



# Activity-based costing in cost management: The impact of KONE PSR on sales overhead costs

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Activity-based costing in cost management:  
The impact of KONE PSR on sales overhead costs

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Opinnäytetyön kirjoittamisen aikaan Packaged Service Repair (PSR) oli suhteellisen uusi myyntimethodi, jota oltiin ottamassa globaalisti käyttöön KONE varaosamyynissä ja jonka tarkoituksena oli vähentää myyntiprosessista aiheutuvia yleiskustannuksia tarjoamalla yksinkertainen ja tehokas tapa käsitellä huoltokorjauspyyntöjä asiakkailta. Tämän metodin käyttöönotto tarjosi hyvän tilaisuuden tutkia toimintolaskennan soveltamista käytännössä todenmukaisemman kustannuseurannan saavuttamiseksi, samalla tarkkaillen toimintolaskennan käytännön soveltamisen tehokkuutta tukitoimintoihin liittyvien yleiskustannusten seurannassa.

Työ aloitettiin vertaamalla toimintolaskentaa teoreettisella tasolla perinteiseen kustannuslaskentaan käytännön toteutukseen vaaditun riittävän ymmärtämisen saavuttamiseksi. Toimintolaskentatutkimus pystyttiin tätä ymmärrystä hyödyntämällä sovittamaan moderniin liiketoimintaympäristöön jokapäiväisen liiketoiminnan yhteyteen. Tutkimusta varten kerättiin myyntidataa PSR-myyneistä ja varaosamyynneistä yleensä Etelä-Suomen alueella ja haastateltiin KONE Elevators Finlandin Etelä-Suomen alueen varaosamyynneistä vastaavaa toimihenkilöä. Tätä aineistoa hyödyntämällä oli tarkoitus selvittää PSR-metodin vaikutus käytännön myyntityön kustannuksiin.

Aineiston tutkimus paljasti, että PSR-paketeilla todella on huomattava positiivinen vaikutus myynnistä aiheutuvien yleiskustannusten vähentämisessä ja samanaikaisesti tutkimustulokset paljastivat myös muuta oleellista tietoa liittyen Koneen maayhtiöiden myyntiprosessiin ja käytössä oleviin metodeihin, kuten puutteellisesta myynnin dokumentoinnista johtuvan tuplarityön, joka sinällään jo aiheuttaa ylimääräisiä kustannuksia, mutta myös vaikuttaa negatiivisesti asiakassuhteisiin, kun useampi myyntimies on yhteydessä asiakkaaseen samasta kaupasta ja tarjoaa mahdollisesti vielä eri hintoja. Näitä tuloksia pystyttäisiin tarvittaessa hyödyntämään PSR-metodin käyttöönoton perusteluun muissa Koneen maayhtiöissä.

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During the writing of this thesis, Packaged Service Repair (PSR) was a relatively new sales method being implemented globally in KONE spare part business that aimed to cut sales overhead costs by offering a more efficient way of handling maintenance requests from customers. As this method was just being implemented, there was a chance to implement activity-based costing methods in order to gain insight into the potential actual savings accumulated by this new method, while also experimenting on activity-based costing and analysing its effectiveness in following costs incurred by these kinds of support activities.

Activity-based costing was compared with traditional costing from a theoretical point of view in order to gain a deeper understanding of different costing methods for conducting such a research in a modern business environment. After the theoretical studies, sales data was analysed together with interview data from the employee responsible for these kinds of PSR sales in southern Finland area at KONE Elevators Finland. This was done order to fully understand the practical impact of PSR.

The research conducted proved that PSR actually had a positive impact on accumulating savings by cutting sales overhead costs and also revealed other relevant information regarding the sales process of a KONE frontline company. The methods in use, such as the double work caused by insufficient documentation of the sales process and consequently even affecting customer relations negatively, when multiple salespersons are in contact with the customer and possibly even offering different prices. The results of this research could be implemented in other KONE units if there were to be a need to justify the use of the PSR sales method to other frontline companies.

Activity-based costing, cost management, activity-based management, management accounting

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## 1 Background

This thesis has originated from the need to better understand activity-based costing and its role in cost management. As modern businesses are constantly developing their processes to stay on par with the competition, the need for skilled workforce is on the rise. Consequently, with the idea of constant development also firmly planted into the minds of the workers, this skilled workforce is also often specialized in a number of different tasks. Personnel contribution to different processes is not the easiest cost to allocate to begin with, but when this idea of multi-versed individuals is also added to the equation, it becomes quite clear that overhead costs from administrative and operative personnel are even harder to allocate to products that are the ultimate results of complex processes. This is also the case at KONE, where a relatively new sales method has been implemented to spare part business. Thus there is now the need to monitor overhead costs more closely in order to determine the effectiveness of this process and document it in order to further the information to other companies in the organisation.

KONE Corporation, founded in 1910, is one of the leading manufacturers in the elevator and escalator industry. The driving idea behind their operations is to offer the best possible people flow experience to their customers by developing services that allow for the movement of people and material smoothly and without delay in the urbanizing environment that is today's world. KONE Corporation operates in over 60 countries while still maintaining their head office in Helsinki, Finland. The client company is a part of KONE Corporation, KONE Global Spares Supply (GSS), which is responsible for supplying spare parts to KONE frontline companies that offer, among other products, maintenance services to their countries' client companies. The target company for the research is one of these frontline companies, KONE Elevators Finland, and their maintenance service sales function.

Currently KONE management accounting has not fully implemented activity-based costing into their selection of preferred methods. However, as described before, there is a need for a method that is able to accurately trace direct and indirect costs for specific activities in order to analyse the effectiveness of different processes performed by employees with a multitude of responsibilities. The timing for an analysis of activity-based costing is optimal at the moment of this thesis in that KONE has recently adopted a new spare part business sales model, where one of the objectives is to reduce direct and indirect costs generated by the time that sales personnel use to handle sales enquiries. In essence this means that there is ample data available from management accounting reports to compare the effect of the new sales model in relation to the old model. The new sales model used is called PSR, short for Packaged Service Repair, which aims to specify the most frequent spare part needs, i.e. the most common elevator defects, and create a ready-to-use package for them that includes the

spares and work needed to remedy the situation. From a sales point-of-view the objective is to remove the need for sales personnel to create a new tender for every time a similar defect is encountered. This is achieved by calculating the price of spares and estimating the installation time needed. PSR accomplishes this by adding the potentially needed spare parts and a fixed installation price for them in an automated process where the mechanic on site only needs to define the defect and the program operated by the maintenance supervisor provides the solution. The examined financial effect here is the impact of KONE PSR on direct and indirect costs caused by the contribution of the sales person into the offer creation process.

## 2 Objectives

This thesis aims to analyse the impact of the Packaged Service Repair process in regards to sales personnel costs related to the spare part sales process, outlining the target more specifically into the actual process of creating a sales offer and the personnel costs involved in it. The main quantitative objective is to trace the effect of PSR in the sales process and create a comparison between the old and new sales method. Consequently this allows for a moderately accurate calculation of the actual cost-reducing effect of the PSR sales tool in sales costs. The objectives are derived from the needs of KONE Global Spares supply to gain data about the effectiveness of their new sales method in order to support the spare part sales of KONE frontline companies and from the need of KONE Elevators Finland to analyse the impact of the new sales method on the practical daily tasks of their workforce. Accomplishing these objectives provides a basis for other KONE frontlines to implement this kind of activity-based costing method into sales process cost allocation.

The thesis also aims to indirectly influence the traditional perception of management accounting by introducing a tool that enables accurate tracing of process costs into daily management strategy. This objective will be accomplished by bringing the results of this kind of implementation of activity-based costing into the attention of the relevant management parties at different KONE frontlines. The learning objective for the student in this thesis is to gain a clear understanding of the basics of management accounting, while gaining an in-depth understanding into activity-based costing, its practical implementation and usefulness in cost management.

### 3 Management accounting and product costing

The theory of management accounting is a broad subject, but it is a necessary subject to understand in order to see the role of activity-based costing in comparison to other costing methods, which are used in management accounting. However, the aim of this thesis is not to fully explain all of the details of different management accounting methods. Rather to first create a concept about management accounting as a whole and then explaining the traditional view most commonly in use. Consequently, taking advantage of this information the text aims to explain the basics of activity-based costing in order to form the basis for the practical implementation. The last subject that will be handled before moving to the practical part of the thesis is a concept called activity-based management. This concept aims to explain the benefits and downsides of activity-based costing and how they can affect the performance of a company. With this information, one will be able to grasp the basic concept of the practical part and assimilate the necessary information about the rules that govern management accounting.

According to Raiborn & Kinney (2010, 2), Accounting is the language of business. With this in mind, it is important for one to understand what is included in the term in question. Accounting is divided into two dialects, financial accounting and that of management and cost accounting (Raiborn & Kinney 2010, 2). Financial accounting is the driver for information directed at external parties, such as investors, creditors and the tax authorities, mainly containing information on the company's debts, equity and profits (Raiborn & Kinney 2010, 2). Management accounting, or cost accounting, is mainly used for gathering information directed at internal users, such as managers who are looking to optimize the performance of a company by eliminating unnecessary costs (Raiborn & Kinney 2010, 2-3). McLaney & Atrill (2005, 7) suggest that one looks at accounting as a service function that provides economic information to its "clients", be they from the external parties or from the internal users, despite it being quite a complex subject. One should always keep this in mind and aim to also implement accounting as such, especially when providing financial figures to interest groups, as accounting is not the easiest to comprehend when compared to other branches of business. The information provided should, nevertheless, be easily understood by all relevant parties. One of the main focuses of this thesis is to accomplish just that, provide a clear description of cost management for the existing interest groups and analyse activity-based costing as an accurate cost-control tool.

Looking at accounting more closely, it is desirable to analyse the differences between financial accounting and management accounting more specifically in order to gain a clear view of the two different fields, and to see the point where financial accounting ends and manage-



ment accounting begins. Raiborn & Kinney (2010, 3-4) describe financial accounting as focused on the whole organization, governed by law and generally accepted accounting principles, consistent, verifiable and formal. On the other hand, management accounting is described as focused on specific segments, governed by situational relevance, flexible and cost-efficient (Raiborn & Kinney, 4). McLaney & Atrill (2005, 13) note the same features, but also further separate the two by the reporting intervals, as internal accounting statements can be prepared as often or as rarely as desired. In comparison, external accounting reports are governed by the law applied, causing them to be published, depending on location and type of business, at least on an annual basis. One important distinction between the two types of accounting, made by both McLaney & Atrill (2005, 13) and Raiborn & Kinney (2010, 3), is that financial accounting is always based on the monetary value of commodities or transactions, but management accounting can also be based on figures of non-financial nature, such as stock or number of sales. Jyrkkiö & Riistama (2000, 16) explain that in practice management accounting statements often also provide more relevant information than financial accounting statements. For example, the profit and loss statement in management accounting more clearly defines the variable costs that affect the profits done by the company than its financial accounting counterpart. By these distinctions one can deduce that financial accounting, by its nature, is quite unidimensional, providing information only on the direct financial impacts of different factors. Thus the operating manager in a medium or large business needs an alternative way of following costs and income on a larger scale, and this way is provided by management accounting.

Kaplan & Atkinson (1998, 1-2) define the transition from financial accounting to management accounting in controlling business processes to have taken place in the early nineteenth century, when companies started managing complex processes entirely by themselves. Before this, financial accounting was sufficient, as a business model of that day usually only included a single process, thus allowing for sufficient details to be had from just the financial accounting statements (Kaplan & Atkinson, 1998, 2). Raiborn & Kinney (2010, 3) complement this view by defining the main goal of management accounting to be the production of in-depth information of a company's underlying operations and processes. Perhaps the most important principle of management accounting, as also stated by Kaplan & Atkinson (1998, 1) is the relevance of the information provided over objectivity or auditability. Management accounting does not need to follow specific rules to be successful, but the data gathered still needs to be transparent to organizational participants (Kaplan & Atkinson 1998, 1). It is important for one to note that management accounting is not a critical tool for smaller businesses with simple processes, especially if the managers themselves participate in operational activities. But for larger companies with complex processes and managers that are not actively concerned with the operational side of the business, management accounting provides valuable information for steering the company cost-effectively onwards. Thus management accounting is ultimate-

ly driven by the needs of the management (Raiborn & Kinney, 2010, 8), while financial accounting is driven by accounting law. Despite this, Jyrkkiö & Riistama (2000, 25) remind that even though financial accounting does not provide all the relevant information needed for analysing the underlying processes of a company, it is still in a key role in providing data for management accounting. This is also seen in the case of this thesis where material will be gathered from sources that are kept mainly for the purposes of financial accounting.

### 3.1 Defining cost in management accounting

As this thesis will focus on allocating and analysing different costs, it is important for one to understand the definition of cost in management accounting, and how it differs from the costs used in financial accounting. Jyrkkiö & Riistama (2000,11), define a cost as a loss of equity incurred from the use of a factor of production, which leads to the essence of costing, matching principle, that aims to trace costs to their actual cause. This kind of definition creates a realistic view of the cost structure of a company, as for example taxes are not viewed as costs in this definition, since they are more of a cut of the profits to the government rather than something incurred from the use of factors of production in a company (Jyrkkiö & Riistama 2000, 13). In order to understand the essence of cost management, one must look at more than just the costs incurred, which are the primary tools used in financial accounting, and view at the subject more as a theory of defining the best route to maximizing profits.

Hornngren, Datar, Foster, Rajan & Ittner (2009, 53) define costs as actual costs, which are costs incurred, be it historical or past, and budgeted costs, which are the future costs for different actions. In this definition, management accounting differs greatly with financial accounting, as financial accounting costs are defined in unison with the standards set by law and accounting principles, while management accounting costs are defined by their relevance. Thus management accounting does not include neutral costs, which are e.g. investment losses that are not relevant in regards to actual day-to-day operations, and in contrast may include additional costs or differences due to the different nature of e.g. acquisition costs in comparison with financial accounting.

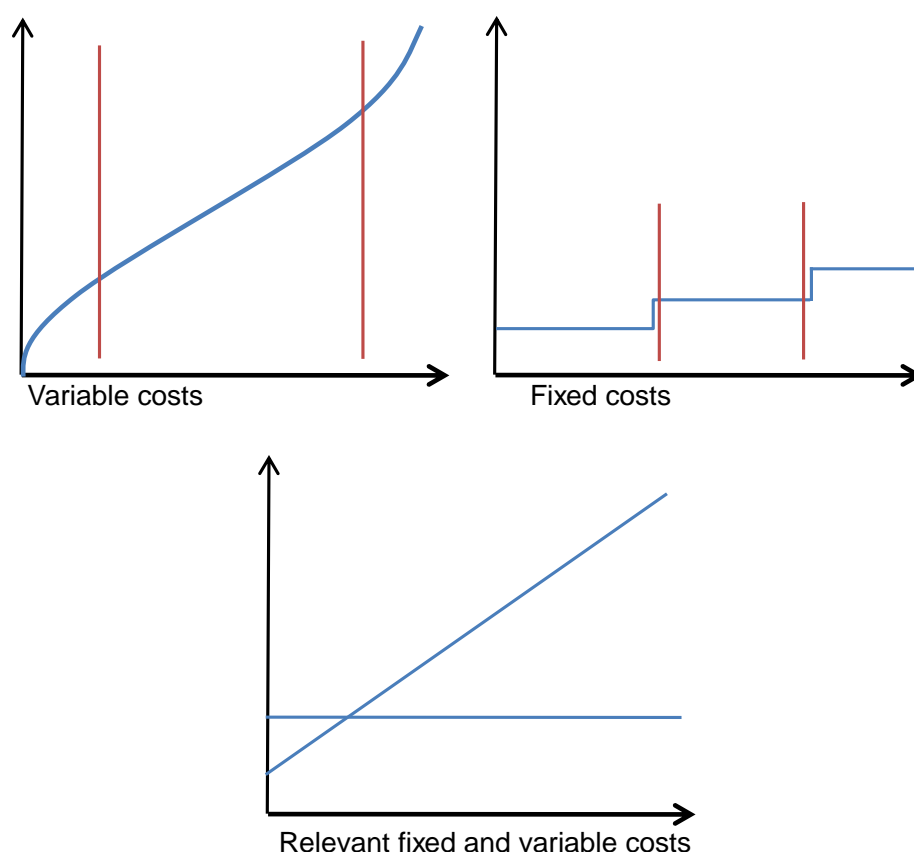
This kind of variation in acquisition costs derives from the fact that financial accounting handles acquisition costs as they have been incurred, but in management accounting these kinds of costs may be handled as how much the actual value of the goods in question currently is. (Jyrkkiö & Riistama 2000, 58-59.) The division of actual and budgeted costs and the analysis of the difference between them allow for comparison of different management actions when the costs are allocated to specific cost objects. This happens in practise by accumulating costs into various categories, i.e. cost centres, which can then be allocated to specific cost objects (Hornngren et al. 2009, 54). Consequently this allows for analysis of the profitability of

specific cost objects and future planning. Riistama & Jyrkkö (2000, 44) point this out to be the essence of management accounting in comparison to financial accounting from profit perspective, as it enables for the analysis of profits per product or per department, as financial accounting only reports profits for a certain time period. This is one of the key factors of the thesis; to illustrate the acquisition of data by way of activity-based costing for analysing profit per product or product group instead of attempting to draw conclusions based on possibly inaccurate assumptions.

According to McLaney & Atrill (2005, 271) when defining costs, it is important to see their relevance or irrelevance to the analysis in question. When analysing costs, defining whether the costs in question are ones that can be affected by decision making or ones that cannot be altered, makes cost analysis easier (McLaney & Atrill 2005, 270). McLaney & Atrill (2005, 270) name these kinds of costs as sunk or committed costs, which in essence are costs that have either already been realized, or are to be realized due to contractual conditions or other non-preventable reasons. One of the main challenges of analysing costing in a case such as the one in this thesis is determining the relevance of the costs, as in a large-scale company many of the overhead costs cannot be directly affected, causing the analysis of specific activities that derive themselves from the operative field and the overhead costs related to them to be the desirable target for optimizing processes, since they can be affected at unit level. The idea behind this approach is that one cannot easily influence policies drawn by the top management of the corporation, but the unit level activities are usually in the hands of unit management. In management accounting costs are divided into two major classifications, direct/indirect and fixed/variable (Horngren et al. 2009, 60). These will be further analysed next as they form the basis for understanding the cost structure of a product.

Fixed costs and variable costs can be classified by sorting them by their behaviour: fixed costs stay the same even when the volume of activity changes; and variable costs differ according to the volume of activity. This is also the classification of costs that one is familiar with from financial accounting (McLaney & Atrill 2005, 281). McLaney and Atrill (2005, 284) also note that costs may also be defined by these standards as semi-variable costs, which are in essence costs that are mostly fixed, but a segment of them is altered by the volume of business. An example of a semi-variable cost could be electricity, which is partly fixed for example with lighting, but variable in regards to production equipment that needs it to produce material. Semi-variable costs are named by Raiborn & Kinney (2010, 25) as mixed costs, and in addition to the aforementioned costs, Raiborn & Kinney also point out another definition of a cost that differs from financial accounting, even though it is derived from financial accounting figures; step cost, which is ultimately a fixed cost that grows step by step as activities grow. Raiborn & Kinney (2010, 26) also note that variable costs are viewed differently by accountants and economists. Accountants view variable costs as linear, meaning that they are constantly pro-

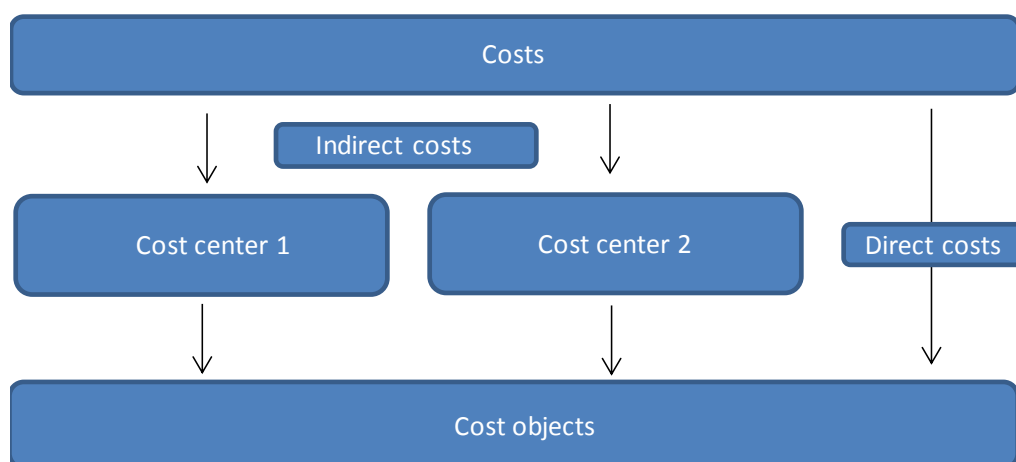
portionate to the volume of business, while economists view variable costs as curvilinear. This is where the cost slopes upward until it hits the relevant range, where it is constant to the point where volumes grow to the extent that variable costs cannot be controlled and start growing faster than production. The challenge when looking at costs from this point of view is that the variable costs are easy to link to specific products, but fixed costs cannot be directly linked to products, thus there is a need to further analyse costs in order to be able to allocate them to specific products or activities.



Graph 1: Actual variable and fixed costs along with relevant costs

The above picture demonstrates the behaviour of fixed and variable costs as they happen in actuality and the traditional view that only views them by their relevance to the current activity level of a company. The Variable costs-graph shows the view of economists when viewed as a whole and the view of accountants when viewed between the red lines. The Fixed costs-graph shows the fixed costs as they are in reality and demonstrates the “step cost”-effect of fixed costs when the volume of activities rises, while the segment between the red lines shows the current actual fixed cost rate.

As companies often have a broad product range, allocating costs to a specific object is valuable for pinpointing the processes that are lagging, i.e. consuming a significant amount of resources. To counter this, one can use the method of dividing costs into direct and indirect costs (Raiborn & Kinney 2010, 26). Direct costs are costs that are directly traceable to the cost object. For example in KONE PSR sales, the parts that are included in the package are direct costs along with directly traceable labour costs, while indirect costs are costs that cannot be traced directly into an object, thus forcing them to be allocated into the cost objects by using a specific overhead rate, that aims to cover the costs of a cost centre by adding them to the sales price of the cost object (Raiborn & Kinney 2010, 26). This is the main challenge of the case of this thesis, as more and more costs related to goods sold are indirect costs, and there is a need to find a reliable way of allocating the overheads, i.e. indirect costs, into cost objects in order to more reliably assess the profitability of different processes. According to Raiborn & Kinney (2010, 26), the main question in allocating overheads is to analyse the significance of the overhead in question in order to decide whether it is cost-efficient or not to trace the overhead to its source. In KONE spare part business, as the individual trades done are relatively low-value and the significance of overheads in costing is relatively high, the need for a reliable and cost-efficient way of allocating overheads is apparent. However, if one is to understand tracing of overheads, one must first have a basic understanding of costing, before being able to determine the best way of allocating different costs to different products.



Graph 2: Traditional cost allocation

The above graph illustrates the traditional view of direct and indirect costs. Here direct costs are allocated into the products as they are incurred, and indirect costs are traced into their specific cost centres before dividing the costs in the pools with relevant drivers into the end-products, i.e. cost objects. This kind of division assumes that the indirect costs are divided by

their respective overhead rates among end-products, which is not often the case with different processes involved in different product life cycles, Consequently the potential for distorted accounts is apparent.

Gowthorpe (2008, 41) divides costs into three broad categories, material, labour, and overheads. When one adds into the equation short-term factors of production and capital expenses, all of the costs relevant for cost follow-up are now in hand. From these costs, the thesis aims to examine indirect labour costs, but material costs and production overhead costs will be briefly examined in order to better see the impact of labour costs in the entirety of costing. Material costs are allocated into products by different methods depending on the view of the business. These methods affect the final cost of products sold in different periods of time. Some of the methods in use are the first in, first out (FIFO) method, which assumes that the material that was first brought into stock is the first to move out of the stock and the weighted average cost, which assumes that the cost of a material in stock is an average of all the items in stock. (Gowthorpe 2008, 41.) There is also the method of last in, first out (LIFO), which assumes that the item that was last brought into stock is the first one out. If the material that is under costing is something that has a highly fluctuating market value, there is also the option of using the running average cost, which assumes the value of all the materials in stock is the same as with the material that was bought last. (Riistama & Jyrkkiö 2000, 108.) It is important for one to note that these methods do not have an impact on the actual transfer of stock, they merely offer a way of allocating product costs into the finished product depending on the nature of the material that is being valued. For clarification, material costs are direct costs and can thus be traced directly into the end-products, but the need to use different methods to define material value come into play when stock numbers are high and governed for a longer period of time.

Labour costs are often allocated to the extent that they can be traced as direct labour costs, and indirect labour costs are handled as overhead (Gowthorpe 2008, 44). This is often the easiest way as employees have many different tasks of which some cannot even be traced at all by means of traditional costing. This is one of the issues that activity-based costing aims to fix. Production overheads are traditionally allocated into cost centres, as shown in graph 2, from which they can be absorbed into cost objects by means of e.g. dividing the total overhead with the number of units produced in that particular cost centre (Gowthorpe 2008, 46, 50). This total overhead per activity can then be used to budget future overhead per commodity produced.

### 3.2 Costing

As financial accounting focuses on reporting past events, management accounting aims to produce relevant information for decision making, e.g. pricing products (McLaney & Atrill 2005, 264). The essence of costing is simply for the company to make a profit by covering all incurred costs with product or service selling prices (Raiborn & Kinney 2010, 67). Costing is concerned with three things: cost identification, cost measurement and product cost assignment (Raiborn & Kinney 2010, 159-160). The basic forms of costing are variable costing and full costing. In variable costing only the variable costs are allocated to products, as the view in variable costing is that fixed costs are always a constant, while the variable costs are the ones that are relevant in tracing costs for specific commodities. In contrast, full costing aims to allocate, in addition to variable costs, all the fixed costs incurred into the products by dividing them by the number of commodities produced. (Riistama, Jyrkkiö 2000, 132.) Variable costing is the easiest and most trustworthy way of allocating product costs, but it also leaves much to be desired since fixed costs are completely ignored in the costing process. In the case of variable costing, the fixed costs are viewed just as an item of expenditure that needs to be covered by the product mark-up. In this regard the different methods of full costing offer their own ways of allocating the overhead costs into the products sold.

The most common variants of full costing are job costing and process costing. Job costing refers to costing methods where the costs are accumulated into specific units of production, e.g. jobs or orders, and process costing refers to the costing method of mass production processes. Job costing is possible when there is sufficient information available on the costs related to a specific unit, such as time records or material cost invoices. Whereas process costing is possible when a multitude of homogenous products is being produced, the similarity of the products allowing for the allocation of a period of costs into the end-products just by dividing them between the units produced. (Dodge 1994, 156.) In other words, job costing aims to allocate all the costs involved in the completion of a specific into the total cost of the product. (Gowthorpe 2008, 39-41.) These kinds of methods allow for quite accurate cost follow-up in a simply-structured company where all the costs are more or less directly linked to the end-products. However, when a company manufactures a large number of heterogeneous products and accurate job costing is not possible due to the complex structure of the company and process costing does not give reliable information, there is a need to implement other ways of tracing costs.

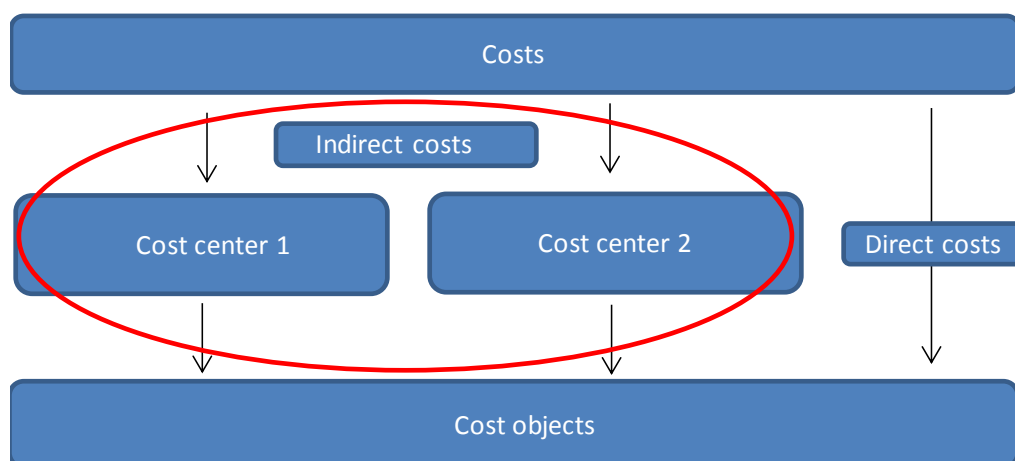
The total overhead per cost object is also called an overhead rate, and is calculated by dividing the total budgeted overhead cost of a specific level with the volume of that specific cost object level. Specifying a cost object for the overhead rate should be such that can be direct-

ly traced into the generated overhead costs. This is often challenging with a company that produces many heterogeneous products, consequently the cost driver in these kinds of situations can be, e.g. machine hours or material handling time. (Raiborn & Kinney 2010, 67-69.) The overhead rate can be utilised in predicting the overhead costs per cost object and balanced out at the end of the accounting period in order to see whether the overhead has been underapplied or overapplied. Overapplied overhead causes the cost of goods sold to decrease, while underapplied causes the cost of goods sold to increase. (Raiborn & Kinney 2010, 70-71.) In essence this means that if the overhead is overapplied, too much equity has been reserved for production that could have been utilized elsewhere. While underapplied means that not enough overhead has been reserved for the cost drivers, meaning that the goods sold may have been sold as underpriced. The overhead rate is quite simple to determine when the cost object is chosen well, as it is only a matter of dividing the total overhead cost by the number of cost objects, making it easy to turn it into a percentage that can be applied to all the to-be-sold cost objects. This is the traditional way of handling overhead costs, by allocating them into easily traceable cost objects, allowing for some kind of precision in overhead allocation. This kind of overhead allocation does, however more or less distort the actual costs incurred by products (Alhola 2008, 21), especially when looking at support functions, where the actual costs become harder still to allocate into cost objects. Thus there often is a need to more accurately allocate overhead, thus the need to implement activity-based costing arises.

#### 4 Activity-based costing

As the cost structures of global companies are complex and need to be competitive at all times, one must have an understanding of the underlying causes of costs and especially overhead costs, instead of just recognizing the costs as they occur. Activity-based costing aims to accomplish this by identifying the actions that happen inside an organization and tracing overheads to them accurately. (Raiborn & Kinney 2010, 114). In KONE spare parts business the supporting functions play a significant role in generating cost for products, and the goal of this thesis is to provide some insight in to the ABC-method of tracing these costs to their source and possibly eliminating unnecessary processes. As Kaplan et al. (2009, 164) state, activity-based costing allows for a more realistic division of monetary resources to the business segments that need them by releasing them from segments that do not need them. This problem of misallocating overhead costs is also called broad averaging, and activity-based costing aims to remove it by accurately defining the costs generated by specific activities (Kaplan et al. 2009, 164). It is as Alhola (2008, 25) states, producing commodities causes different activities, these activities cause costs, and the recognition and analysis of the costs incurred by these activities is the essence of activity-based costing.





Graph 3: Broad averaging

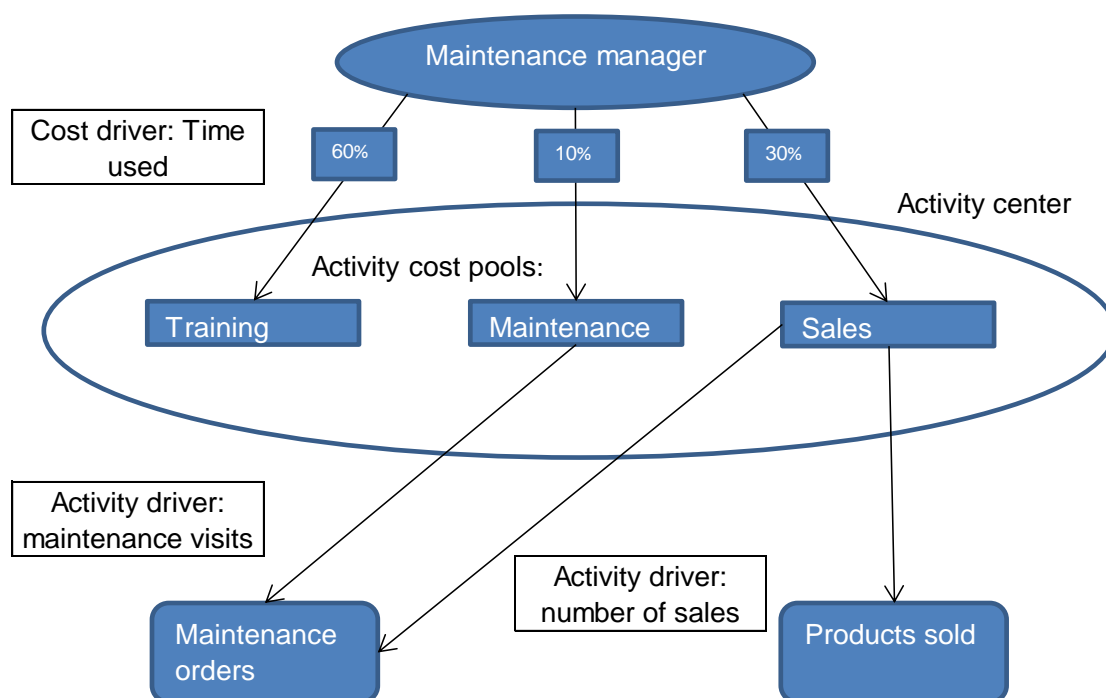
The above graph shows, circled in red, the part of costing where activity-based costing aims to influence the allocation of overhead costs. This is where the “broad averaging” happens, when overhead costs are allocated into the end-products directly without attempting to analyse in detail the actual labour involved in the activities per different cost objects. The thesis itself will focus on just one of the cost objects and the actual and allocated costs related to it, attempting to depict the whole process of surveying one activity.

Defining cost drivers for processes is a requirement for following costs generated in a way that allows comparison between different product families. Cost drivers are factors that have a direct causal relationship with a cost over a given time span, meaning that there is a cause-and-effect relationship between a change in the level of activity and a change in the total costs (Horngren et al. 2009, 58). The essence of defining a cost driver is to accumulate cost to it in order to analyse the activity that it is linked to. The defining characteristics of a cost driver are that it is easily identified and directly related to the activity that is being performed while also being appropriate for performance measurement. In more complex environments it is necessary to group cost drivers in order to gain a deeper understanding of their relation to activities. This kind of grouping can be done by defining cost drivers to unit-levels, batch-levels, product/process-levels and organizational/facility levels. (Raiborn & Kinney 2010, 119-120). This is also called a cost hierarchy by Horngren et al. (2009, 173), and is useful for identifying cost-allocation bases that are also drivers of cost in activity cost pools. Horngren et al. (2009, 58) note that it is important to factor in that even costs that are fixed in the short run may have cost drivers in the long run, e.g. support functions that do not immediately react to changes in volume. The level at which PSR is being analysed is process-level, so the cost driver should be one that can be linked to the sales process of specific

product categories. This allows for the allocation of the potential savings in overhead to be linked to the whole product family that is affected by PSR.

The costs in an ABC-system are accumulated into activity centre cost pools, which are cost pools of which a separate reporting of costs is needed. These kinds of pools are gathered by pooling up the costs that have the same cost driver. After this the costs are further allocated out of the activity centre by using an activity driver, which measures the demand placed on activities. (Raiborn & Kinney 2010, 125). This kind of allocation allows for a detailed view of overhead costs incurred by specific activities, presenting a broader perspective into product costing. The general steps to follow in allocating activity-based costs in KONE spare part sales are to first seek out the initially recorded sales department costs and locate e.g. the personnel costs from there. Secondly to divide them between cost drivers that can be for example the used hours for spare part sales. And finally to allocate the costs from these activity centre cost pools by activity drivers, which are e.g. the number of sales, into the cost objects that are the most common spare parts sold which are replaced by PSR. It is important to note that activity-based costing attempts to identify the most relevant cause-and-effect relationship for each activity pool instead of just attempting to find the most obvious and easiest-to-link numerical cost driver for indirect costs (Horngren et al. 2009, 172).

The benefit of activity-based costing compared to traditional costing systems like absorption costing is that it identifies individual activities as the fundamental cost objects, instead of just roughly allocating the indirect costs into the finished products (Horngren et al. 2009, 170). Simply put, activity-based costing creates a cost for an activity, accomplishing what traditional costing cannot. This is the ultimate goal of this thesis, to create a template for tracing costs for specific activities, allowing for accurate analysis of the cost-effectiveness of different processes or products sold.



Graph 4: Activity-based view of costs caused by maintenance manager

The above picture aims to demonstrate the view of costs in the case of a maintenance manager in charge of training, maintenance and sales from an activity-based cost point of view. From a traditional costing view, the contents of this picture are located in a cost centre inside the red circle of graph 3 on page 17. To specify, the contents are a part of a cost centre, as a cost centre would most likely traditionally be the maintenance department, and this graph is only the maintenance manager's part of that particular cost centre. The cost driver is the time used by the maintenance manager and it is divided between the responsibilities as it happens in reality. The activity cost pools are as shown on the picture and the activity drivers show how different costs from different pools are allocated into two different end-products by their respective activity drivers. This creates a quite different view of allocating the costs incurred by the maintenance manager when compared to the costs that traditional costing might show. As in this picture we can see that 30% of the maintenance manager's time is used on sales, from where the cost incurred is divided by activity drivers respectively into the maintenance orders and products sold. This allows for accurate overhead allocation into both the maintenance orders and product sales based on the actual costs incurred. Which is in comparison to other more common full costing methods, where all of the overhead incurred would be divided into the end-products by a similar cost driver, e.g. the number of sales done, without giving thought to the time consumed by the activities, a notable benefit.

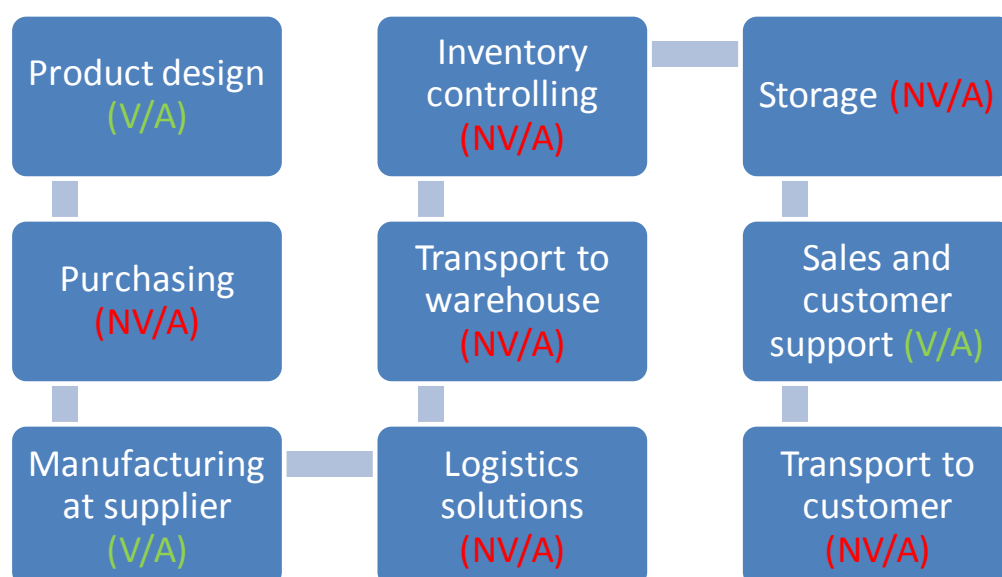
## 5 Activity-based management

Hornngren et al. (2009, 178) define a method of managing based on activity-based costing, activity-based management, as a method of using ABC-data to make decisions on pricing, product mix, cost reduction and process improvement. An effectively executed ABC-system provides accurate information about the costs of different products in a wide product mix and the significance of non-value-added activities in a specific process (Hornngren et al. 178-179). This kind of information allows for an in-depth analysis of the profitability of a specific product, where traditional costing would distort the overhead costs related to that specific product if the mix included a multitude of heterogeneous products. The analysis of non-value-added activities may also provide valuable information for decision making regarding improving processes. Activity-based management also takes advantage of costs allocated to the design of products and planning of activities (Hornngren et al. 2009, 181), as it allows for tracing of e.g. design activities per product, rather than handling the design department just as a cost centre that needs to be allocated into the cost objects to cover the costs. Ahmed, Bin Dost, Khan, Bukhari, Noor-ul-Ain and Ali (2011, 995) support this view by defining activity-based management as: “a tool for achieving continuous improvement”.

In order to create a framework for activity-based costing through activity-based management, Raiborn & Kinney (2010, 114) propose to start with a simple approach of identifying activities as either value-added or non-value-added activities. A value-added activity is one that adds to the selling value of a product; while a non-value-added-activity is one that, if removed, does not negatively affect the value of a product. As goods are often sold according to market value and not by the actual price of covering costs incurred, a company that excels in eliminating non-value-added activities will generate a larger profit compared to one that does not succeed in the same. (Raiborn & Kinney 2010, 114-115). In the case in question, competition is significant, and as the players in the market are the largest in the world, all possible competitive edges need to be utilized in order to maintain a steady market position, thus eliminating even seemingly insignificant non-value-added activities may have a significant impact for a company in the long run. Furthermore, this kind of approach of analysing activities as value-adding or non-value-adding gives valuable insight into the structure of a company while also supporting the implementation of activity-based management. In this case, the PSR-process has already been implemented in order to impact, in the sales process, the non-value-added activity of creating a sales offer from scratch every time even when the sales that is being handled is quite simple and easy to generalize.

Raiborn & Kinney (2010, 115) suggest that one starts activity analysis by identifying the organizational process where the non-value-added and value-added activities to be analysed are involved in. It is important to note that matrix organizations, such as the target in this thesis, are often quite complex and the process needs to be accurately defined and limits are to be

set in order to prevent the analysis from becoming too complex. Thus the process to be analysed in this thesis will be limited only to the sales process of specific components that have been partially or fully covered by the PSR process already. This way the thesis will be able to locate the benefits of activity-based costing while also analysing the success of KONE PSR sales model. After identifying the process that is to be analysed, a process map or detailed flowchart should be prepared in order to indicate every step that is involved in the process (Raiborn & Kinney 2010, 116). When the process map is combined with time assessments for each part of the process, a value chart can be created that traces the lifecycle of a process, allowing for assessment of time used for value-added and non-value-added activities (Raiborn & Kinney 2010, 117). When indicating sales process activities in the case of this thesis, the value-added activities should also be analysed separately in order to distinct the value they add and compare it to the savings done by PSR. It is as Raiborn & Kinney (2010, 117) point out, one should view value-added and non-value-added activities as what adds the most time and cost and the least value. One should also note that creating a value chart for every service or product in a company is time-consuming, but as Raiborn & Kinney (2010, 117) emphasize, but a few of these charts may allow for accurate indication of where money is being needlessly spent on non-value-added activities (Raiborn & Kinney 2010, 117).



Graph 5: Example of a company flow chart

The above picture shows a flow chart with all the steps that are present in the life cycle of a single end-product, i.e. cost object. The analysis of value-added (V/A) and non-value-added (NV/A) activities depends very much on the perspective of where they are made of. For example the purchasing process of a company might be seen as a value-added activity if the

purchasing department is actively sourcing for new suppliers and inviting new tenders in order to optimize purchasing prices, but it can also be seen as a non-value-added activity if the purchasing department only processes the purchase requests done by salespeople and orders the requested materials. Thus the analysis of processes requires a hands-on approach where one should gather sufficient knowledge first about the actual state of affairs before making decisions. After this kind of analysis has been successfully implemented, it is possible to implement the activity-based costing method itself as described earlier. The hands on the approach will be done by means of face-to-face interview, which is, according to both Ruusuvoori & Tittula (2005, 13) and Ghauri & Gronhaug (2010, 126) a reliable method of gathering data and allows for leading of the conversation in order to understand the how and why of the research problem studied. The interview method is also supported by the fact that the target group in this research is quite small, so by way of interview the thesis worker is able to gather the largest possible amount of data needed to draw conclusions on the case and its implementation. In the case of this thesis the interview will be implemented by forming an agenda for the interview where the research question has been divided into smaller segments in form of questions that need to be answered in the interview in order to gain the necessary information to draw conclusions about the impact of PSR. These questions will be introduced later in the practical implementation part of the thesis.

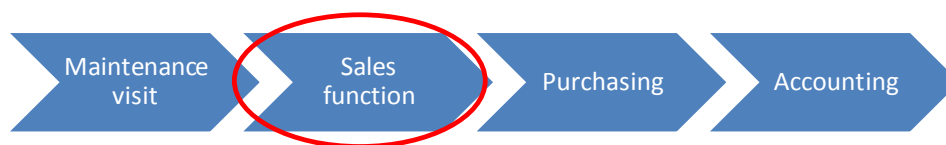
Turney (2005, 131) points out that activity-based management allows for increased value for the customer while also increasing the profits made by the company providing this value. Turney (2005, 133) also notes that activity-based costing provides timely information on processes and work that is being done, allowing for efficient management of different tasks by reducing manufacturing and support costs and more accurately pricing products. Dodge (1994, 136) points out that the usefulness of activity-based costing lies here in the analysis of the effectiveness of processes, rather than just in the more accurate accounting statements made available by following activities. These are all valid arguments; however there are also arguments to the contrary. One of the stumbling blocks of activity-based management is its cost-effectiveness, as even a small-scale activity-based costing follow-up may cause a significant increase in costs, as there always is a need to use labour hours in order to gain additional data for costing if it is not readily available from management accounting statements or other sources. According to Riistama & Jyrkkiö (2000, 187), if a large-scale implementation is preferred, a significant amount of resources need to be located into creating a working data structure that supports activity-based costing. Gowthorpe (2008, 77) agrees with this, but also points out that studies examining the success of activity-based costing have proven that most companies that have implemented it have experienced a rise in profitability. Gowthorpe (2008, 78) points out that in addition to extra costs incurred by gathering data for ABC, there might be resistance by staff on the basis that their daily work life is disturbed and they might become redundant with the implementation of increasingly efficient processes, thus causing

subconscious or conscious distortion in ABC-studies and implementation. According to a study reported on by Cardinaels and Labro (2009, 42), this kind of distortion can, however be prevented by carefully laying the foundations for data gathering, e.g. by informing personnel beforehand that data like this will be gathered.

If the rewards outweigh the risks, the decision for implementing ABC can be supported by analysing the benefits versus the costs that using ABC will incur (Horngren et al. 2009, 182). This will be looked into when implementing ABC in the practical phase of the thesis, allowing for a first-hand experience about the practical task and its challenges. Horngren et al. (2009, 182) list some tell-tale signs for deciding whether it is relevant to implement ABC: if significant amounts of indirect costs are allocated using only a few cost pools, if most of the indirect costs are identified as output unit-level costs, if standard low manufacturing cost-products show small profits while special high manufacturing cost-products show large profits and if operations staff disagree with the reported manufacturing and marketing costs. These are all valid notions that should be observed if the company is not yet utilizing activity-based costing.

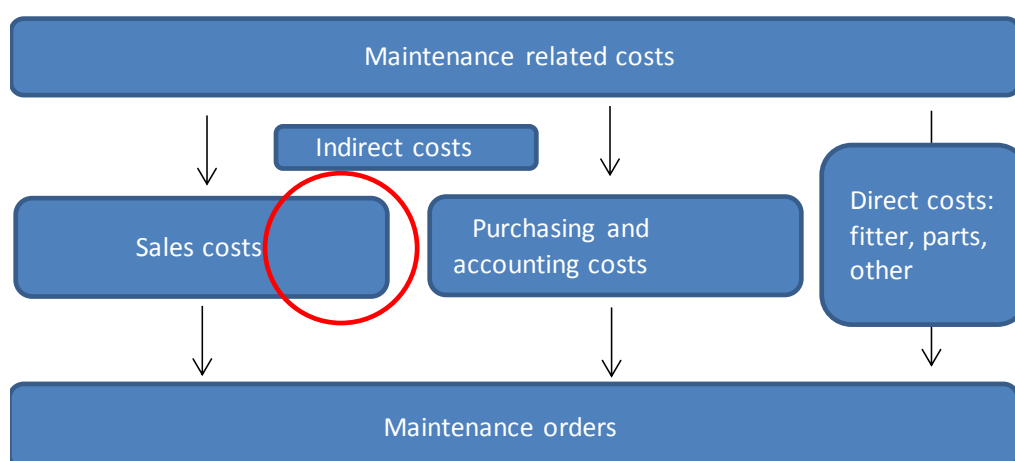
## 6 Implementation

The practical work of the thesis started with a meeting with the Controller of KONE Global Spares Supply. In the meeting the idea of implementing activity-based costing into controlling overheads in order to analyse the effectiveness of the PSR sales process was introduced. This meeting formed the basis for the theoretical framework of the thesis. With the framework clarified, the implementation continued by defining the spare part sales process of a KONE frontline and locating the position of the PSR sales in the whole process. This allowed for further analysis of the thesis in light of the theoretical framework and provided a base for the planning of the practical tasks. The PSR process was defined even more accurately on the operational level by a meeting between the GSS (Global Spares Supply) representatives and the change and accounting managers from KONE Elevators Finland. In this meeting the concept of PSR was cut down into smaller segments and the sales process was introduced as it actually happens on the operational level of spare part sales. The representatives of KEF (Kone Elevators Finland) also expressed their own view on the objectives of the thesis, which supported the original objective well and allowed for constructive analysis of the whole process between GSS and a frontline with first-hand experience. At this point the objective was clear: to compare the allocated overhead cost i.e. the maintenance supervisor in the sales process with the actual overhead incurred by committing the maintenance supervisor's time into the sales process.



Graph 6: Simplified process flow chart of the target process

The above graph shows a simplified process chart of the whole maintenance process. In this chart, the maintenance visit at a site spawns a sales lead as the fitter inserts it into the system based on the condition/equipment of the elevator. After that the sales lead is handled by the maintenance supervisor. If the sales offer is successful, it will move through an automated purchase process which will order it from GSS after which the transaction is handled by the accounting department. The material will then move from the GSS warehouse to the site/other designated destination and the fitter will install it. The sales function circled in red will be the one examined more closely.



Graph 7: Maintenance process from a traditional costing perspective

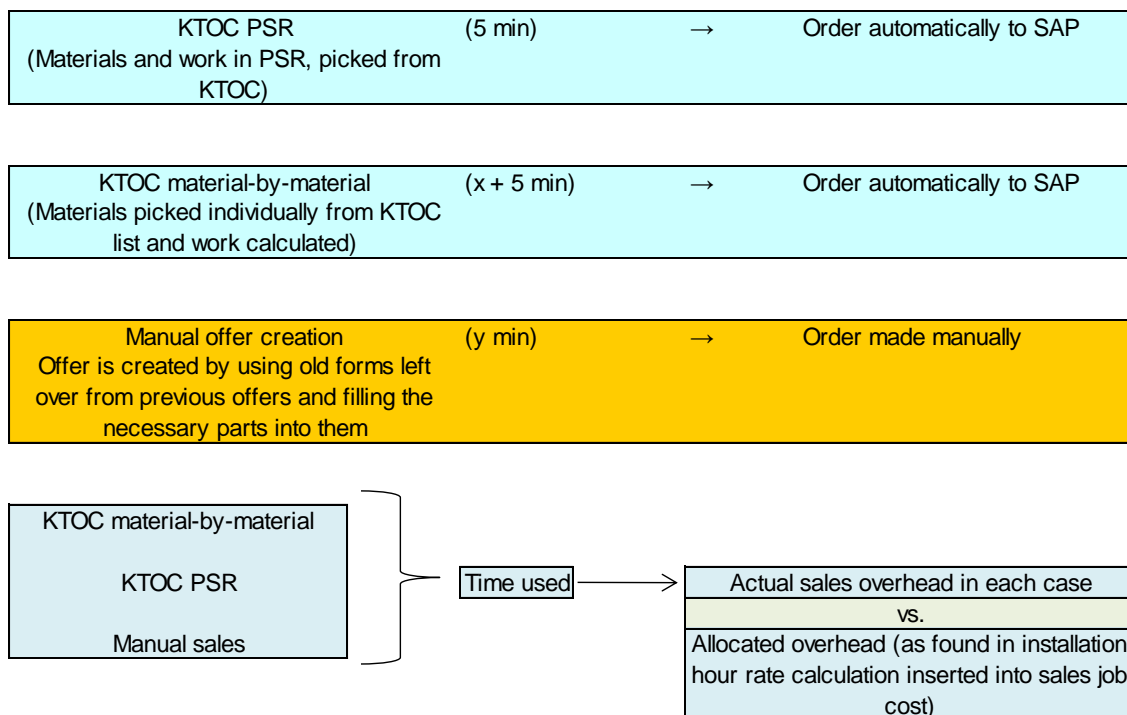
From a traditional costing perspective, the cost allocation of the maintenance sales process looks like this. In this case the sales costs will be separated from the overhead costs and analysed by way of activity-based costing to achieve the objective of this thesis. To achieve this, data would need to be gathered for both the overhead costs present here and the activities that govern the overhead cost accumulation to cost objects.

The gathering of activity data would be done by interviewing two maintenance supervisors that were known to be well acquainted with the sales process of spare parts by both the old way of manual ordering and the new way of KTOC (KONE Tendering and Order Configuration



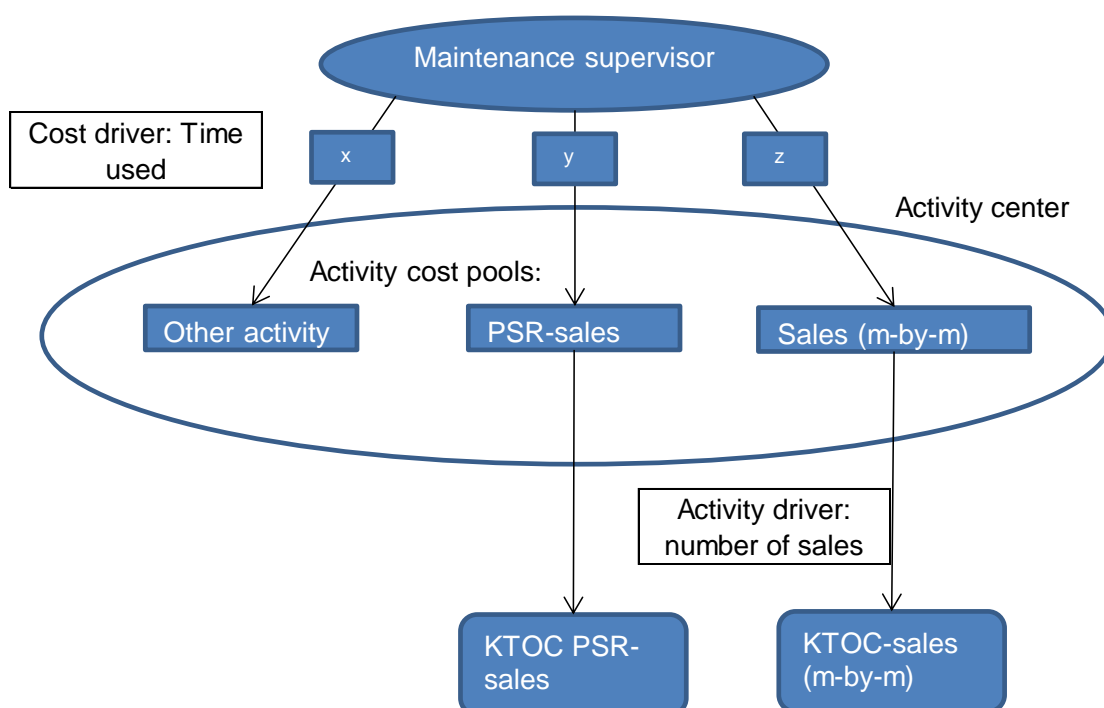
tool). The possibility of including more interview subjects was also introduced; however the change manager informed that the maintenance managers all have different responsibility areas and it would not significantly affect the results even if more were interviewed, as it would be hard to determine the level of expertise the managers have with the different sales tools, since some of the managers were known to only handle issues not related to sales and others to only handle sales when others were not available. By only including two maintenance managers with a significant knowledge of the sales process and different sales tools, the thesis also allowed for the portrayal of an optimal sales process with fully trained professionals in various situations including different sales tools, as the target interviewees were ones that were known to be experts at the sales process that was studied.

The interviews were designed to happen as open discussion between the thesis worker and the interviewees in order to further deepen the knowledge on the subject for the thesis worker and to allow for steering of the interview into the correct direction while still maintaining the relevance to the subject by listening to the opinion of the interviewee. It was decided that the interview would consist of an introduction to the research and the reasons behind it, after which the interviewee would introduce the three different sales methods and their implementation to the thesis worker and the thesis worker would be able to document the approximate time used for each kind of process in a specific sales case. The three different sales methods that were examined are depicted in the picture below with a brief description into each one of them.



Graph 8: The sales methods in use at the target company and the goal of the research

The above KTOC PSR method is the target method of this study. It consists of a ready package in the sales program that includes everything needed to complete a trade: all the required spare parts and an hourly rate which in turn includes the work effort of the fitter and the supervisor as well as indirect costs incurred by the maintenance operation. It also includes a ready-to-use sales text that describes the contents of the package and its benefits to the customer. The KTOC material-by-material method is the control method for PSR, where the sale is done by picking all the required parts one by one from the KTOC-system, calculating the work hours needed for the installation and writing a description about the maintenance offer into the sales documents. The third method depicted is the manual process of creating a spare part offer by using forms created by an older program similar to the KTOC-system and adding the necessary spare parts and prices into them. The third method was changed from what was originally planned with KEF, as the research indicated that the original method discussed with KEF was not relevant to the spare part sales process, since it was more about stock replenishments and not about maintenance sales.

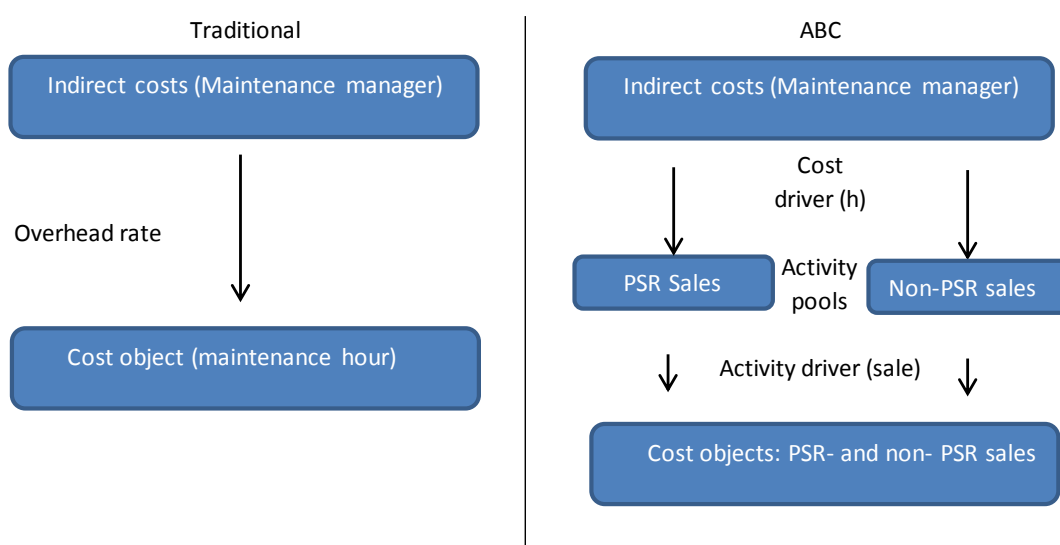


Graph 9: Maintenance supervisor ABC-cross-section

This graph is derived from the earlier graph of the responsibilities of the maintenance manager shown in the theoretical part of the thesis. Here, the implementation is illustrated as how it fits into the idea of activity-based costing. The defining thought behind this is that the ac-

tivity-based management perspective has already been taken into account and the sales offer creation process has been found to be a non-value-added activity, thus justifying PSR and the activity-based costing approach into the process to see how this has impacted the total costs allocated into the products. From the graph one can recognize that the cost driver that needs to be first found is the time used in these sales activities in order to form the activity cost pools for each of these activities. After that there is only the straightforward process of linking the activity cost pools to their relevant activity drivers, which are in this case the respective sales of the PSR-packages and the non-PSR sales made via KTOC.

Before moving forward, it might be necessary to compare what has been gathered thus far about traditional costing and activity-based costing with the target of the thesis in order to justify the need to perform this kind of activity-based research. Currently the overhead cost that is the maintenance manager has been allocated into the cost object (maintenance sale) by including it in the hourly rate of the fitter. What this means in practice is that the more time the installation takes, the more it is assumed that the maintenance manager participates in it. While this is a justified approach, especially when it is logical that the more complicated the maintenance, the more time the manager also needs to invest in it; it still assumes that all of the activities inside the process are similar among the cost objects. As the case here is the new sales method, which affects the indirect costs allocated into the hourly rate, but only in a part of the cost objects, one can no longer safely assume that the costs are correctly allocated, if the cost objects clearly no longer consume the same amount of indirect resources. For this, activity-based costing offers a way of following the actual costs caused by the consumption of these resources by activities.



Graph 10: Traditional and ABC-overhead allocation

The above graph shows the difference between the traditional and ABC-ways of allocating the overhead costs incurred by the maintenance manager into the cost object. In the traditional side, the cost is allocated into the maintenance hour, as justified before, and in the ABC-side the cost object has been changed into an individual maintenance sale, based on the thesis objective, which was to find out the total actual impact of the PSR-package into the overhead costs. With the aforementioned findings and with the help of this graph, one can deduce that the use of either of these costing methods can be justified as their respective cost allocations enable the covering of the total overhead costs, but the strength of activity-based costing here is that it provides the management with more information about the activities inside a cost centre while also providing more accurate numbers for the financial staff to work with regarding e.g. pricing or profitability analysis.

### 6.1 Gathering the data

The data gathering was preceded by the acquisition of research permission from the manager of the to-be-interviewed maintenance supervisors. The research permission was quickly obtained and the manager confirmed that the interviewees were the correct persons for the research, further implying that one in particular had considerable expertise on the particular focus area of the research. After that, the interviewees were contacted and preliminary interview times were arranged. At the start of the first interview with the one supervisor that was the most apparent subject for the interview, it became evident that no further interviews would be necessary, as the first interviewee was also the only one in the KEF1-area (KONE Elevators Finland southern Finland area) that was familiar with the examined sales process, apart from a few people that had just recently been introduced to the method, but were not yet completely familiar with the process. Thus the target group of the research consisted of only one person, but as the person was also the only one involved in the KTOC-sales process, this would not negatively affect the research i.e. provide incorrect results in contrast to the original plan. The target of the interview was to survey the activities involved in the different sales methods and provide the time consumed by each of these activities. The acquisition of feedback regarding the KTOC-process was also necessary in order to gain insight into the other cost-reducing aspects of the process.

The questions that were written down in order to support the interview were as follows (these were not used directly as such in the interview, they were only written down as guidelines to support the interviewer and to keep in mind the facts that needed to be cleared in order to gather sufficient data for the research):

- 1) Can you estimate the time used spent preparing service repair sales?
  - Structuring between sales, management duties, training and other operational activities
- 2) How has KTOC implementation affected this time use?
  - KTOC vs. old sales method, first-hand information about the process
- 3) Can you estimate how much time it takes to prepare a sales order in KTOC; PSR and non-PSR?
  - Example case (e.g. KRM), for comparable data
- 4) What do you see as the advantages or disadvantages of KTOC, PSR, and the older sales methods?
  - To see other impacts of KTOC and PSR

The interview revealed that the KTOC-sales process itself was not too widely used, but in addition to that, the PSR sales method was only used by the interviewed supervisor and no one else and also revealed some reasons behind this. However, this did not affect the reporting of the actual impact of PSR in sales overhead costs, as they were now much easier and more reliably traceable, since the only one performing the PSR activities was being interviewed. The main question of the research, the impact of PSR on sales overhead costs was thus clarified by creating a PSR sale with the supervisor and recording the time used. It was decided beforehand that the PSR to be analysed was KRM (KONE remote monitoring system), as it was the most sold PSR, since it was quite a straightforward installation and did not require too much analysis of the maintenance site or target elevator. The time used by the PSR transaction in selling a KRM-package was four minutes, and when it was compared to a sale done material-by-material, the material-by-material sale took on average 30 minutes. This significant difference could be explained by the lengthy process of the material-by-material sale, where the first step was to insert the elevator number into the Minerva data system (Data system in use that lists GSS offering spare parts), after which the system would show the suitable spare parts which would need to be analysed and added one by one into the KTOC-system and combined with the installation hours in order to calculate the total sum for offer, after which there would still be the need to create a sales text for the offer. Whereas the PSR-package already included all of these texts and it could be brought up simply by inserting the elevator number into the KTOC-system. The manual offer creation did not differ much from the material-by-material KTOC-method time-wise, but there were quite a number of causal connections to other overhead incurring activities, which will be discussed in the next chapter. This part of the interview covered the activity-based tracing of overhead costs regarding the PSR sales process, but the interview also revealed some points defending the KTOC process in general compared to the old sales process.

KONE Elevators Finland had the need to gain data for supporting the transition from the old sales method into the KTOC-system, hence the interview aimed to also clarify the situation in regards to the differences between these two methods. As there was no apparent saving in the time consumed by the sales process in these two cases, there was a need to delve deeper into these two processes, and by doing this quite a number of reasons were found that supported the use of KTOC rather than creating manual offers based on old offer forms. The most apparent benefit of the KTOC-system was that when an offer was created in KTOC, it would be visible to everyone browsing KTOC, removing possible miscommunication between supervisors creating offers. A practical example of this was that the interviewed supervisor did roughly 2-3 sales offers per month unnecessarily, as someone else had already made an offer manually, but there was no trace of it anywhere else than on the desk of the supervisor that had made the offer. This in itself already would be a cause for wasted indirect costs, as the order creation itself consumed an average of 30 minutes. This kind of double work would also damage customer relations; if there were e.g. three people tracking one sales lead inserted into the system by the fitter and none of the offers were stored anywhere, the worst case scenario would be the customer receiving three different orders with three different prices for the same maintenance issue. In addition to the aforementioned reasons, also e.g. sick leaves could be easily handled when all open offers were visible in one system so that other supervisors could continue working on urgent cases with the correct information on what had previously been done.

The second part of the data gathering comprised of acquiring the maintenance sales volumes from the target company, while also acquiring the hour rate calculation, as it was where the overhead cost of the maintenance supervisor was allocated. In addition to this, the total estimated cost of the maintenance supervisor was acquired in order to compare the actual cost in the sales process to the allocated cost. These would then be used in unison with the interview results in order to portray the impact of PSR on the sales process and analyse the happened and potential impact of the PSR method in regards to the labour costs incurred by the use of the supervisor's working time.

## 6.2 Analysing the data

Based on the data gathered, the total number of maintenance transactions completed during the observation period was 1200, of which 69 were PSR sales and from these the number of KRM sales was 56. This is important to note, since the PSR sale that was timed during the research was a KRM sale, so the impact of the 13 other PSR transactions are not taken into account in order to ensure the results are not distorted. In order to view the impact of the KRM-package in the overhead costs in total, the first calculation will measure the actual overhead caused if the KRM sales were not PSR-packages. In these calculations the cost of a maintenance supervisor is assumed to be 6000€, which will be divided per hour with the assumption that the supervisor works 160 hours per month on average. The allocated supervisor cost in this scenario is, per the hour rate calculation, 3,25 € per installation hour, and one KRM-maintenance sale contains six installation hours. An example of the hour rate calculation can be found in appendix 1.

Based on these assumptions, one can calculate as follows:

Supervisor cost per hour:

$$6000\text{€} / 160 = 37,5\text{€}$$

Allocated supervisor cost per KRM sale:

$$6 \text{ hours} \times 3,25\text{€} = 19,5\text{€}$$

Total allocated supervisor cost in KRM sales:

$$56 \times 19,5\text{€} = 1092\text{€}$$

This is the allocated cost at the moment in KRM sales, and will be compared to the actual costs in both PSR and non-PSR sales. For non-PSR sales one can calculate as follows:

KRM sales time material-by-material:

$$56 \times 30 \text{ min} = 28 \text{ hours}$$

Actual supervisor cost incurred by KRM sales in this scenario:

28 hours x 37,5€ = **1050€**

And for PSR sales as follows:

PSR KRM sales:

56 x 4 min = 3 hours 44 min

Cost incurred by KRM sales in this scenario:

3 hours 44 min x 37,5€ = **140€**

From these calculations one can see that the impact of PSR is significant in the case of actual overhead incurred from the sales activity, as the actual resources saved in the case of 56 successfully utilized KRM-PSR:s is 910€ (1050-140€). The calculations also show us that the implementation of PSR provides a significant pricing (or other) advantage when compared to the allocated supervisor wages. As this research only treats KRM packages as PSR packages since that has been closely examined, one can calculate the total impact of these PSR sales on actual sales overhead costs by calculating the total costs in a scenario with no PSR as follows:

Total actual overhead cost in the case of no implemented PSR:

1200 sales x 30 min = 600 hours x 37,5€ (Supervisor hourly rate) = 22 500€

And comparing them with the savings accumulated by PSR:

Savings accumulated by PSR in comparison to total actual overhead:

$910€ / 22\ 500€ = 0,0404 = 4\ %$

One can thus see that there is a 4 % saving in actual sales overhead costs (generated by the supervisor) by just implementing one PSR package into the day-to-day maintenance sales offering of a KONE frontline. While this might seem like a small amount when looking at just the monetary value, it should be noted that this research was based on just the southern Finland area of KONE Elevators Finland and there was just one PSR package that was actively used in the offering. As the total number of PSR:s in KONE GSS offering are in the thousands and there are many other KONE frontlines, it is clearly visible that with the help of PSR packages it is possible to significantly impact the sales overhead costs in frontline spare part sales,



consequently releasing resources for e.g. the generation of additional sales leads or into developing the PSR method itself.

### 6.3 Conclusions

The theoretical framework helped in gathering an impression about activity-based costing that turned out to be in reality very much alike to its theoretical counterpart. The same notions were made that were apparent in all of the literature, such as the difficulty of implementing activity-based costing and the lack of sufficient information about overhead cost allocation in traditional costing. The quality of the research was quite high, as the research question was defined accurately so there was no loss of focus at any time during the practical part and the precise definition of the target process helped in pinpointing the exact activities that were to be surveyed before comparing them with the historical sales figures, which were also quite straightforward, allowing for an accurate analysis of the actual costs without creating distortion in the results. The scheduling of the whole process succeeded quite well all in all, even though there was a bit of delay in the kick-off of the project due to the hectic nature of modern day work-life and the difficulty of matching calendars so that necessary preparations could be made. Despite this small delay, when the actual work could be started the process was executed very efficiently and even on par with the original schedule defined in the thesis plan, even though there was a two-week delay at the start. From a financial point of view, the thesis implementation was effective, as all the meetings that were held were effective and straight to the point, so only the least possible amount of human resources was committed to the progress of the thesis at all times, while maintaining a constant and efficient work pace with the least possible amount of downtime. Based on these observations, further implementation of activity-based management could very likely have a positive impact on profitability when executed properly, as also the different studies that have been done on it suggest.

The overall effectiveness of the implementation suffered a bit from slight delays that arose when the target of the research became more apparent and changes needed to be made in order to adjust the thesis into the new format, as is the case with most projects where one has to first familiarize themselves with the subject before being able to start working. However this served as a valuable lesson in that a concrete hands-on approach really is necessary if one is to succeed in gathering reliable information for activity-based costing and management. It also helped understand the effect a complex organization structure may have on information flow and proved that efficient communication between different units is the lifeblood of a large company.

Despite the aforementioned complications, or perhaps in a small part thanks to them, the results from the research provided valuable information on the current state of the PSR-sales

method and its benefits in KTOC sales. The positive impact of PSR on sales overheads became quite apparent even with just analysing the one PSR-package and thus the main objective was reached. In addition to this, the secondary objectives, which were introduced by KONE Elevators Finland, were also accomplished with the comparison of actual cost and current cost allocation and the gathering of the strong points of the KTOC-process in comparison to the old way of selling spare parts. The straightforward results from the analysis of PSR sales and the benefits of the KTOC-process provide a plausible basis for applying this kind of analysis into other frontlines if there is a need to study the benefits of KTOC and PSR more extensively. A preliminary data gathering sheet has been prepared for this purpose and can be found in appendix 2. The overall success of following a specific process and precisely allocating its overhead consumption also supports the implementation of a similar follow-up in other aspects of the business, for example in problematic budgeting units, in order to gain a more thorough understanding of on what activities the time of an employee is actually spent and how much does each activity actually cost to the company, thus allowing for an accurate analysis of where to spend the available human resources.

From analysing the implementation process itself, one can deduce that:

- I. The implementation of activity-based costing requires involvement from all the parties affected, but does not necessarily need many dedicated workers, as the data gathering can be done collectively with a single organizer
- II. When properly planned, the committed resources can be minimized by effective process management, allowing for valuable data regarding processes to be gathered without consuming significant amounts of resources
- III. Even on a smaller scale, the activity-based approach into support functions offers valuable and previously unseen information about the process examined, allowing for more accurate process management and development
- IV. PSR has a significant impact on the sales overhead costs incurred by the supervisor, as it removes many time-consuming activities from the sales process, such as the creation of sales texts (See the 4% saving on total overhead cost per the examined period)
- V. The KTOC-system prevents double work and helps in maintaining customer relations by maintaining a database of sales actions that can be easily followed by all the users of the system, consequently also helping with e.g. sick leave cases etc.
- VI. The need to communicate efficiently all the changes in different processes inside an organization is vital to ensure that everyone has the same understanding about the

actual goals of different actions in order to efficiently implement all the tools available on different organizational levels. This was especially highlighted in that the use of PSR-packages was not common at all in the researched company, even though the aim of the packages was to benefit all the involved KONE parties.

In regards to follow-up actions on the part of KONE GSS and KONE Elevators Finland, for KEF, further and more thorough follow-up on larger scale could be suggested in surveying the activities done by the maintenance supervisors in order to gain more concrete results on the indirect disadvantages caused by not implementing KTOC, which could then be used to further validate the use of KTOC in all maintenance-related sales and justify the potential costs that would incur from extending the training of KTOC-use to all maintenance supervisors in Finland. Consequently this would also offer a chance to collect feedback on the PSR-process in order to develop it further while also providing a larger research group for surveying the actual savings accumulated by both the KTOC-system and the PSR-sales packages. For GSS, The need to communicate more effectively with frontlines became apparent in this particular case, since there was only one PSR-package actively used in spare part sales. It was found that there was valuable feedback available on the development of the PSR-packages, such as the problem of using the pre-defined PSR installation hours when all the maintenance sites are different, but it was also apparent that the actual aim of PSR was not made clear to the people that were supposed to be employing it, thus there were some preconceptions that prevented a deeper perception of the entirety of the Packaged Service Repair method. In regards to this there could hence be a need to market the idea more thoroughly to the end-users in order to ensure that the method is equally well-known by everyone participating in the process, thus ensuring that PSR can be employed to its full potential and allowing for interaction between the developers and the end-users so that it can be developed even further.

The follow-up actions can be summarized as follows:

- I. For KEF: A large-scale research into the double work caused by not using KTOC would allow for more concrete figures on the actual costs incurred and also allow for the analysis of the impact of this kind of double work on customer relations.
- II. For GSS: This kind of large-scale research done by KEF would offer an opportunity to gather feedback about the PSR-packages and allow for a more accurate analysis of the impact of PSR.
- III. For GSS and KEF: This research would allow for hands-on marketing/communication about the essence of PSR in benefiting all the KONE parties

involved, potentially increasing the volume of PSR sales.

- IV. For GSS: The essence of PSR should be taken concretely to the operational level and it should be examined whether the case depicted here of PSR sales volumes being lower than expected is true also in other frontlines. This information could then be used to plan for the marketing of PSR in order to reach the sales volumes targeted.
- V. For GSS and KEF: The potential of implementing activity-based costing to other support functions should be assessed, as in this case relatively little work was needed in order to gain concrete information about the effectiveness of a particular process. (Appendix 3 depicts a simplified example of activity-based management and activity-based costing implementation step-by-step.)

Regarding the learning of the thesis worker, this thesis provided an understanding of the underlying processes in management accounting and cost management, forming a basis for further studies in the area. Examining management accounting and activity-based costing supported the knowledge gained from earlier studies in management in general and financial management and extended the view on even the most simplistic day-to-day processes that happen in a company by introducing the cost aspect into them. The practical work also provided a great deal of information regarding KONE spare part business and especially the front-line sales process. The main theoretical subject of activity-based costing was also viewed closely from a practical point of view while implementing the data gathering and emphasized the choke points of the process while also providing hands-on information about the workload involved in this kind of follow-up of individual activities. The theoretical studies helped broaden the view on business management along with different methods of cost management and could in the future prove valuable when further examining different methods of management by allowing for comparison with activity-based management.

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## Appendix 1. Hour rate calculation in maintenance sales

Total	100,0 %	75,00	
	35,2 %	26,40	Direct wages
	4,3 %	3,25	Supervisor wages
	24,3 %	18,23	Indirect wages
	3,2 %	2,38	Indirect wages, supervisor
	15,9 %	11,90	Labour employer costs
	2,1 %	1,58	Labour employer costs, supervisors
	13,3 %	10,00	Other variable costs
	1,8 %	1,35	Other variable costs, supervisors

This picture depicts an example of allocating costs into the hour rate fee. It is similar to the one used in the calculations of this thesis, but has been heavily modified in order to not reveal delicate information about the business strategies of the target company.



Appendix 2. Data gathering sheet for similar analysis

**Impact of PSR on sales overhead costs incurred by maintenance supervisor**

**1. Activity follow-up on the time it takes to create a PSR sales offer and a normal KTOC sales offer**

Example case: KRM PSR

Sales time:

KRM (or similar) sale without PSR

Sales time:

**2. Comparison of sales times in regards to overhead cost**

KRM PSR sales time \* hourly rate of maintenance supervisor = x

Non-PSR sales time \* hourly rate of maintenance supervisor = y

$y - x = z$  = impact of PSR on single sale

**3. Total impact of PSR on actual sales overhead**

$z * \text{actual PSR sales (or potential PSR sales)}$  = total actual (potential) overhead savings

**4. Comparing actual PSR overhead into allocated overhead**

Allocated overhead - actual PSR overhead = potential resources released for other actions, e.g. new sales

### Appendix 3. Activity-based management process

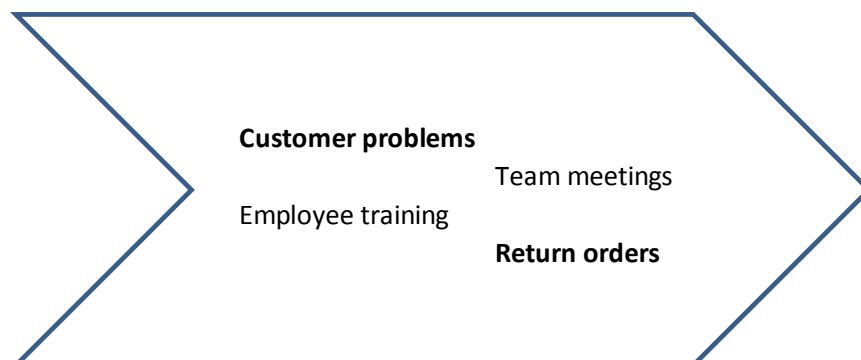
The process begins by creating a process flow-chart that depicts all the processes inside a business unit:



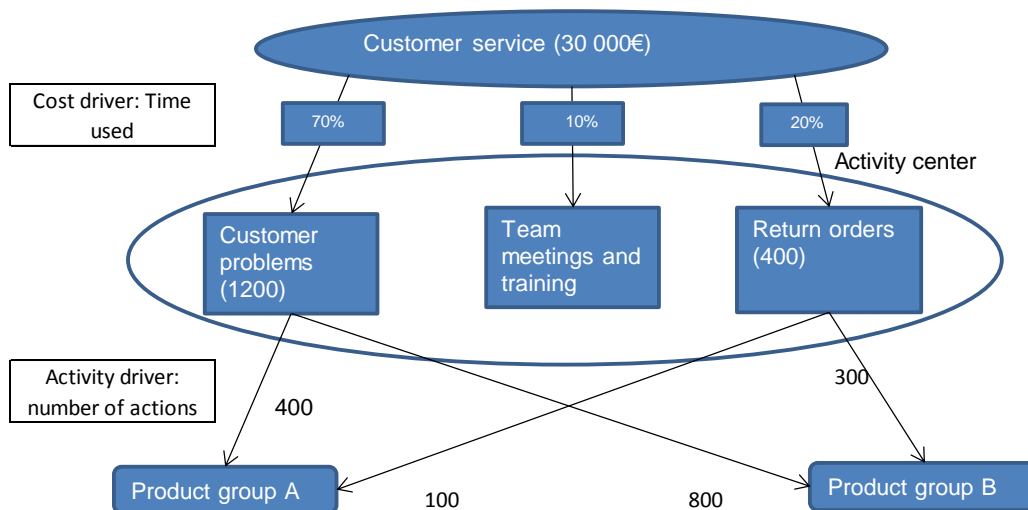
After this the value-added and non-value-added properties of the different processes may be assessed, or the one to be further analysed may also be selected based on other reasons, e.g. relatively high costs compared to sales volumes etc.



In this example the Customer service-process will be examined more closely, even though it can be seen as a value-added function from the customer's perspective, but as alternative issues may be the reason behind activity-based analysis, the case could be here that customer service has had a significant increase in overtime labour costs in the past months. Thus the customer service function will be dissected by means of activity-based costing.



The first step is to see what activities are happening inside the customer service process. This step requires hands-on experience from the people involved in the process in order to get the actual information on the activities. In this example there are four activities inside the process, which will then be researched by means of activity-based costing.



In the above picture the activities inside the customer service process have been examined by way of activity-based costing. This kind of information could be gathered by examining data from internal accounting, if there is such available for e.g. number of return orders handled, and by interviewing/observing the daily activities of the customer service function.

From the activities, customer problems and return orders can be directly linked to product groups, so they have been assigned their own activity drivers to allocate the actual costs from them into the end-products. Team meetings and training are viewed as an essential part of the function that cannot be directly linked to different product groups even by activity drivers without extremely detailed research, so they will need to be allocated traditionally e.g. by dividing them equally by end-products.

What is significant in analysing the activities that are linked here to the end-products is that product group B seems to be causing the most of the customer problems and return orders. By way of traditional costing this kind of information would not be available. From this information the manager could then draw different conclusions, such as that product group B has an issue and it should be pulled from the selection, or perhaps more importantly, that as customer problems use 70% of the customer service's time, there is a need to develop the problem handling process in order to release resources from it to other functions.

To see the impact of product group B customer problems in monetary terms, a simple calculation will do:

Cost committed to customer problems:

$$0,7 \times 30\,000\text{€} = 21\,000\text{€}$$

Percentage of which used by product group B:

$$800 / 1200 = 67\%$$

Resources committed to customer problems regarding product group B:

$$67\% \times 21\,000\text{€} = 14\,070\text{€}$$

This kind of calculation will further help in analysing the potential cost that can be allowed for creating an alternative for releasing committed cost from customer problem solving. The same calculation can be done for return orders caused by product group B ( $0,2 \times 30\,000\text{€} \times 0,75 = 4500\text{€}$ ), ultimately showing the total resources committed to handling product group B-related issues to be 18 570€, which is 62% of the total resources committed to the customer service function.

The things to consider when examining a process:

- I. The cost driver should be easily traceable and directly linked to the activity (in employee functions time used is most common)
- II. The activity drivers should be easily traceable and directly linked to the demand i.e. end-product/cost object
- III. There can, and should, be multiple end-points for costs driven with activity drivers from activity cost pools, i.e. the cost objects should not be overly generalized