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Process development: Implementation of SAP ERP Enhancements in an Accounting Team

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ABSTRACT

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In process development of information technology (IT) systems there is a high degree of failure to meet the set targets for the development. This might be due to several reasons, one of which can be failure to properly plan the project before implementation and setting clear targets. Many different approaches to process development exist today and some of the more popular methods are explained in depth in this study.

The purpose of the study is to gather and analyze information for managers of Company X prior to a potential software implementation and review the existing theoretical framework for process development. The gathered information of this case study provides the managers with crucial information on whether the implementation is viable or not. Data was gathered in order to get a good baseline understanding of the current situation in the relevant team, showing how a typical workday is spent. These data also made it possible to calculate the estimated changes within the team efficiency in the case of an implementation of the potential process related IT enhancements.

In the theoretical framework the existing theories in process development are reviewed in order to provide the reader with a broad understanding of the different approaches in the area. The theoretical part of the thesis focuses on some of the methods in process development which are more commonly known and which fit in an office setting.

The methodology chosen for the empirical part was a typical case study method as this method was seen to best fit the area of research. The information gathered for the case study was primarily collected from primary sources as these needed to be current in order to provide the correct picture.

Keywords:
Process development, SAP enhancements, accounting team

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ABSTRAKT

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Många processutvecklings initiativ inom informationsteknik (IT) misslyckas med att uppnå de satta målen för projektet. En av orsakerna till misslyckandena kan vara att ingen grundlig planering av projektet gjorts samt att man inte satt upp tydliga mål för projektet. Idag existerar många olika metoder inom processutveckling och i denna undersökning är några av de mera populära metoderna presenterade noggrannare.

Målet med undersökningen är att samla och analysera information för ledningen inom Företag X före en eventuell implementering av tillgängliga IT uppdateringar. Innan detta gjordes en genomgång av den befintliga teorin inom processutveckling. Den samlade informationen i denna fallstudie ger ledningen inom Företag X väsentlig information som hjälper dem att besluta om en implementering är lönsam eller inte. Data samlades för få en uppfattning om hur en typisk arbetsdag spenderas i teamet och således få en grundläggande inblick i nuläget. Dessa data möjliggjorde också en kalkyl av de väntade förändringarna i teameffektiviteten vid en eventuell implementering av de tillgängliga IT uppdateringarna.

En genomgång av de existerande metoderna inom processutveckling gjordes vilket ger läsaren en bred förståelse av de olika tillvägagångssätten inom området. Teoridelen fokuserar på några av de mera välkända tillvägagångssätten inom processutveckling som också passar i en kontorsmiljö.

Som undersökningsmetod valdes en typisk fallstudie eftersom denna ansågs passa bäst för undersökningsområdet. Informationen som samlades för fallstudien var i första hand från primära källor eftersom dessa behövs för att få en korrekt inblick i den nuvarande situationen i teamet.

Nyckelord:
Processutveckling, SAP uppdateringar, bokförings team

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ABBREVIATIONS

CEO	Chief executive officer
ERP	Enterprise resource planning
EUR	Euro
IT	Information technology
NPV	Net present value
ROI	Return on investment
SAP	Systems applications and products
SPI	Software process improvement

1 INTRODUCTION

1.1 Background of study

In the era of global competition companies are often forced to constant transformation in order to achieve productivity and efficiency. This leads companies in the direction of cost-reduction activities which can be carried out through process development and process improvement projects. Such process improvement projects can according to some case studies reduce the number of process steps significantly while simultaneously reducing costs and avoiding lay-offs in cost-reduction activities. (Bisson & Folk, 2000) There is a need to identify improvement aspects in all features of the company, also overhead (Kumar & Harms, 2004). Such developments affect the role of employees, as have been noted by Albright & Lam (2006). They argue that during the last three decades the accountant's role has developed from only evaluating and reporting activities within the business to team working within the scope of managerial science, much due to the many initiatives within the area of continuous improvement during the mentioned period.

One of the many models of the continuous improvement initiatives is "lean thinking". Lean thinking addresses the problem with *muda* which is the Japanese word for any human activity not creating any value. *Muda* can be found in many places of a company, it regards mistakes calling for of corrective action, overproduction leading to too high inventory levels, unnecessary processes and unneeded transportation of both personnel and goods. Lean thinking aims at changing *muda* to value creating activities hence doing more with lower input. In the core of lean thinking is *value*. Value is created for the customer and therefore only the end customer can define what value is. The main idea in lean thinking is: Identify the actions needed in the process of producing the *value* and constantly eliminating obviously wasteful steps by constantly transferring the *muda* to *value* generating activities within the process. (Womack & Jones, 2003)

The importance of process improvement is constantly existent, both during economic downturns and the successive turn, recovery and thriving of the economical state. In the time of economic restraints (i.e. downturn) the business process improvement works focus is on reducing resource allocation and consumption. On the other hand, the process improvement work in the time of economic prosperity shifts in its focus towards managing possible expansion needs of process capacity. (Lenhardt et al. 2003)

However, according to Hugh (2003) many process improvement efforts fail to meet their promises since they actually do not improve the actual aspect they set out to improve. According to him this regards all types of process improvement. As an example Hugh (2003) furthermore states that up to 70% of projects in information technology (IT) development fail to deliver the outcomes they initially set out to meet. This regards the promised functionality, time and financial plan of the project. Some of the reasons behind this can be that the improvement sets out to fix to big aspects of the business, setting out improvement goals with experts not knowing what the daily work is all about. Also many process improvement efforts do not have a follow-through phase which makes it impossible to know whether their goals were actually met.

According to Hugh (2003) there are five tools which can be used in order to avoid deceptions. Firstly to focus on customer-focused improvements, focusing on what the customer needs and arrange improvement projects so that the measures impacting the customer's satisfaction are done first. Secondly he says that improvements should be done in smaller steps. Rather having a measureable improvement within one month than several projects ongoing which do not show concrete results. The third tool is to involve the employees as they know the work which is undertaken at the company. The employees can also foresee any impact the improvement efforts will have on their daily work better than outside personnel. However, the employees will need support in this practice. Also fourthly, the process improvement efforts should be divided into projects which are controllable

and can be scheduled while being assigned to specific persons. The fifth and final tool is to ensure that there are only few surprises and the employees are certain of what to expect, this can be managed by a weekly review, emails or a bulleting which shows the progress. Communication is a necessity to the triumph of improvement efforts.

1.2 Aim of study

The aim of the study is to provide the management at Company X accounting department with the supportive theoretical understanding of what process improvement is, along with the clocking of work tasks and providing them with a written business case for available SAP ERP tools implementation. The theoretical framework explains to the reader why process improvement work is important for the business and in which ways this can be done at companies. Furthermore, the framework also presents some of the different types of process improvement theories which allow the reader to acquaint himself with different methodologies in process improvement. The theoretical framework delivers the reader the conceptual background of process improvement in order for the reader to better comprehend the case study which follows and allow a steady ground for decision making in the process improvement work at Company X. The name of the actual company in the case study has been altered in order to protect the company. This is done due to the sensitivity of some of the material presented.

The study aims to examine how the potential implementation of three different information technology (IT) enhancements in the SAP ERP tools available would affect the productivity and costs within one of the teams at the accounting department of Company X. While simultaneously discussing other possible future process related developments as well. These facts are compared to the current SAP ERP solution through gathering data showing the current situation within the team. The study provides the reader and management with a clear case of the costs

inflicted of such an implementation while critically evaluating the effects the implementation would have on the team's efficiency, showing the reader the expected financial and efficiency changes of such an implementation. The details noticed in the study provide the management team at Company X with facts and figures allowing them to accurately evaluate if desired improvement criteria have been met by the implementation. The results of the current situation mapping will also serve as a baseline for other future process development situations which may arise.

Also, if the management team's evaluation leads to a favorable decision of the implementation of the upgraded SAP ERP tools for the team this study can serve as the foundation for future studies within the topic of process improvement at Company X. This study can also serve as a baseline for the future retrospective study on whether the expected gains from implementations were achieved or not.

1.3 Research questions

The research questions in this case study focuses on the factual data of the business case within the team and the focus point is to find out what effect the possible implementation of the three available upgraded software solutions would be. In order to be able to clearly evaluate whether the research question is answered three different research questions were stated.

1. How much time is consumed at each work step with the current SAP ERP solution?
2. How much work-time could be expected to be reduced within the account receivables team with a possible implementation of the three available enhancements?

3. How much expected costs could be saved within the account receivables team with a potential implementation of the process enhancements at hand?

As these research questions set a clear and measurable goal to study within the aim of the study they can be seen as appropriate and measureable. Also, they allow for evaluation of whether the research questions have been answered or not.

2 THEORETICAL FRAMEWORK

In this chapter the theoretical framework of the thesis is constructed. The chapter contains both contextual theory on the development of organizational processes up to today's date and reflects upon the development of the modern process development procedures. Furthermore, the importance of procedures in process development is presented throughout the theory chapter. Also, some of the more common practices and mentalities within process development are presented. The concept of lean thinking, kaizen, process mapping and 5S in the office setting are elaborated further as context for process related development practices. Finally a brief context for calculating savings for software and process development is reviewed in order to provide the background for the case study which follows in the latter part of the thesis.

2.1 The evolution of organizational processes

In many modern businesses processes are regarded as the way of carry out a task within the scope of the organizations bureaucracy. All organizations have processes, whether they are formalized or not is a different question. Processes can be regarded as the cornerstones or building blocks of the organization. While some scholars' debate that establishments can be defined with less than twenty processes others portray more complex examples. One example of the latter is Volvo which has acknowledged over one thousand processes. Which one of these being the correct one is determined by how the process boundaries within the corporation are defined. (Modig & Åhlström, 2012)

According to Modig & Åhlström (2012) the word process originates from the Latin words procedure and processus which can be translated as "moving something forward". Additionally they define processes by flow units being moved forward which can be either (a) material in a production, (b) information, when submitting

a permission which goes through different stages before approval or (c) people, which could be theme park customers.

Hammer & Champy (1993) debate that the evolution of business processes leading towards today's business organization has its roots in the beginning of the twentieth century. These organizational roots would have come forth as Henry Ford and Alfred Sloan adjusted operations of Fords automotive production and GMs managerial organization. Adam Smith had earlier introduced the division of labor into small simple segments of work. This concept was adapted and minimized by Henry Ford to fit the production in the automobile industry. Before the dawn of Henry Ford and Alfred Sloan the production of the car was constructed so that the parts were fitted together by skilled laborers. The division of the labor in the car manufacturing industry was advanced by Ford from having the cars being built by skilled laborers entirely at one stage to dividing the tasks into smaller more simple and manageable steps. This enhancement meant that the workers could install only a set of parts as prescribed at the factory and therefore also less skilled labor was needed. This however, also made the production process more complicated to put together.

Furthermore Hammer & Champy (1993) state that Alfred Sloan developed the foundation of the managerial structure Fords factory arrangements required. He adjusted the principles of Adam Smith's division of labor to fit into the management structure of the whole company, a task which both Henry Ford and Sloan's predecessor had failed to comprehend. Sloan adjusted Fords system into smaller divisions which managers could easier oversee, this was done from a company headquarter and the monitoring was done only by monitoring financial numbers. According to Sloan managers did not necessary have to possess the expertise in engineering, as these operations could be supervised by specialists in these areas. Sloan instead focused on the need for financial expertise. This knowledge complemented the production engineering professionals.

These actions taken by Henry Ford and Alfred Sloan were completed after the Second World War in the 1960's by ITT's Harold Green, Fords Robert McNamara, and Reginald Jones working for General Electric. They set out financial parameters and expectations for businesses they desired to be involved in, distribution of funds and the expected proceeds they demanded from the desired businesses. These parameters were monitored by different staff at the corporations such as controllers, planners and auditors. This organizational model rapidly made its way to Europe and Japan after the Second World War since the organizational structure was well suited for the postwar development of growth and demand. (Hammer & Champy, 1993)

The mentioned business structure was ideal for the needs of the time as it divided the work steps into smaller parts that the managers could oversee and allowed for short training periods. In the break of the technological boom the organizations managerial roles also could be divided into smaller portions and reoccurring tasks. However, as the systems for controlling the demand, budgeting and planning grew they soon also became even more complex as the companies expanded their business. (Hammer & Champy, 1993)

In the time after World War 2 Japan gained a more advantageous position in the economic sphere. This development can be ascribed unto the technology immersion from Europe and the United States, the productivity motivation, quality improvement program which was country-wide, flexibility in manufacturing and also multinationality. (Imai, 1984)

After the oil crisis in the 1970´s the flourishing economical state which had been present during the past couple of decenniums was suddenly lost. This situation had been distinguishable by the concentration on magnitude rather than product superiority through quality, fast growing markets and apprehension of high revenues rather than low expenditures. The new circumstances succeeding the 70's crisis saw an alteration in market distinction towards product quality, high raw material costs and production overcapacity, higher competition, the need for

prompt product development and the requirement for lower breakeven points. As the western companies did not modify their ideas of innovation strategy to fit the new market demands they unexpectedly found Japanese companies evolving in competition. (Imai, 1984)

2.2 The importance of process improvement

According to Imai (1984) *kaizen* is the solitary most significant management concept of Japan and therefore the key to Japans competitive triumph in the post-World War two era. The word *kaizen* in the context of his book means ongoing improvement including all of the employees. This practically means involving everyone from top management to the factory workers in the process of improving the company's operations. He furthermore debates that the concept of *kaizen* is so implemented into the Japanese society that managers often act accordingly without even recognizing their *kaizen* way of thinking. The concept of *kaizen* is elaborated further at a latter point of the theoretical framework of the thesis.

Process improvement outcomes in both dropped costs and providing an improved product or service for the client. This is done through identifying the value-adding actions in the organization; these are actions create the products desired by the customer by using the resources available in the company. Actions not adding to the value of the organization can be removed without loss in value. Among other areas the area of in-house accounting and organizational functions are subject to a high potential for improvement efforts in companies. (Ruhl & Yang, 1995)

The time necessary for carrying out each process is stated as "cycle time" by Ruhl & Yang (1995) and starts by preparation and ends when the process is ended (ex. filling in a document to the moment of completion of the documentation filling). Moreover, organizations would try to reduce the cycle time by improving a pro-

cess in order to enhance the quality of the output from the process. This is done through eliminating activities which do not add value to the organization.

Process improvement initiatives aims to in the most efficient way create services or products to consumers. Different companies can have diverse approaches to improvements of processes, analyses of processes which provide dissimilar explanations depending on the company. A vast number of companies do not outline parameters or targets as they engage in programs for improvements which are recommended to them by experts. If business culture is not taken into calculation, incorrect methods are used or if the preparations are not done properly the improvement initiative might be unsuccessful. (Coskun, Bashil & Baracli, 2008)

Zellner (2011) argues that the literature and consulting on the subject of reorganization and improvement of business processes do not provide enlightenments on how improvements are to be done but rather focuses on the activities before and after the process improvement have taken place, not the actual improvement activity. Further, he concludes that the ones which do describe the actual improvement are of the nature that they cannot be used again due to the lack of methodological configuration.

Process improvement efforts failing and not actually improving anything is commonly heard of. 70% of IT (information technology) developments in businesses fail to meet the initially planned outcomes in guaranteed functionality, time and financial plan of the project. The main reasons for this are due to the project trying to fix too big aspects of the business, setting out improvement goals with experts not knowing what the daily work is all about or since the projects have no follow through part which would make it potential to estimate the aftermath of the task. (Hugh, 2003)

In the aspect of software introduction from external sources and process development Stock & Tatikonda (2004) discuss that as companies introduce new software into processes from sources which are external to the company itself it is too

common for companies to advance with an ad-hoc approach. By actively planning such implementations the implementation of such efforts would be more successful

3 POPULAR APPROACHES IN PROCESS DEVELOPMENT

3.1 Lean Thinking as process development tool

Lean production was initially introduced by John Krafcik in an article in the year 1988 paralleling the efficiency levels amongst car manufacturers (Modig & Åhlström, 2012). The concept of lean thinking deals with the problem of the Japanese word *muda* which means activities not adding value. The dilemma with *muda* is that it is everywhere. Lean thinking aims at reducing *muda* through focusing on activities which add *value* to the end customer and making these processes *flow*. The main aim is to change waste/*muda* into value creating activities in the organization. There are several different types of *muda* and they are all to be considered waste by the company. (Womack & Jones, 2003)

In this chapter the main concepts of lean thinking are elaborated further.

3.1.1 Creating the value

According to the theory of lean thinking the focus of the company should be to create value. And only the end customer can define what value actually is. With the definition of value being defined by the customer it is important for businesses to specify the value. (Womack & Jones, 2003, 16-19) Also, in planning of projects the approach should be working backwards from what criterion the finished project should fulfill. Lean principles could cut up to 20% time in construction projects, while saving money at the same time. (Lean, 2005)

According to Modig & Åhlström (2012, 19-23) the focus of processes can be either resource efficiency or focused on *flow efficiency.* In the former one the focus is on how the organization efficiently can bring together their internal resources in the most productive way while focusing separately on each different phase in the process, adding time to the total process (Figure 1).

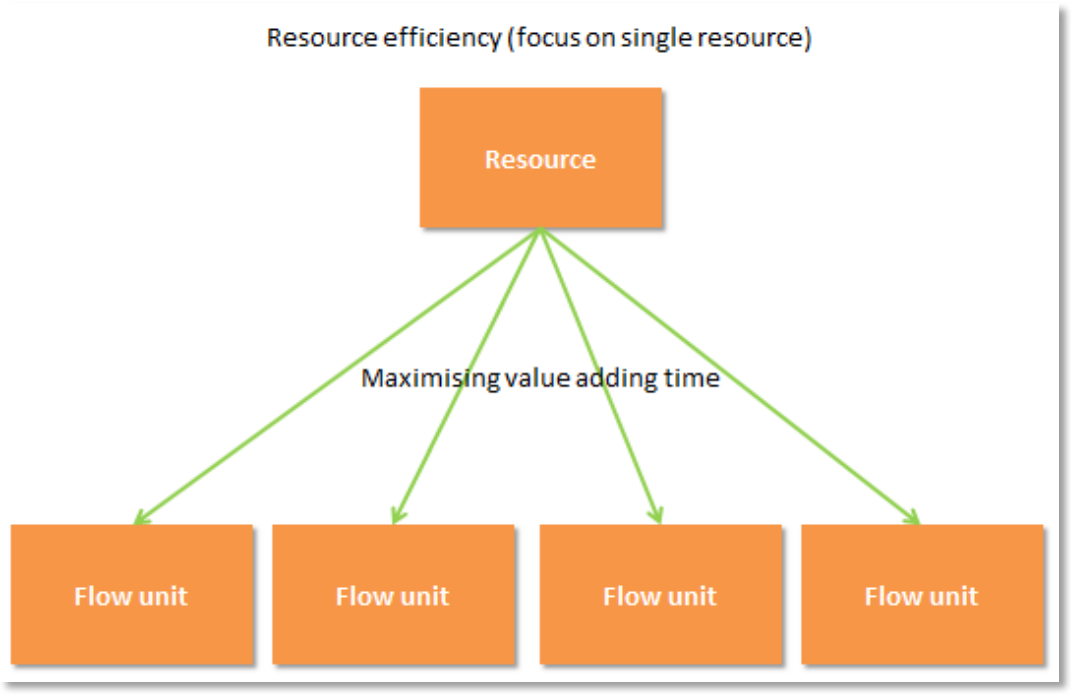

Figure 1. Resource efficiency (Modig & Åhlström, 2012, 21)

The latter on the other hand shifts the focus towards how the organization can create the best *flow* in their process. Another way of explaining the *flow efficiency* approach is that it focuses on the flow units handled in the business. *Flow efficiency* is the value creating activities divided by the total throughput time. A flow unit is the unit handled in a process which can for example be one patient in a hospital. In this way of looking at processes the resources are brought together to provide the best flow from the units perception (Figure 2).

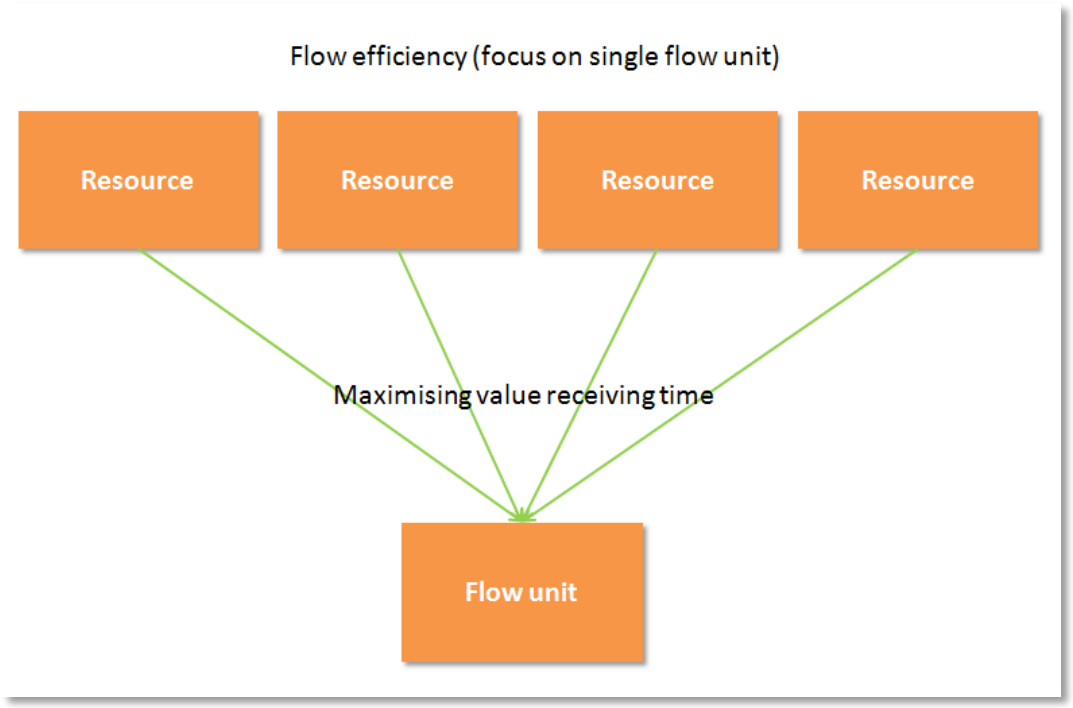

Figure 2. Flow efficiency (Modig & Åhlström, 2012, 21)

3.1.2 Identifying the value stream

In the process of creating value the business has to identify the actions which are required to bring one unit (product or service) through the most important managerial tasks within a company, these actions are called the value stream. (Womack & Jones, 2003, 16-19)

Moreover, as the actions required for bringing one unit through the managerial tasks have been identified it is common that three actions occur during in the value stream. The actions in the value stream are either (1) instantly recognizable to create value, (2) unavoidable but not creating value due to technological restrains. This can be defined as type one *muda*. The third type of actions in the value stream can be identified as (3) directly avoidable and not creating value. This type of actions is defined as type two *muda*. Many of the *muda* types are said to be possible to directly avoid by communication between different departments within

a company and understanding the work tasks of different departments. (Womack & Jones, 2003, 19-21)

3.1.3 Creating process flow

When a business has identified its value and mapped the value stream, the most obvious *muda* has been abolished from the process it is time to focus on the next phase in the lean thinking process. In the next phase of lean thinking the business is to make the remaining value-adding processes flow. (Womack & Jones, 2003, 21-24)

Modig & Åhlström (2012, 31-46) outline three laws which statistically can prove why it is problematic to achieve both resource efficiency and *flow efficiency*. The first law is the law of little which indicates that the throughput time equals the amount of flow units in process times the cycle time per flow unit. Hence, the throughput time is the time the total amount of units undertakes to get processed within a process. This also means that the throughput time will change depending on how fast each unit can be processed and how many units are to be processed. The second law is the law of bottlenecks which show how processes work and why there are issues in creating *flow efficiency* in businesses. The bottleneck theory indicates that within a process there are sub-processes. Sub-processes slow down the total process throughput time since they fail to allow the free flow of the process like the neck of a bottle. The sub-processes creating bottlenecks in the total process can be identified by a waiting time for the unit before the bottleneck and the phase after the bottleneck has to wait for units to pass the bottleneck in order to be capable to effectively do its work. This also means that the bottleneck of a process carries the responsibility of the slow flow of the process. Also, as one bottleneck is eliminated at some phase in the process another will emerge at some other place of the process. Finally, the third law is the law of effect on deviation on processes. This law proves that there are connections between throughput time,

resource efficiency and variation. Variations can appear due to resource variation (broken computers), flow units variation (different customer requests) or external factors (late pronouncement of forthcoming measures). As the variance gets higher the throughput time will stay greater even as the resource consumption percentage is reduced (Figure 3).

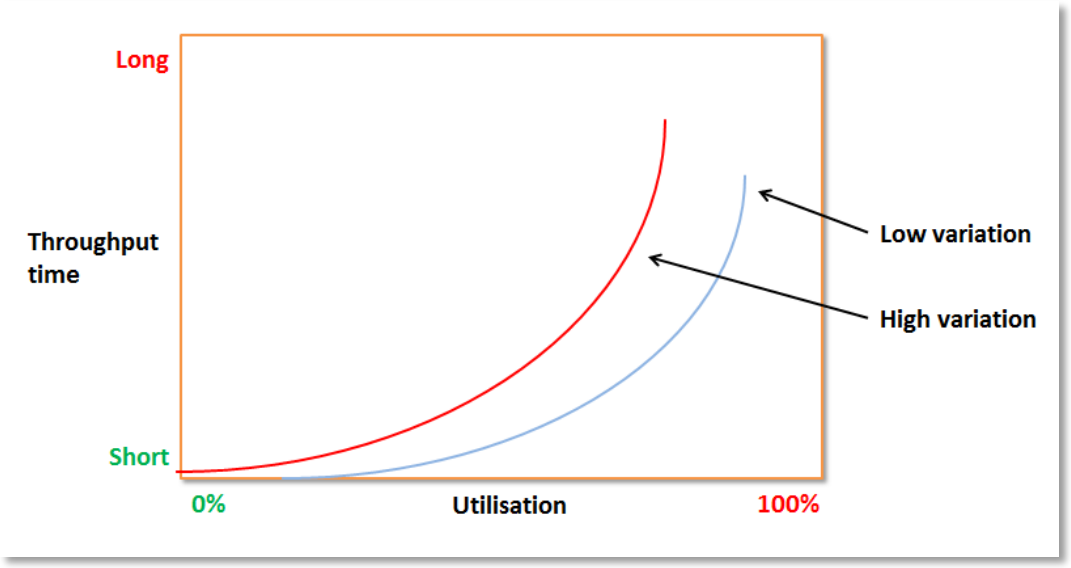

Figure 3. Variations effect on throughput time and resource efficiency (Modig & Åhlström, 2012, 43)

As the process period is defined reliant on the throughput time in the process these borders also have to be defined for the process. The *flow efficiency* is the measurement of how much of the total process time from the initial encounter to the final stage or completion of the process actually is used by resource allocation on the unit handled. The resource allocation time is divided by the total process time to arrive at the *flow efficiency*. The *flow efficiency* is presented as a percentage of the total process time. (Modig & Åhlström, 2012, 8-16)

In order to understand the *flow efficiency* further this is portrayed in n a fictive example of a healthcare process. In the example Modig and Åhlström (2012, 8-16) inspect two different processes focusing on creating similar value. As these examples are examined they argue that one is superior to the other in regards of flow

efficiency. In the first example the unit is required to go through a total of 5 different stages before the process is finished, a process lasting a total of 42 days with a total of 2 hours allocated to the actual resource utilization. In the other example the unit is handled in a one-stop-shop lasting a total of 120 minutes with a total of 80 minutes resource allocation. By dividing the allocated resource time by the throughput time they arrive at the *flow efficiency* which is a factor for process efficiency. In the first example the computation (2h resource allocation/ 42 days or 1008h total process time) arrives at a 0, 2% *flow efficiency*. The second examples computation (80minutes resource allocation / 120 minutes total process time) arrives at the *flow efficiency* of 67%.

3.1.4 Creating pull

As the value of the company has been defined by the customer the company can focus on creating the exact value the customer desire. This will allow the customers to *pull* the products from the company instead of the business pushing new products to the market. As markets fail to create *pull* of products this leads to high inventories for products without market demand which have to be sold at discounted prices or thrown away. The solution to this problem can be visible in different stages; the manufacturer can start to produce a smaller scale of products and later filling the shelves as the need arises. (Womack & Jones, 2003, 24-25)

3.1.5 Striving for perfection

Womack & Jones (2003, 25-26) claim that as the actions taken to increase the flow in processes managers realize that lean thinking is a continuous task. And the process of Lean thinking starts all over again. At this point the aim becomes to produce the value even nearer to the customers final wish through dialogue with the end customer. Often the elimination of *muda* is possible through relatively

easily available technological solutions. Moreover, an important factor of the lean principle of perfection is to think in a *kaizen* manner, leading to never ending improvements. Transparency in the lean corporation is maybe one of the most significant incentives for perfection which allows for more parties to participate in the development work, allowing for more expert opinions, everyone from subcontractors, suppliers to employees could be involved. As *flow* and *pull* is created by many contributors in the organization the business should consequently also give immediate feedback to these contributors in the form of additional benefits.

This fact is also underlined in an article written by Shultz (2005) which discuss that the definitive goal within companies is to reach better quality and reducing the deviations within processes. Hence, the ambition is to construct flawless processes.

3.2 Kaizen in an organizational setting

Kaizen can be translated as improvement, and is argued by Imai (1986, 29) to be the single most important factor to Japans success after the Second World War. However, in many western companies executives are not even conscious that *kaizen* exists and may possibly be used to their economic advantage. The main point of *kaizen* is continuous improvement and working to improve operations. (Imai, 1986) Moreover Chapman (2006) explains *kaizen* as a way of rapidly implementing improvements which can be measured. *Kaizens*, which according to him are brief inputs which aim at reaching a specific goal within a brief timeframe. Teams working with *kaizen* also will affect the cycle-time and overall productivity of companies he argues.

In a study by Brunet & New (2003) they conclude that three features exist in the definition of *kaizen.* It is constant, often incremental and everyone is involved in the improvements of the *kaizen* oriented organization. Also, their findings indicat-

ed that *kaizen* tends to take different forms within different organizations and shadows the modifications in the business surroundings. As the implementation of *kaizen* activities may vary in companies the unifying factor is that they all rely on *kaizen* in their managerial setting to meet their goals remains. However the findings also indicated that *kaizen* approaches may be vulnerable to changes in the business environment.

In his book, Kaizen: the key to Japan's competitive success, Imai (1986) explains that the initial stage of *kaizen* is involving everyone and acknowledging that the organization has difficulties which need solving. Also, all *kaizen* activities strive for enhanced end-user satisfaction. Furthermore *kaizen* is process oriented, meaning that executives should encourage the workers process related improvement efforts, something which contrasts from the more western executive methodology of observing the workers outcomes without captivating the effort made in the process.

3.2.1 Kaizen explained

One of the big differences between Japanese and western companies explained by Imai (1986, 1-21) was that in many western industries the factories remained unchanged for up to 25 years at the time of writing. In contrast to this practice changing factories is a must in Japans business culture. After the Second World War even survival as a business was a challenging task and it required constantly improving the operations. This makes the mentality of *kaizen* a built in routine in Japanese management.

Furthermore Imai (1986, 1-21) indicates that the ongoing improvements of k*aizen* should involve everyone and in all areas of life, be it the social aspect of e person's life, the life at home or the professional aspect of life. They all need constant development and not accepting the status quo. Also, *kaizen* is claimed to be pro-

cess-oriented as well as people-oriented in the way that process improvement is a prerequisite for better results and people's efforts are focused on instead of only the results of the person. In the *kaizen* values the concept covers the mentality of consumer-orientation, total quality control, suggestion system, Just-In-Time, zero defects, productivity improvement and new product improvement among others as an umbrella which explains the mentality of the Japanese initiatives to improvement efforts in one word. This aspect of *kaizen* is also supported by Súarez-Barraza, Ramis-Pujol & Kerbache (2011) as they in an article reviewed literature on *kaizen* and found *kaizen* to be an umbrella term for managerial philosophies, a part of Total Quality Management (TQM) and a theoretical standard for development strategies which includes a set of cornerstones or a foundation for it to work in an organization. The foundation of *kaizen* is working together, eliminating waste, learning and teaching, involving top level management, giving suggestions and is also process orientated. But *kaizen* is also a part of TQM, a set of principles and a management philosophy as seen in Figure 4.

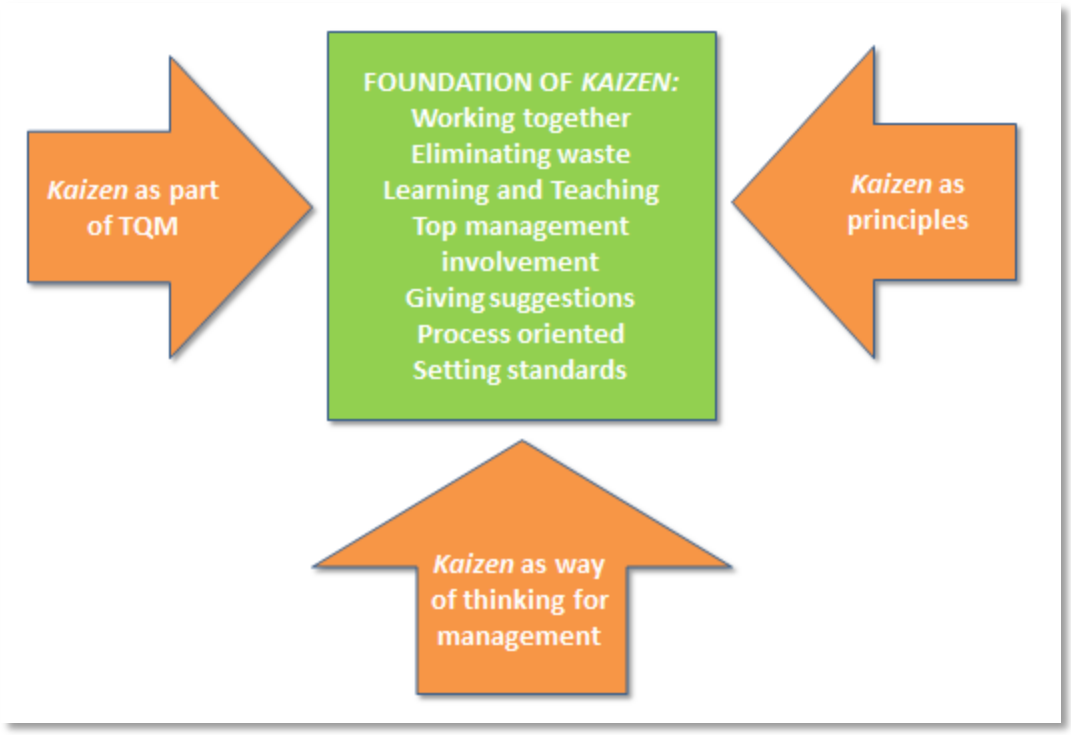

Figure 4. Kaizen's three principles and foundation (Suárez-Barraza et. al. 2011, 303)

According to *kaizen* mentality there should not be one day elapsing without some type of improvement being implemented. The *kaizen* mentality will lead managers on a road of unending improvement since *kaizen* is a constant process. (Imai, 1986, 1-21)

By Brunet & New (2003) *kaizen* was divided into four main activities linked to the term. (1) The *zero defect* mentality which allows for employees to instinctively implement improvements. (2) The processing, organizing, evaluating and possibly acting on development initiative *suggestions* made by employees. (3) The *policy deployment* which deals with how the managers and executives promote the goals and schemas in the organization. (4) *Small group activities* which are the very essence of *kaizen* thinking.

3.2.2 Kaizen in management

In management the *kaizen* concept of Japan the focus is on improving and maintaining principles. This practically means that the higher up in the organizational chart a person is in the company the more concerned they are to be about improving the operations. The blue-collar factory personnel on the plant floor will commit to the agreed standards of the work and become more skilled at their task. This increase in expertise will provide them an attention on how they can develop their own work, which they can give suggestions about in discussions or through recommendations. (Imai, 1984, 1-21)

In their article Marksberry et.al (2010) indicate that Toyotas *kaizen* activities called Jishukens which directed by executives can be very effective in increasing the managers understanding within the area of teaching others to conduct their daily work, conducting their own work better as well as the aspect of problem resolving. This underlines the writings in *kaizen* by Imai (1986) which said that Japanese managers have a focus on improving and setting the standards for the workers, this might be formal standards or not so visible rules. After these new improved standards are set in force it becomes the managerial task to maintain the functionality of these set rules.

Furthermore, the said improvements can be divided into two: innovation and *kaizen*. Figure 5 shows the division of innovation, *kaizen* and maintenance according to Japanese managers. (Imai, 1986, 1-21)

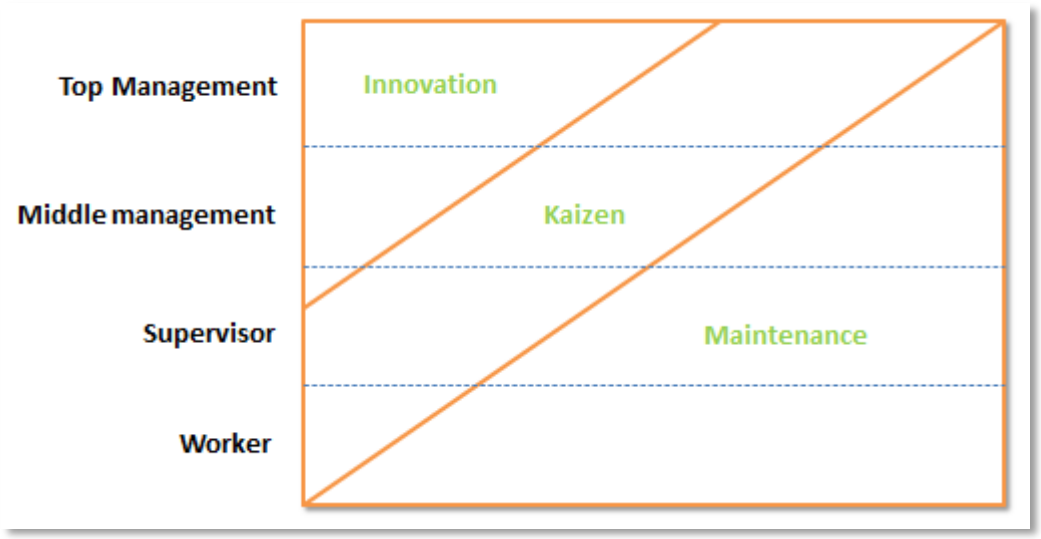

Figure 5. Japanese mentality of work tasks (Imai, 1986, 7)

3.2.3 Kaizen and quality improvement

Imai (1986, 1-21) claims that *kaizen* is the other side of the story in quality and productivity. Waldo (1992) said in his article on achieving total quality through *kaizen* that *kaizen* is a part of Total Quality Management. Imai (1986, 1-21) also mentions that since all managers are concerned with improvement, improvement as a classification being a good thing. In order to improve something the starting point is to distinguish the necessity of improvement needed or the problem. If there is a failure to distinguish the problem there is also an issue with realizing the need for improvement. As problems have been distinguished, undertaken and reduced there is a need of standardizing the change in order to reach better heights in the progresses. He also admits that *kaizen* has had influences from quality and quality control in its development. Wittenberg (1994) identified *kaizen* to be dealing with quality on several levels not only regarding products but also people.

3.3 5S and eliminating waste

The 5S approach to continuous improvement addresses the aspect of decreasing waste in an office environment, waste in offices can be found in the aspects of spending resources on non-productive tasks such as waiting, searching, movement and office supplies. (Fabrizio &Tapping, 2006) These elements of waste in the office environment can all be eliminated through the implementation of 5S system according to Fabrizio & Tapping (2006). Samuels (2009) write that in order for 5S to be successful in organizations the employees need to be allowed to implement the changes and should be made conscious of how many assignments the competition is gaining through pricing. In her article Filipusic (2007) claimed that 5S also can be used outside business environments in order to regain control of a home housing setting with kids.

The 5S concept originally included four Japanese words beginning with the letter S. This however, was changed to five and when being implemented into the west both words and meaning of the 5S's were modified in order to fit the setting. The five S's are today *Sort*, *Set* in order, *Shine*, *Standardize* and *Sustain* (Fabrizio & Tapping, 2006, 1-10). The five S's are by Fabrizio & Tapping (2006, 1-10) explained as:

Sort, should be done by sorting away unnecessary items from a zone.

Set, means placing remaining items in order so that they are easy and well-organized to find.

Shine, is done through entirety cleaning an area, and keeping it clean.

Standardize, basically means creating standards for how an area should be kept organized and clean. These standards should be evident.

Sustain, addresses the schooling which should be done in order to make sure all employees follow the principles for 5S.

3.3.1 Typical waste in the office according to 5S

In an article written by Chaneski (2011) he says that companies have done a good effort in reducing waste, but more can be done. According to the 5S principles there are seven types of waste which often can be identified in office surroundings and by Fabrizio & Tapping (2006, 1-10) they are explained as follows:

1. The waste of rectifying work already done. The waste of resolving work regards the activities and time spent redoing work which could have been done appropriately the first time. The waste results in preventable resource allocation which is not adding value to the company.
2. The waste of time waiting for something. Usually the root of this waste is rather easy to eliminate. It is important to eliminate this type of waste since it means ceasing productive work of an employee.
3. Unnecessary movement. Each time someone is forced to make a movement it causes waste of efficient work time. This type of waste can be addressed through redesigning office spaces.
4. Spending too much time working with any process. Spending too much time on any process is all work which is not adding value to the end user and can be reduced. Often the reason for this type of waste is human routines. In addition to this Chaneski (2011) says that, working more with any component than what is essential is waste of this type.
5. Waste of device defects. This type of waste concerns the time spent waiting for any device which is defecting at any point. The defects in devices can be due to neglect of the device repairs or forecasting defaults which result in the device running slowly or shutdowns in the device.

6. Inventory waste. All extra storage of unnecessary inventory can be regarded as this type of waste; it means that the company is spending money on non-allocated resources. The surplus of any type of materials not being utilized can be defined as unnecessary inventory.
7. Checkup waste. Any time a finished project is being scrutinized it means that human resources are being allocated to control an already finished project. The controlling of any type of projects or works is done in order to ensure the project is done correctly. In order to eliminate the waste of checkups all employees must understand why the checkup exists. Checkups show deviancies after they have arisen, which shows that if there were no deviancies the checkups would not have to be made. Even if there is a deficiency it does not necessary mean that any mistake has been made by an employee.

3.3.2 Preparing the implementation of 5S in an office surrounding

When 5S is implemented into an office environment it is important to do so systematically in order to improve the setting. Without comprehending what there is which need improvement it is little improvement that will be implemented. (Fabrizio & Tapping, 2006)

Before the actual 5S implementation takes place the project should be planned appropriately by someone with the sufficient knowledge in the specific process and appropriate authority to make changes. The planning should be done in order to gain the managements support in the project and should include specifics on who will be the appointed person responsible, when the project will be made (timeframe), where the project will be implemented (in which process areas) and should also consider possible complications which may arise in the process. Before the managements' approval can be obtained there might be changes needed to the proposed project plan. The planning process works as a cycle between the pro-

ject team, management and the shop level up to the point where management approves the plan, which can be after several changes to the original plan. (Fabrizio & Tapping, 2006)

After the plan has been made the project area should be selected for implementation of the 5S system. This stage should set separate areas at each point to set up the system in order not to stagnate the whole process when implementation takes place. Furthermore this allows implementing the 5S system in smaller stages instead of having to implement the whole project at once. Also an implementation team with various skills should be appointed; this team will be responsible for the implementation of the 5S system from this point on. (Fabrizio & Tapping, 2006)

Further, parameters for measurement should be set which will show which aspects are aimed to be improved through the implementation of 5S in the office. Here the seven wastes are to be measured in order to get quantitative data on what waste the implementation aims at reducing. This data will help in motivating people to do change, and reward them as the waste is reduced after implementation of 5S system. At this point photographs of the current state at the office should be taken in order to show the development of the project, the photos should be real and spontaneous photographs of specific office areas. (Fabrizio & Tapping, 2006)

Moreover, a diagnosis of the office surrounding should be made with scorecards for the target area. The scorecard lists 25 inefficient uses of the target area and is divided into categories according to the 5S´s. The more problems which can be identified in the office within each of the 5S's the lower the final score will be in regards of efficiency in the office. Finally in the planning phase a project table should be posted for easy reflection of the issues at hand. The project table shows at what stage individual projects are, where they began and where they aim at getting. The project table should also be easy to follow and comprehend. After this stage the Sort, Set, Shine, Sustain and Standardize steps are implemented, these steps are explained further in chapter 0 Sort, Set in order, Shine, Standardize, Sus-

tain. The process map of implementing 5S in an office setting can be observed in Figure 6. (Fabrizio & Tapping, 2006)

Figure 6. 5S implementation process

3.3.3 Sort, Set in order, Shine, Standardize, Sustain

This chapter focuses on the activities of (1) *sort*, (2) *set in order*, (3) *shine*, (4) *standardize* and (5) *sustain* in the continuous 5S system as defined by Hough (2008).

(1) Identify the objects in the office which are not needed for the everyday routine in the work and ***sort*** them out. These objects are given a colored tag and relocated to a location of everyone's choosing where a decision on how to deal with the object is made. These articles might be infrequently in use and consequently can be relocated to storage. This process can provide much needed space for the actual work process.

(2) After unnecessary items have been put away the remaining items are given markers (including office furniture) clarifying what they are, the label might say "scissor" or "worktable". The remaining articles are then ***set in order***.

(3) ***Shine*** means to clean the whole workplace and also refers to daily housework in order to keep the improvements over time. All employees like a clean environment. At this stage objects in the need of repairing frequently appear, showing the safety side of 5S. It might also be profitable to set up objectives before following through with the shine part of 5S, which supports keeping people liable and concentrated.

(4) The objective for ***standardize*** is to keep the changes permanent in the office, therefore a standardization of the superior ways of functioning in the office should be done. In this stage procedures can be recognized laterally with graphic aids. Also, short offensives can be planned in order to keep the first three steps in place.

(5) Finally the routines of the workplace should be changed in order to ***sustain*** the changes, this can be challenging since the trend to go back to the previous practices might take place. The focus should be on keeping a new ground measurement of the practices without checking the work; organiza-

tions might implement the 5S message several times and in different ways before it becomes the new procedure. The loop is continuous through persistence, other ways the 5S initiative might be forgotten in the long run. The positive consequences of 5S will often contribute to the workers interest in the topic. Fabrizio & Tapping (2006) also argue that the improvements should be continuous through different activities through: events if the improvements will be intervallic, backing if certain persons will do the improvements and consistent consultations if they will happen on team level.

3.4 Process mapping and Cycle time reduction

In cycle time reduction product or service processes are scrutinized in order to develop improved and more efficient processes if waste time can be identified. When using cycle time reduction the actual development is implemented by the employees in the process. Involving employees in the development work allows for higher motivation for process modifications. (Furlow, 2003) One phase of cycle time reduction plan presented by Furlow (2003) is mapping the process. The approach of cycle-time reduction can eliminate both process bottlenecks and delays in factories and offices according to Buchanan (1999). Andersen (1999) say that common approaches to cycle-time reduction are executing actions parallel allowing for: up to 80% decrease in cycle-time, changing the order of actions reducing transportation of documents, refining scheduling which can result in several days of cycle-time reduction and decreasing the amount of stoppages that interrupt workflow such as telephone calls which another employee could take care of. As one example Andersen (1999) mentions cutting 20 days from a 29 day cycle-time during a four month period restructuring an order system. The cuts were made through cutting interruptions and postponements and creating a process table and rearranging process stages which were of comparable nature.

3.4.1 Process mapping

Processes can be mapped in three different ways as presented by Rummel. A process can either be mapped as a relationship map, a flowchart or a cross-functional map. These three differ in the way that they display a process. Mapping processes allows viewing work in a visible way. (Damelio, 2011)

A relationship map shows the relationship of stages in a process and how they are linked together. The relationship map shows the parts in a company and the relationship between the internal and external parts in the organization. One example of a relationship map can be the relationship between supplier-organization-customer. A basic model for a relationship map can be viewed in Figure 7. (Damelio, 2011)

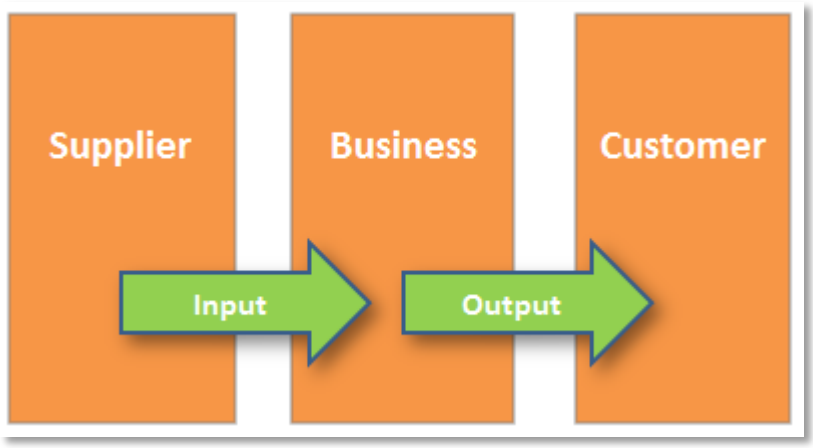

Figure 7. Relationship process map example (Damelio, 2011, 41)

A flowchart process map is an illustration of actions taken in order to achieve an output placed in succession. A flowchart shows a work activity which might take account of both value adding activities and nonvalue-adding activities. A basic workflow process map is presented in Figure 8. (Damelio, 2011)

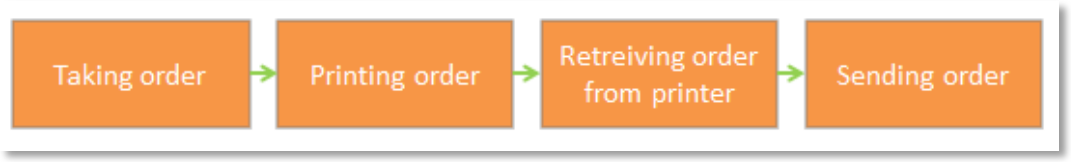

Figure 8. Flowchart process map example (Damelio, 2011, 98)

In a cross-functional process map the flow of a task across several different functions displaying the work together with a trail demonstrating the connection of the activities of connected resources. The workflow presents the related work actions as a route from input to output. A cross-functional process map can be viewed in Figure 9. (Damelio, 2011)

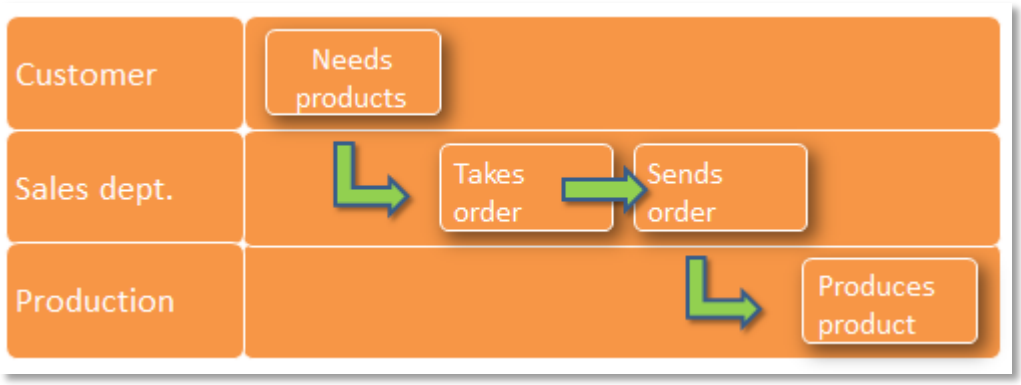

Figure 9. Cross-functional process map example (Damelio, 2011, 80)

A work limitation is used to define where work starts and where it ends. This means that all phases of work have their respective limitations. The work performed is defined by the act proceeding after an initiating event has occurred and is completed with the act leading to the output of the work. (Damelio 2011)

3.4.2 Cycle time reduction

A model for the cycle time reduction process is provided by Furlow (2003). This is done by generating maps for processes and decreasing surplus resources from them. With cycle-time reduction the existing process is used as initial point for the

improvement, which according to Furlow (2003) should look as follows, here presented as a nine step procedure.

1. The first stage of cycle time reduction is setting a target for the improvement, this target should be stated in an easy to understand fashion.
2. Set up a financial plan for the project, deciding the maximum amount of money which can be invested into the project while aiming at achieving low costs.
3. Appoint an appropriate person as the project leader. Preferably someone who can implement changes and is easy to collaborate with. This person is briefed on how the project is evolving.
4. Construct a team, the members of the team ought to include persons who are accustomed with the process, supervisors, and employees from different process stages, enabler understanding the process's importance without being included in the process and finally two participants not involved in the process. One of them should be a person who is not involved in the process but who understands the importance of it and the other one should be able to look on things from a new perspective.
5. Create a breakdown of the process displaying the main parts and explain the main parts in a brief way. At this stage the involved person of the process parts should also be listed along with the normal completion time for this person in the process. At this stage some thoughts might arise as inefficient resource allocation surfaces.
6. The team starts to look into the different process stages in greater detail and generate a process map of the contemporary processes. They then set observable time-frames for each process phase in the map while listing the required personnel and abilities. This allows for target setting for efficient process flow.
7. With the process mapped the cycle time reduction can begin. While keeping the worthy stages of the process the repetitive parts are deleted, necessary changes are implemented and unnecessary waste is eliminated from

the process. Some of the questions to ask are: What activities are adding to the time in the process? What type of expertise is essential at which phase? How many employees should be involved at what phases of the process and does it have to be conducted in this particular way?

8. After the excess waste has been identified the perfect process is formed positioning the improvements. This should then be shadowed by a study of the challenges and opportunities in the implementation. The results are then discussed with the project leader in order to find out where to focus the improvements.
9. Create a new process and present it to the management, including test-run helping managers to find process obstacles. This allows for changes before the full scale implementation of the new process.

Also, according to Buchanan (1999) a new team conducting the implementation should be formed in which the planning team's members are leaders. The implementation team should include new members into the implementation other than those in the planning phase. Additionally Buchanan (1999) writes that gatherings should be held regularly to guarantee the alignments of the implementations.

3.5 Calculating the profit of software process improvements

Software process improvements (SPI) have consumed a significant amount of financial resources in companies. These SPI initiatives aim at creating more streamlined and efficient processes through enhancing and arranging them. Calculating return on investment (ROI) for SPI is important as this can help managers to understand how software process improvements can unravel issues within the organization. Calculating ROI on SPI's also help to visualize whether the expected gains of the SPI are worth the costs of the SPI; show which SPI should be prioritized. (Solingen, 2004)

According to Solingen (2004) when deciding on investments it is a precondition to calculate costs and benefits this applies to all investment decisions, also SPI investments. Involving participants and being realistic simplifies the quantification of the calculation. The benefits arising from SPI initiatives should be estimated together with the stakeholders of the project. As the ROI calculation is made all the costs for the SPI are added together (including office space needed, travel costs and IT resources and hourly cost of the improvement team). The same is then done for the benefits of the SPI. Here too several aspects of benefits should be taken into consideration such as: the effect the SPI will have on other areas of the company, saved amount of work costs after implementations (for example due to less interruptions due to system failure). These financial gains can be gathered by asking the relevant departments for financial figures on the gains which are expected for their department. The benefits are then divided into direct and indirect benefits as some of the benefits will be directly linked to the SPI and other benefits will be visible in other processes. As these figures have been estimated the ROI calculation is done.

In his calculation of SPI ROI Solingen (2004) uses the formula (benefits-costs) / costs for SPI ROI. This divides the total profit of the investment by the costs of the investment. For example if the total costs of a project are €65 000 and the estimated total benefits €100 000 the ROI calculation would be (100 000-65 000) / 65 000 = 0.5384 or ROI = 53.8%.However, in cases of investments which last for more than one year net present value is a stronger metric to use Solingen (2004) continues.

According to Reynolds (2004) the net present value (NPV) uses the concept that a sum of money received in the future is less valuable than the equivalent sum of money received today. Generally money loses value over time due to inflation. In investments the risk of the future value of the money makes the present value decrease. If the investments assumed rate is 10% this will mean that €1 invested today will be worth €1.10 in the future. Consequently at the same rate €1 one year

from now has the value of €0.91 today. The formulas for future value and present value are future value = Present value*(1+rate)^time in years and present value = Future value after x amount of periods/(1+rate)^time in years (Brealey, Myers & Marcus, 2011, 145).

Reynolds (2004) illustrates this concept through comparing ROI, NPV and pay-back period in an example where an investment of €130 000 is made for a project. The company's forecast is that this will bring savings each year to the company of €35 000 the first year and €70 000 the next years following after the initial care costs have been paid. If ROI is calculated for a three year investment (using the formula savings divided by costs) it shows a ROI of 135% after a three year period and according to payback period the investment would be paid back after 28 months. However with ROI and payback period calculations the time value of the money is not taken into consideration. As the same investment decision is evaluated taking into consideration the time value of the money it shows that at 10% the actual ROI would be 109% with a payback period of 33 months of the investment. The net present value of the investment however shows a profit of €60 015 after a four year period as the initial investment of €130 000 has been deduced from the cumulative discounted cash flow of the investment. Consequently Reynolds (2004) argues that if the analysis would be calculated for a longer period of time it would show a higher NPV than these figures.

4 METHODOLOGY

For this study a qualitative method was used. This is due to the fact that quantitative data is not available for these types of studies. The study aims at presenting the factual data available prior to the potential implementation of the improved SAP solutions. In this case a quantitative approach could be seen as unpractical since surveys would not provide factual data prior to a potential implementation. And the research question is looking for factual data not human opinion which would be provided by a quantitative method.

Due to this background information presented in the chapter 1.2 a qualitative approach for the study was chosen, since "It is a descriptive, non-numerical way to collect and interpret information" (White, 2000, 29). Furthermore a qualitative study sets out to understand a phenomenon in everyday life which cannot be statistically measured due to unique situational facts involved in the process. The specific qualitative method chosen for this study is a qualitative case study approach. As a case study is not only qualitative to its nature since case study sets out to give an in-depth description of a situation and uses several methods to gather data. (White, 2000)

Since there are several different types of case study methods, an evaluation of which case study method is the most suitable for the scope of study has been made below. (White, 2000) There are several different case study approaches available according to White (2000) and these are described by him as:

Atypical case study, the research sets out to study a one-off situation which is not ordinary and might not ever occur again.

Multiple case study, evaluates several similar cases in order to better understand the scope of the present case.

Typical case study sets out to study the company in its typical state and for example understanding a company structure before and after an new implementation of some sort.

P*recursory study*, which is a study before starting a research made in order to provide context prior to a research.

The *multiple case study* approach cannot be seen as suitable since there are not many available sources of similar cases. Also, the *atypical case study* method can be seen as unsuitable to a rather routine task of managers which in this case is to understand the factual data before a possible software implementation. Furthermore, since no continuing study will be made on the topic at this point and time a *precursory study* is not the option. (White, 2000) However, a *typical case study* which according to White (2000) aims at understanding a rather typical situation can be seen as a good approach to the research question and for fulfilling the aims of the study. As this *typical case study* method sets out to for example study a situation prior and after an implementation of some sort while evaluating the benefits and limitations of the implementation can be seen as the most suitable method to implement in this study. This method despite the limitations of objectivity and the possibility of generating a vast amount of information for the case study it can still be seen as the most suitable for this project.

In this typical case study some elements of factual data will be presented in the form of numbers and figures. These data are deemed necessary in order to make sound judgment about the potential implementation of the improvement project. Also, in order to further understand the situational background data will be gathered and processed from a number of different sources such as press-releases, business environment reports and to some extent from internal databases of Company X. Through the gathering of information from several different sources the case study was made more valid and robust in its form (i.e. triangulation) which is confirmed by White (2000). This different information will also help to provide context to the situation prior to implementation of the software solution.

5 EMPIRICAL PART NOT INCLUDED

6 CONCLUSION NOT INCLUDED

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