods. There are two main categories to data: primary and secondary data.

Primary data are collected by researcher using different methods like interview or observation and secondary data is existing data like company documents and historical records, as suggested by Yin (2018). Primary data are of special value because researcher observes when and how it is extracted while secondary data are collected for another reason than addressing research’s problem but are much easier and cheaper to access (Sachdeva, 2008). In this study both primary and secondary data are collected and used. As primary data, list of material stored at the warehouse and even order history of material and products were provided to researcher. As secondary source of data, interviews and observation have been conducted.

3.5.1 Observations
To get a clear picture of input, output and daily activities at company’s storage in Gothenburg, several observation occasions were planned and implemented in beginning of the study. During observations, some clear patterns came to notice that influenced research structure and what to focus on to identify the possible improvement areas. Nature of observation have been unstructured with the mail objective of capturing basic information of tasks, activities, process steps and possible clues for problems. Structured observation is considered appropriate in descriptive studies, whereas in an exploratory study the observational procedure is most likely to be relatively unstructured (Kothari, 2004)

3.5.2 Interviews
After observations, finding patterns and themes and creating initial structure of the study, it was time for more in-depth data which were collected from several interviews with storage manager, CEO and project managers. By recommendation of Golvet, no interviews were conducted with floor layers. The reason is that project managers are much aware of those steps that are fulfilled by workers.
There are two main types of interviews: structured interviews and qualitative interviews. Structured interview provides same set of questions to all respondents consist of open and/or close questions. Qualitative interviewing on the other hand, going off at tangents is often encouraged (Bryman and Bell, 2011) as respondents’ perspective and point of view is of much greater interest for researcher. Qualitative interview can be divided into two categories of semi-structured and unstructured interviews. In both cases, the process of interviewing is flexible but in semi-structured interview, researcher has a list of questions or fairly specific topics to be covered whereas in unstructured interview may be just a single question that interviewer asks, and interviewee responds freely (Bryman and Bell, 2011).

This research started with unstructured interviews in parallel with observations. It was basically one-question interview: what are the biggest issues that they face with regards to warehouse and storage. After building the initial structure of the study, more of semi-structured interviews were conducted. Usually during the interview, a new aspect or question popped up which needed more focus and explanation. In very early phases it became obvious that structured interview could not be of use in this research as there were no previous data and document about current processes as an input for structured questions.

3.6 Reliability and Validity

Quality of research is assured through reliability and validity of data and analysis. Validity refers to the extent to which a test measures what we actually wish to measure (Kothari, 2004). To secure validity of this research, collected data from observations and interview data (related to process map) has been confirmed with other members of organization repeatedly. So called member-check together with using different sources of information to verify the theme are the techniques which has been used for validity of research.

Another aspect of research quality is generalisability of the study. Generalisability or external validity refers to the degree to which findings can be generalized across social settings (Bryman and Bell, 2011). It is more challenging in qualitative research as they tend to conduct case studies and smaller samples than quantitative ones. Although, Bryman and Bell (2011) suggest that it is the quality of the theoretical inferences that are made out of qualitative data that is crucial to the assessment of generalization. As all project managers were interviewed at Golvet, there is no sampling method than needs to be validated. Even if it is not possible to guarantee the generalisability of case studies, the researcher has looked back and forth between similar studies’ results and this case study which secures the quality of theoretical inferences.

Reliability has to do with the accuracy and precision of a measurement procedure (Kothari, 2004). Reliability is concerned with the questions of whether the results of the study are repeatable (Bryman and Bell, 2011). Reliability of research results are examined through testing the generated process map. If the process map is sound proof, it should always give the same output giving the same input and going through all the steps. This has been tested together with storage manager at Golvet repeatedly during process map generation period.
Golvet is a member of “Golvkedjan”. Golvkedjan is a nationwide association owned by 50 of the country’s leading flooring and tiling companies in more than 70 places in Sweden.

4. EMPIRICAL RESULTS
This chapter describes the case study at Golvet and explains the main results of the research mainly based on secondary data gathered from Golvet and Golvkedjan. Generated process map is also illustrated in this section.

4.1 Case study at Golvet Göteborg
This section of the research introduces case study at Golvet and empirical data collected during the study together with analysis of data with help of theoretical framework and using methods which were explained before. Secondary data collected from company’s home page, Golvkedjan’s integrated system and documents provided by representatives of the company. Interviews with warehouse manager, CEO, sales administrator and four project managers were conducted at Golvet. Warehouse manager was interviewed several times during the study.

Golvet Göteborg AB is one of Sweden’s largest and Gothenburg’s biggest flooring company. In addition to the head office in Gothenburg, Golvet has departments in Stockholm and Varberg. Golvet provides services in following areas:
- Textile Flooring
- Other types of Flooring
- Floor Renovation/Improvement
- Floor Grinding
- Flooring full projects

4.2 Quality management and BPM
Secondary data shows that Golvkedjan has established and implemented a documented and integrated management system for quality, environment and work environment according to the requirements:
- SS-EN ISO 9001:2008
- SS-EN ISO 14001:2004
- SIS-OHSAS 18001:2007

Golvkedjan supports its members towards quality and business excellence. Even though they have established some standards locally at Golvkedjan, Golvet does not possess its own processes in place. Extracted documents from Golvkedjan’s integrated system explains their quality policy as below:

The flooring company Golvet must always meet or exceed the customer’s requirements, needs and expectations so that we therefor maintain their confidence. We will achieve this by:
- Building long-term and lasting relationships with our customers by performing business ethics with good ethics and morals
- Carry out our assignments at the right time, at the right price and to the customer's full satisfaction
- Every employee has the right skills, takes responsibility and shows a commitment to their task
- Evaluate the efficiency of our work processes and thereby work towards continuous improvement
- Meet all legal requirements and industry rules that affect our business
- Interact with industry organizations
- Make sure that the quality policy is continuously valid by management’s reviews
- Make our quality policy understood by our employees and known by our customers, suppliers and other stakeholders

4.3 Process purpose
Based on secondary data from Golvkedjan’s integrated system, objectives are:

Satisfied customers: Golvkedjan’s members should perform flawless constructions and meet or exceed customers’ needs and expectations.

Effective work processes: simplify and optimize all work processes to create competitive power in the market.
Local quality target field is left empty in steering map document.

Golvet’s strategies emphasizes on quality and classifies it into categories of: Continuous competence development, assign right assignment to right person, coaching and feedback. Figure 7. Summarizes company’s strategies, objectives and other aspects.

Steering Map Golvet Göteborg AB 2018–2021

Business idea: Based on forecasts, our region grows with 7% on yearly basis in form of new productions and renewing. Our ecosystem needs increased sustainability through choose of right material and way of performing the job.

Ecosystem: We have a new and dedicated management. We have new annual contracts which help us get through negative economic effects. We need to communicate the obvious fact that all employees should perform their job with precision to get the best result.

Organization: Quality:
- Continuous competence development
- Assign right assignment to right person
- Coaching and feedback

Strategy: Environment: Work Environment
- Revenue
- Liquidity
- Occupation
- Complaints
- Invoicing

Objectives: Economics: Effective work processes
- Satisfied customers
- Environment: Staff

Figure 7 - Translated and adjusted version of Steering map (Golvet)

4.4 Process documentation
The secondary information from Golvkjedan’s integrated system includes a separate section for documentation. There is specifically a heading for documentation of working routines. The main goal with routine documentation is
to meet all the requirements according to integrated system’s standards which are mentioned in previous sections.

4.5 Process map
Process map is generated based on observations and interview results. It summarizes steps which are discussed in next chapter. Generation of process map together with streamlining and improvement areas are part of Analysis chapter.

![Figure 8 - Process map, warehouse process at Golvet](image)

5. ANALYSIS AND DISCUSSION
This chapter analysis and discusses the opinion of respondents and researcher in connection to literature review. Analysis and discussion are combined in the same chapter as it consists researcher’s opinion.

5.1 Quality management and BPM
Golvet is not yet a mature organization in areas of quality management. Even if ISO 9001 standards has been established by Golvkedjan, there is no good knowledge of what it means for Golvet and there are no documented processes visible to everyone or used properly to accomplish the assignments. No prior studies have been conducted at Golvet around process management and business excellence which makes those concepts unfamiliar for many of employees. Awareness about quality management related to processes has been observed and examined within Golvet by interviewing people involved in warehouse process. Level of awareness inside the organization is various. Quality management has not been in investment areas of Golvet so far and this which leads to different level of awareness and understanding of this field.

According to interviewee 5: “few audits have been conducted at Golvet by Golvkjedian’s initiative but none of them has major focus on warehouse processes”
Golvet does not own any separated quality policy rather than the suggested one from Golvkedjan which is more of a recommendation for all of their members and locally for their own organization.

5.2 Process purpose
Process purpose generates from company’s high-level strategies and customer needs. According to interviewee 5, Golvet’s high-level quality objectives are generated from Golvkedjans strategies on central level as described in Result chapter.

Steering map is the only document specifically created by and for Golvet and not inherited from Golvkjedian’s generic regulations and recommendations. It is although a high-level document which lacks the process breakdown and as a result does not include process purpose.

5.3 Process documentation

Warehouse process at Golvet is not documented neither standardized. The only person aware of whole process is the warehouse manager. As a result, this area is very fragile and depended on one individual. None of interviewees were aware of process related documentation to refer to when unsure about an activity. “The only way is to ask around and try to find the answer” Mention interviewees 2,3 and 4.

“Starting as new hire at Golvet, the only way to learn processes is to shadow current employees who does the similar job or the warehouse manager. It means that everyone follows the process slightly different from others”. Says interviewee 2.

Interviewee 2, 3 and 4 where asked about a certain trigger in the process and three different answers were collected. While interviewee 2 sends an email to order material, number 3 calls for ordering and number 4 sometimes sends an email and sometimes makes a phone call.

When it comes to responsibilities of process steps at Golvet, it seems to be unclear and unofficial. As it is a rather small number of people involved in warehouse process and mostly one person involved in service related warehousing, they try to support each other to be as fast as possible for delivery. Interviewee 1 claims that “absence of warehouse manager can cause delays in many steps of process.”

5.4 Process mapping

Process of process mapping at Golvet started with identification of core processes, of which warehouse process was selected as first step towards process management. The reason behind this selection lies in different aspects. All respondents who was interviewed emphasized that warehouse process has many improvement areas. It was rather easy to find process stakeholders and find the value of each step which also made it a good fit as first step towards process management. Process discovery was an interview-based method using observations, documents and interviews.

After process identification, all the secondary data collected within the company in parallel with observations and primary interviews with CEO and warehouse manager. Map generation started at this point using primary and secondary data and
went through analysis by help of further interviews. Process map level is kept on activity flowchart with possibility to breakdown to smaller tasks and even build a high-level process out of it together with Golvet’s other processes.

Three different swimlanes identified which also indicates different owners for each swimlane. Whereas warehouse manager is owner of “warehouse” level of process map, Workers (Floor layers) are owners of “workplace” level and suppliers are in charge of last swimlane.

The clear output of warehouse process is material in right measurement which is delivered in right time to workers at workplace as its input is description of needed material from inventory check of Golvet’s storage (trigger). When it comes to service assignments, Golvet only uses some standard material which are refilled on continuous basis. As there is no technology in place which determines when and how much material should be ordered, this calculation is done manually by warehouse manager through storage inventory. Warehouse manager explains the activity as below:

“There are few types of flooring that customers can chose from. Based on historical knowledge of past few months, how big the current assignment is and inventory of storage, orders are placed. Sometimes we have frequent orders with continuous delivery to the storage. Invoice is received at the same time as delivery of material.”

Warehouse manager uses an email template to order the material which includes code of material recognized by supplier, amount and date of delivery.

While project managers have the knowledge of chosen material, floor layers start their assignment by measuring the area for flooring and call warehouse manager to inform the measurement. Warehouse manager then cuts and prepares the material for delivery to workplace. Transport of material should be done by workers themselves, but it could also be warehouse manager who transports the material to destination. Sometimes there is no worker on workplace who has an available transport vehicle, or no one has driving licence which results in warehouse manager or transporting the material to the destination.

After completing the assignment, waste should be transported back to Golvet’s storage by workers and be disposed in waste container. Complete process map is shown in figure 8 in previous chapter.

After completing process map, it went through map analysis by testing the map together with warehouse manager. Following factors were considered at this step:

- That right triggers are identified
- That each activity and even the whole process has an owner
- That there are correct inputs and outputs for each element
- That there are key controls in place. Key controls secure that the process step is completed and correctly fulfilled. There are no defined key controls in place for all of process steps. For instance there is no way of securing waste transportation to Golvet storage after the assignment is finished.
• That success measurement is possible to define for each step mostly with regards to time. For instance, how long it takes to deliver the material in right measurement to destination after the phone call from workers made.
• That cycle time for each step is possible to define.

5.5 Process Streamlining
During process generation, some apparent improvement areas came to notice using streamlining methods that are explained in section theoretical framework.

First problem that was discovered happened to be lack of smart solutions to keep track of material, amount, measurement and usage frequency. This results in warehouse manager doing own judgements what to order, when to order it and how much to order. Not having a standard way of inventory investigation and not having a proper track of old materials, results in high amount of old material stored at Golvet and high cost of maintaining.

To eliminate inventory waste, Golvet needs to define a proper way of ordering enough supply and keeping track of excessive material in storage. They need a policy in place what to do with old materials to reduce the cost and overcome problems with use of additional place.

Error waste was also recognized during the study. As the process was not documented properly, human errors can easily occur depended on who takes the responsibility of each step.

Redundancy elimination could also be considered at Golvet. There is a possibility to eliminate one process step and transport material directly to the destination which even results in external transport reduce. By eliminating non-value adding steps in the process, Golvet comes even closer to business excellence.

Another improvement area is around process cycle time. Ordering too late or late delivery time to Golvet together with transportation time from Golvet to destination may result in delayed completion of assignment which is out of direct value for end customers.

Another recommendation is to create a spaghetti diagram of material and people motions in Golvet’s storage to find areas of improvement. As material are not market properly and there is no solution or technology to search for certain material, others than warehouse manager could have difficulties to find what they are looking for in the shelves and it could also be of value to see how people move around the storage and what should be moved to decrease the internal transport distance.

It is important that Golvet identifies key success measurement for each process step and tries to improve them continuously. Together with this, success measurement of each step is important. It sets a standard for how much time each step should take and how it is possible to deliver faster and more effective.
6. CONCLUSIONS

This section is to address research questions which were raised in beginning of study. Even if many of the tools and methods were changed and replaced during the study because of its nature, focus to address main questions were kept unharmed during the whole research. Outcome of this research is an as-is process map which shows the main activities, inputs and outputs and visualizes their connections to each other. It is important to keep in mind that this is only the first step towards process management and business excellence. As-is process was analysed for matter of streamlining and some apparent wastes were recognized which should be addressed in order to make the process more effective. Streamlining and optimizing is not a one-time activity and processes should all the time be evaluated for further improvement.

Research questions which are addressed in this research are:
   A. What are the main activities, inputs and outputs in warehouse process?
      Process map is the documented result of research that addresses this question
   B. Where in the process, major problems can be found?
      Several improvement areas were defined and discussed in streamlining section in analysis chapter which address this question.
   C. What should be changed in the current process to make it more effective?
      In streamlining section, there are suggestions for improvement to make the process more effective and streamlined.

6.1 Practical implications
Golvet needs to invest in areas of quality, process management and continuous improvement. It needs both time investment and financial investment. Not having the competence inside of the organization, Golvet needs to seek help to focus on this areas, either in terms of recruitment or consultancy.
To work with process management, Golvet needs also a focus on education and training to gain commitment in all levels of the company. Streamlining the processes and making standardized ways of working, will short term cost a lot and also require more effort from all employees which will affect how fast and effective they do their daily works.

6.2 Further research suggestions
According to findings of this research and theoretical studies, it is recommended that Golvet first of all extends this map to include even project related orders. At the same time, a study on requirements of smart solution for warehouse process could be as value to Golvet. Implementing and utilizing technologies can support Golvet to keep track of the material, keep order in storage, trace the orders and waste etc.

It is also recommended that Golvet extends this activity-based process map to both higher and lower levels of process map hierarchy. Moving down to top, a high-level process map can be created which illustrates relation of warehouse process to other core and support processes in the company and moving down in the hierarchy it is even possible to break this down to task level flowchart. Higher level maps is first priority for Golvet to recognize connections to other processes defining all the inputs and outputs in relation with each other.
Golvet needs to standardize way of storing material, how long the store them and how to handle the material which is over. This is mostly related to project related material which was excluded from this research, but it came to notice in early stages and all interviewees have mentioned this as one of big issues.
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APPENDICES
Golvet’s steering map
**Styrkarta Golvet Göteborg AB 2018-2021**

**Affärsidé**
Golvet Göteborg AB utför golventreprenader.

**Omvärdl**
Enligt prognos växer vår region med 7% årligen, i form av nyproduktion och renovering. Vår omvärd kräver okad hållbarhet genom val av material och vårt sätt att utföra våra installationer. En försvagning i konjunkturen kan påverkas och genom härdare konkurrens och lägre prisnivåer som följd. Vi kan också se en svårighet att hitta kompetent ledning till en löneinlägg vi kan klara av att betala.

**Analys av org.**
Vi har en ny och dedikerad ledningspersonal. Vi har nya årsavtal som hjälper oss att drabbas av eventuell försvagning av konjunkturen. Vi behöver kommunisera ut det självklara att varje medarbetare måste utföra sin del av arbetet med god precision och till ett bättre utfall.

**Strategi**
Kvalitet:
- Ständig kompetensutveckling
- Matchning av individ och roll
- Coaching och feedback
Miljö:
- Vi ska uppfyllas som ett miljövänligt företag genom att ta ansvar för vårt miljöpåverkan
Hållbarhet
- Fokus på att ta projekt som ställer krav på hållbarhet
Personal:
- Vi ska uppfyllas som en attraktiv arbetsplats genom att ha en leande organisation

**Övergripande mål**
Ekonomi:
- 7% vinstmarginal
Kvalitet:
- Effektiva arbetsprocesser
- Nöjda kunder
Miljö:
- Minskad miljöpåverkan med
  1 % (klimatmål)
Arbetsmiljö:
- Personalt som
  trivs
- Söker arbetsplats

**Styrande**
- Omsättning (kr)
- Likviditet (%)
- Beläggning (%)
- Rörelse (kr)
- Fakturering (kr)

**Indikatorer**
- Nöjd Kund Index
- Nöjd Personal Index
- Miljöprestanda (%)

Genom att ständigt hålla vår värdegrund levande visar vi att vårt företag drivs framåt av säkra installationer med nöjda kunder som följd. Genom vårt engagemang tar vi ansvar för att vi har rätt kompetens för att uppfylla eller överträffa våra kunders förväntningar.

---

**GOLVKEIDJAN - YRKESMÄN ÖVER HELA LANDET**
Trafiksäkerhetspolicy

Vi ska arbeta för bästa trafiksäkerhet för våra medarbetare och andra trafikanter
Detta ska vi uppnå genom att:
- Uppfylla alla tillämpliga trafiklagar
- Inte acceptera användandet av alkohol eller droger under arbetsutövandet
- Följa hastighetsbestämmelser, regler för lastsäkring och bältesanvändning
- Ta hänsyn till övriga trafikanter, anpassa hastigheten till rådande trafik- och vägsituation samt
  för övrigt vara goda föredömen i trafikmiljön
- Ha våra fordon i trafikdugligt skick
- Ha beredskap för nödlagsförebyggande som andra trafikanter
- Utvärdera trafiksäkerhetspolicyens fortsatta lämplighet vid ledningens genomgångar
- Göra vår trafiksäkerhetspolicy förståd

Nödlägesberedskap

Rutiner vid brand: Rädda Larma Släck
- Utrym lokalen, räkna in personalen
- Ring 112
- Beställarens anvisningar skall följas i händelse av brand ute på arbetsplassen
- Uppslutningsplats för personal är vid: Ingången till JYSK i köpcentret 421.

Följsamhet och Avvikelserapportering

Samtliga medarbetare, anställda och inhysd personal
- är ansvariga för att följa regler, instruktioner och rutiner samt att genast rapportera eventuella risker
  och hot mot företagets policyer.
- har ansvar att rapportera eventuella avvikelse till närmaste chef/arbetssledare eller miljöansvarig.
Samtliga avvikelser beaktas och ligger till grund för framtida förbättringar.