

# Activity-Based Costing and management in the supply chain

## An expired hype or an undervalued tool?

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Breda, November 2009  
Our ref.: 9024D189/IS/ld v1.0  
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## 1 INTRODUCTION

Independent of the economical climate, there is an increasing necessity for companies to have transparency of cost in general and insight in the aspects influencing these costs. The world is getting smaller and competition is growing.

The objective of the white paper is to provide understanding on how activity-based costing or even better activity-based management can help to gain this knowledge, how it can be used to the advantage, but also what the limitations are. So the objective of the paper is to answer the central question: is activity-based costing an expired hype or an undervalued tool?

The question is answered by giving a view on the background, potential issues and approach of an activity-based project (chapter 2). But also by discussing a business case with AkzoNobel. The purpose is to get a more pragmatic view (chapter 3), supported by the business case. At the end of the white paper some systems and tools are briefly reviewed followed by a general conclusion.



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## 2 ACTIVITY-BASED COSTING AND MANAGEMENT

Let's further explore what activity-based costing and management are and how they can be used.

### 2.1 What is activity-based costing and management?

Activity-based costing (ABC) has been developed by the industry in the US already in the 70's and 80's. It has gained broader awareness in businesses around 1988, when Cooper and Kaplan published a number of articles in the Harvard Business Review.

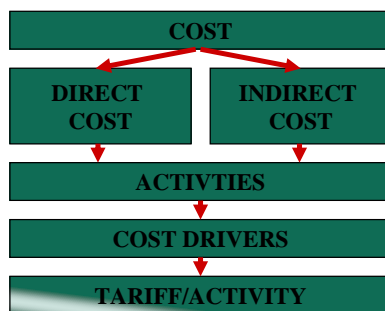


FIGURE 1: TRADITIONAL ABC

In figure 1 the basic principle of traditional activity-based costing is demonstrated which is that all cost categories (e.g. personnel related cost, IT cost, building cost etc.) are assigned to activities. Additionally drivers are specified which determine the cost level, like orders, order lines, number of products or square meters. Through the cost per activity and the volumes of the drivers, a tariff per activity can be calculated. Traditional activity-based costing is focusing on the assignment of all costs to activities.



Activity-based management (ABM) is cost management based on the information out of ABC. This can be to improve efficiency and reduce cost via for example value chain study and reengineering but also investigation of customer/product profitability.

Originally, activity-based costing was mainly focused on production companies. Nowadays it is also implemented in types of business it would not be expected, like hospitals, libraries, in large banking and telecom firms. Also in logistics, there are developments around activity-based costing, yet often it is still considered a financial tool. This is unfortunate, because although ABC is a cost analysis tool, it can be a great help for operational managers.

### 2.2 Different ways to use ABC → activity-based management

There are many different ways of activity-based management, which can be split in two main groups as displayed in figure 2:

1. Cost allocation handles the process of allocating cost of a department/organization to a certain customer and/or product. The outcome of activity-based costing can be used to determine the allocation. ABC is typically used to influence customer behavior and to assign cost as fair as possible.
2. Another method of activity based management is cost reduction and analysis for which the outcome of the activity-based costing can be used as well. In this group the objective of using ABC is mainly to influence behavior within the department/business itself.

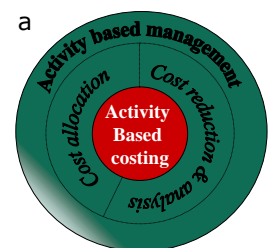


FIGURE 2: ABC VS. ABM

### 2.2.1 Cost reduction and analysis

Understanding your cost is a vital prerequisite of being able to reduce cost. An important feature of activity-based costing is providing this knowledge.

But this is definitely not the only aspect, maybe not even the most important one. Other ways of activity-based management in this category are:

- Gain knowledge on resource utilization
- Examine customer/product profitability
- Raise in- and external understanding of departmental cost drivers
- What-if analysis
- Support customer cost reduction
- Internal benchmarking.

Within different types of businesses and business functions, ABC can be used to gain knowledge on resource utilization, for example:

- In libraries, activity-based costing is used to assign cost to the different types of loaning, like internal borrowers versus interlibrary loans. It gives library management more understanding on how their scarce resources are being utilized. For hospitals it can be used in the same way for different types of patient services, in banks for client services.
- Production companies use activity-based costing to improve cost estimation and, as mentioned before, for a customer/product profitability study. The last function can also be used for other businesses functions like logistics.



A specific concern for departments/businesses is that customers, corporate management and other departments within the business, do not have a clear understanding on how (order) behavior impacts the efficiency and cost of the processes. Activity-based costing can help to build this understanding by:

- Using information from activity-based costing for what-if analysis to show the cost impact of changes in for instance batch size.
- Presenting and explaining the cost implication of using a particular order type and/or transportation mode. E.g. based on ABC it can be explained why an emergency order or air shipment is more expensive to pick/pack than a regular order.
- Compare, analyze and present the cost per unit of similar customers.

The information can also benefit customers because they can be advised on how to reduce their own cost.

An additional aspect is that the outcome of ABC can be used for (internal) benchmarking of the efficiency of activities. For example by comparing the tariff per activity between different sites of the same business.

This can only be applied when it is assured that the basic principles of the activity-based costing models are exactly the same. Meaning that the cost categories and the cost drivers used, need to be exactly aligned.

## 2.2.2 Using activity-based costing for cost allocation to (internal) customers

As mentioned before a specific type of activity-based management is the allocation process.

When a department is considered a cost center it can be decided to allocate the cost of the facility/department to the (internal) customers or products.

Before the introduction of ABC, overhead cost was mainly covered in prices, via a mark-up based on a fixed percentage decided by controllers. This process is referred to as an allocation process. Figure 3 represents the process and where ABC can support. If the allocation process is already in place, but the cost allocation is not based on ABC but for example on percentages, activity-based costing can be applied to double check if the commercial agreements are based on the right drivers and methodology.

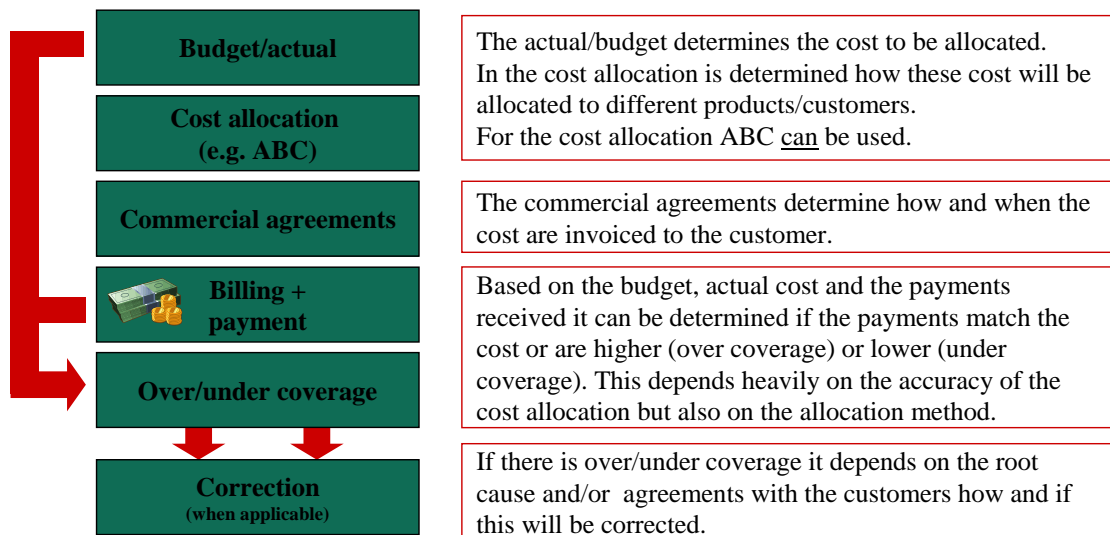


FIGURE 3: COST ALLOCATION PROCESS

## 2.3 Concerns related to activity-based costing

When looking at the concerns around ABC, experience shows two major concerns:

1. Requirements around data availability
2. Level of complexity.

### 2.3.1 Data availability and level of complexity

Access to and transparency of information are important enablers for activity-based costing. This is related to both cost and business volume data. Regarding cost data it is important to differentiate cost on the correct level, for example to be able to identify cost of equipment versus packing material. In many circumstances departments and cost centers are not aligned, complicating the data collection. In addition the level of quality of the activity-based cost model is often confused with the level of detail.

As an example: in a logistics environment where order pickers, forklifts and reach trucks are used it can be useful to assign the cost of the equipment to the different activities like inbound, pick/pack etc. separately by type of equipment (reach truck, order picker etc), as reflected in option A of figure 4.

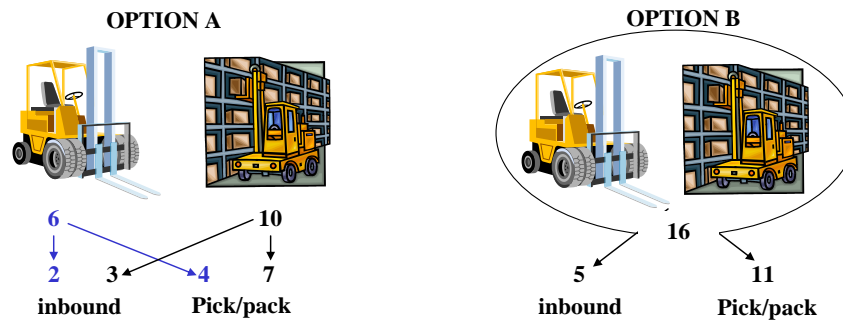


FIGURE 4: DIFFERENT LEVELS OF EQUIPMENT ALLOCATION TO ACTIVITIES

Another option is to group all logistics equipment into 1 category and assign pieces of the group to an activity, as reflected in option B of figure 4.

Comparing the 2 options:

- Option A seems more accurate but cost data on this level of detail is often not available.
  - Option B is less complicated and total cost of equipment is usually on hand.
- Experience has learned that the impact on the tariffs, by using option A, will be marginal.

The same is valid for information requirements around cost drivers. Most companies know exactly how many units they produce of a certain product, how many orders they have processed, how much patients they have treated or how many books they have loaned. Going into a more detailed level of information on for instance number of shipments, full or mixed pallets or extracting specifics on customer level can be complicated. Solutions are to:

- Change to a different level of detail
- Use the operational experience available to make some assumptions.

If the data issues are related to information on customer level, ABC can still be used to demonstrate what happens if the activity level of a certain cost driver changes. In general, data availability and level of complexity are critical, especially when updating the model regularly. Important is to be aware of this and not to overcomplicate (keep it measurable, repeatable and transparent).

### 2.3.2 Concerns around cost allocation

When using ABC for cost allocation to customers there can be additional issues like how to deal with:

- Fixed/indirect costs
- Over- and under coverage
- Customer changes impacting other customers.





One of the issues related to cost allocation is how to handle indirect/fixed cost. The problem is that when a fixed cost is allocated to a customer based on one (fixed) tariff, the actual cost will appear to be variable.

For illustration:

A production company has a dedicated building. There are no options related to rent. 50% of building costs are assigned to pre-assembly. The cost driver for this activity is the number of products assembled. Customers of the activity are invoiced for building cost based on the number of products they have assembled multiplied by a fixed tariff. The tariff is determined yearly based on the budget. When pre-assembly decreases, the allocated cost to these customers decreases as well. So the building cost appears to be variable. However the space used and paid for has not changed, leading to under coverage of the cost of the building, being the second concern mentioned above. here are different ways to deal with coverage issues, like:

- Not assigning fixed costs and allocating them to a customer separately
- Working with variable tariffs.

The first solution seems to be in contradiction to the objective of traditional ABC, which is focusing on the assignment of indirect cost to activities. Nevertheless in most cases even only assigning variable cost to activities is a big step forward compared to the situation before implementing activity-based costing; assigning all cost based on percentages.

A disadvantage of working with variable tariffs is the impact of changes in the activity level of one customer. These changes can cause a tariff modification for all customers. Which is the third concern related to applying cost allocation: how to deal with changes of a certain customer impacting other customers. Having a tariff by customer increases the level of complexity of the model which is not desirable either.

Over- or under coverage can also occur on direct cost when there is a limit to the variability of cost. For example in personnel related costs, because of limits in the headcount elasticity (e.g. the number of temps). When an organization does not have temporary employees it can be difficult to accommodate a reducing workload by reducing headcount (because no more temps are available and reduction in fixed personnel is not an option). In such a case, a solution to prevent coverage issues is to have a separate tariff by volume range. Another option is to agree with customers on periodical credit or debit notes based on actual cost and activity levels.

The role of a team working on an activity-based costing project is to look at all these issues and come up with the best solution. Key is that all solutions are incorporated in the commercial agreements covering the cost allocation.



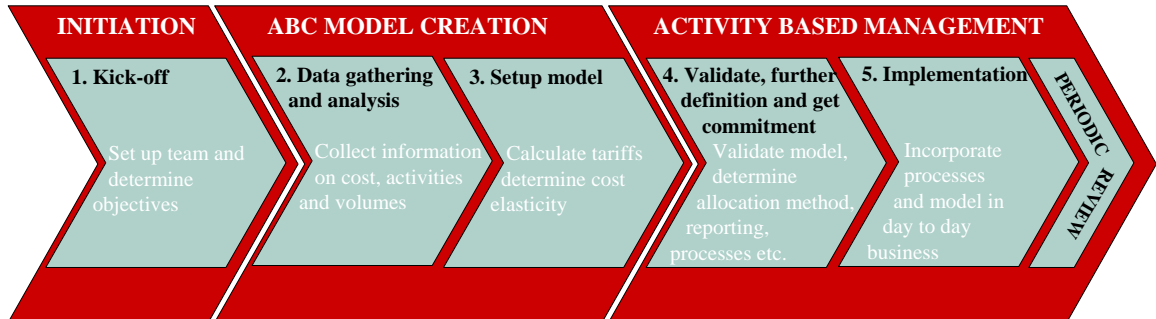


FIGURE 5: HIGH LEVEL PROJECT STEPS

The concerns identified are manageable via a solid and pragmatic project approach as visualized in figure 4. The project approach will be further explained in the business case, in the next chapter.

### 3 BUSINESS CASE AKZONOBEL CAR REFINISHES



AkzoNobel Car Refinishes is a world leader in coatings for car repair and commercial vehicles. The International Distribution Center (IDC) is located on the site in Sassenheim (NL), which is also a production location. The warehouse delivers in some countries to regional distribution centers and in others to end users, branches and/or distributors directly.

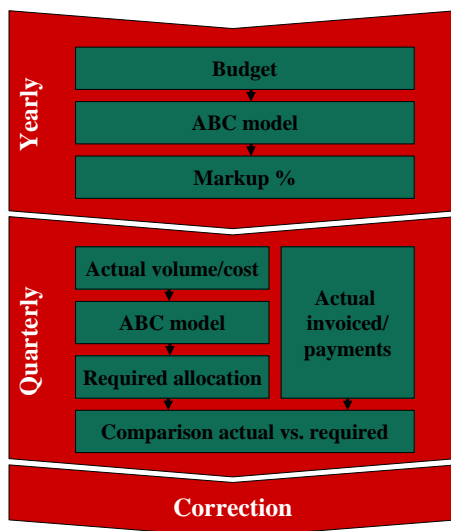


FIGURE 6: ALLOCATION PROCESS IDC

Within AkzoNobel Car Refinishes an allocation process is in place which is visualized in figure 6. The allocation process assigns the cost of the IDC to the sold-to countries. Part of the process is an activity-based costing model, used for two purposes:

1. To determine the expected cost allocation based on the forecasted cost and volumes which determine the mark-up.
2. To allocate costs based on actual volumes.

The ABC model initially used assigned different costs to activities based on percentages. It was considered complex and there was a lack of trust in the accuracy of the model by AkzoNobel.

For this reason a project was initiated to develop a new ABC model. Allocation method and commercial agreements were out of scope.

There were 2 main steps recognized within the project:

1. Creation of the ABC model blueprint
2. Model validation.

### 3.1 Blue print creation

The objective of the blueprint is to have an overview of all activities, costs, volumes, resources etc. which are the basis of the ABC model. To come to the blue print several steps were required as indicated in figure 7. First step is analyzing and grouping the cost. First the costs were divided in direct and indirect cost. A decision was taken to only categorize cost as direct, having a high level of dependency on operational drivers. The background was to avoid unwarranted over or under coverage as much as possible.

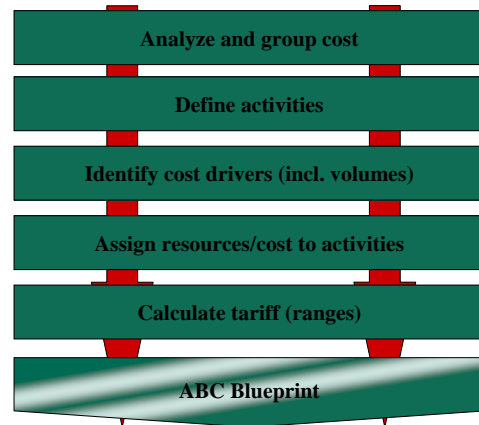


FIGURE 7: DETAILED STEPS  
BLEU PRINT CREATION AKZONOBEL IDC

As mentioned earlier, the warehouse is located on a production site. Consequently a big part of the warehouse costs (aprox. 15%) are site allocations which are determined and fixed on a yearly base. Including these costs in the tariff would lead to unjustifiable over- or under coverage.

The result of the cost analysis was that 50% of the distribution center cost was classified as direct and 50% as indirect. The project team decided to allocate direct and indirect cost to the sold-to countries separately and based on a different method.

The level of allocation (on region, sold-to or ship-to level) is driven by the level of detail of the data collection and less by the model itself. The data is extracted out of SAP on destination level enabling grouping on every level required (region, ship class, country, sold-to or ship to level).

#### 3.1.1 Direct Cost

Direct costs were first divided in two groups, being workload related and usage costs. Both groups are allocated to the (internal) customer based on cost drivers (as further detailed in table 1). They included:

- 75% of all personnel related cost, which were all defined as workload related
- Pallet usage cost
- Cost of packing material (usage cost)



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Cost driver	WORKLOAD RELATED									USAGE COST			
	Inbound	Outbound							Admin	Pallets	Packing material road	Packing material sea	Packing material air
		Full pallet retrieval	WMS ops.	Case pick & pack	Pick & pack air shipment	Check & loading	order mgmt.	Export documents	Staf IDC				
	Pallets in	Full pallets	Order-lines	Order-lines mixed	Order-lines air	Pallets out	sold-to-days	Export sold-to-days	sold-to-days	Pallets out	KG		
Full pallet/road/EU	X	X	X			X	X		X	X	X		
Full pallet/sea/export	X	X				X	X	X	X	X		X	
Air shipment/EU	X		X		X	X	X		X	X			X
Air shipment/Export	X		X		X	X	X	X	X	X			X
Mixed pallet/road/Export	X		X	X		X	X	X	X	X	X		

TABLE 1: ACTIVITIES (IN CL. COST DRIVERS) BY ORDER TYPE & DELIVERY LOCATION

For workload related cost the activities and the related drivers were determined. For usage costs the focus was on cost drivers. Because the IDC handles mainly hazardous material, the impact of shipment methods and order types on both usage and workload were carefully considered. Air shipments create a considerable extra workload. This also impacts the usage of packing material, which is subsequently split by transport modality.



Within the activity inbound no specific activities were distinguished. The cost driver for inbound was simply defined as number of pallets in. Main issue was that no inbound data was available which in the case of the IDC, was extracted out of SAP, on sales order and delivery level. This problem was overcome by finding the relationship between the number of in- and outbound pallets. It was decided not to increase the level of complexity of the model by adding for example mixed and full pallets even though these have a different inbound workload.

Not every activity/tariff will be applicable for every process flow as specified in table 1. Via the (SAP) data is determined whether an order is for full pallets, sea, air etc. It was decided not to differentiate tariffs between AkzoNobel headcount and temporary employees. Although within AkzoNobel the costs of these two groups have a major gap, it was determined to work with an average cost per employee.

Missing in the list of activities are storage and transportation cost which typically would be included in the ABC model of a warehouse. The allocation of transportation cost was outside the project scope. They are invoiced directly to customers at actual cost.

### 3.1.2 Indirect cost

As indicated earlier indirect costs are 50% of the warehouse cost to be allocated. Within AkzoNobel it was decided to classify building cost as indirect. Because building cost are fully fixed, but also because one of the main functions of the warehouse is to act as a storage buffer for the production, limiting the influence of the customer on the stock level. Other examples costs marked as indirect were management related personnel costs, IT cost and logistics equipment.

Since indirect costs are considered fixed, the proposal is to allocate them to sold-to countries yearly based upon fixed proportions. Consequences are that:

- Even if a customer does not order in a month, 1/12<sup>th</sup> of the indirect cost will be allocated
- Allocation of indirect cost will not result in over/under absorption compared to the budget.

For the cost driver kilogram (kg) ordered was chosen since this is most recognizable for a customer.

### 3.1.3 Cost elasticity

One of the main issues encountered when designing an ABC model for cost allocation, is how to deal with allocation results when (monthly) activities are starting to significantly differ from forecasted activities.

For direct cost the risk of over- and under coverage is limited by excluding cost which is considered fixed within a year. For AkzoNobel this meant that the direct cost per activity is fully dependent on the headcount cost. As a consequence coverage issues can be restricted by varying the headcount in line with volume fluctuation.

The decrease of the headcount based on (temporary) volume changes is limited by the number of temporary employees within the IDC. When only fixed resources are left, under coverage can only be prevented by raising the tariff. The other option is of course to accept the under coverage. Within the ABC blue print a section is included to demonstrate the elasticity of every activity. By showing which tariff is valid, in which volume range, to avoid coverage issues.

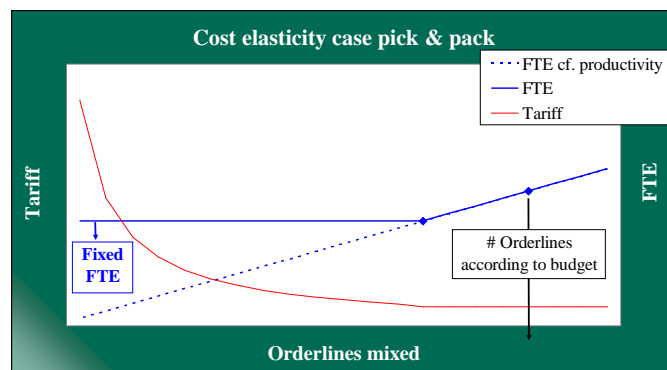


FIGURE 8: GRAPHIC VIEW OF COST ELASTICITY

On indirect cost the advice is to allocate indirect cost based on a fixed proportion (being budgeted volume in kg), therefore no cover issues can occur compared to budget. However not all cost categories in the indirect costs are fixed. They may be considered independent of the cost drivers, but can be different from the budget, e.g. repair cost.

Therefore in practice cover issues between the allocation and the actual indirect cost can still occur. Because of the unpredictable nature of the variability it cannot be handled via defining cost elasticity.

How to deal with coverage issues should be handled in the commercial/partnership agreements. Since the (internal) customer does not want to pay too much but the operations does not want to take the business risk and financial consequences caused by the varying volumes of the (internal) customer.

There is another way in which indirect cost can start to change considerably compared to budget. When there are significant changes in the business requiring extra equipment and/or (outside hired) space. Such major changes require review of the entire ABC model, which should be included in the allocation process description.

### 3.2 Validation and output

After the blue print creation (including cost elasticity) and the decision on how to deal with indirect cost, the second part of the project could start. The objective was mainly to validate the model and propose reports for future use, since the allocation process itself was out of scope. The model was validated in several ways:

- Comparison of allocation between old and new model
- Using the model for two what-if scenarios
- Report creation and validation of the output.



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Comparing the allocation result (in €), for several months, of both old and new model (both direct and indirect cost) illustrated both models gave approximately the same outcome. However the new model came to this outcome in a more transparent way. With the help of the model the impact of two different what-if scenarios was analyzed. The objective of the exercise was to get insight on the impact of (network) changes on cost and resources. In one of the scenarios a distribution center was closed, shipping directly to customers. This is leading to an increase of the total and mixed order lines and number of pallets out within the IDC. However the number of full pallets out would decrease. In the original blueprint the cost driver for administrative activities was ship-to days. Representing the number of days a customer would be delivered.

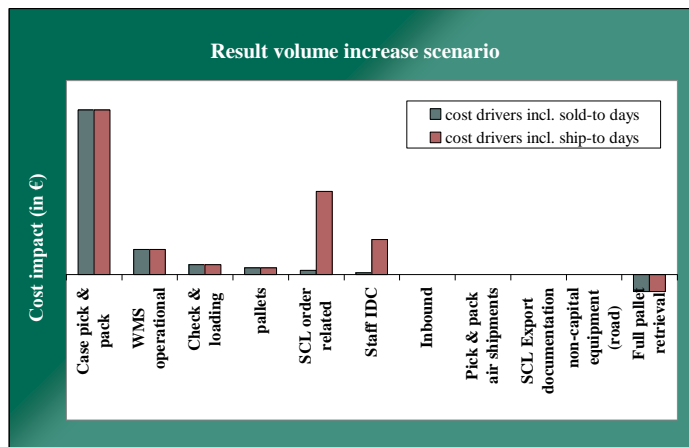


FIGURE 9: GRAPHIC VIEW RESULT WHAT-IF SCENARIO 1

Closing the regional distribution center would increase the number of customers delivered from the IDC and therefore the ship-to days.

According to the ABC model, this would result in an increased workload of the administrative tasks and extra resource requirement. However in practice no impact in administration was expected. Therefore the initial cost driver was incorrect and changed to sold-to days (representing the number of days a sold-to country is delivered).

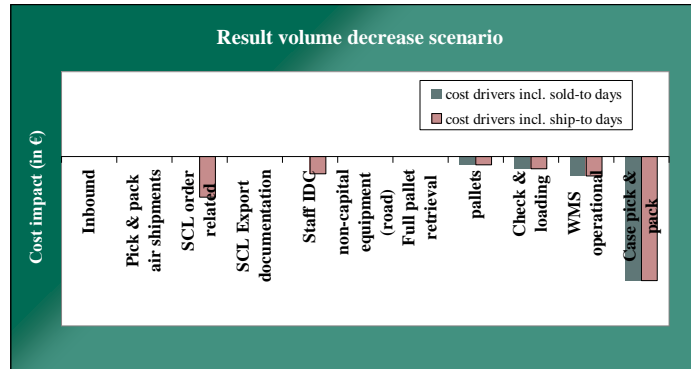


FIGURE 10: GRAPHIC VIEW RESULT WHAT-IF SCENARIO 2

In the other what-if analysis the orders for a distributor were consolidated in stead of shipping them to three different locations, resulting in a decrease in total and mixed order lines and number of pallets out. Impact on full pallet retrieval was marginal.



The total number of kilogram shipped by the IDC does not change in either of the scenario; as a result there was no immediate impact on the indirect cost.

The final validation, of the ABC model, was completed by creating reports based on actual data and evaluating the results. The following reports were proposed:

1. Actual versus budget comparison:
  - a. On cost/activity level
  - b. On customer level
2. Order pattern comparison.

*1a. Actual versus budget comparison on activity level*

This report is considered interesting for both financial and operational departments. For one, it provides the opportunity to evaluate the operational effectiveness, by comparing:

- Actual versus budget cost
- Cost according to ABC calculation, versus actual cost
- ABC allocation, actual cost and the invoiced amount (customer payments)

JANUARY '09							
	1/12 Budget	ABC Allocation	ABC result	Actual	Actual vs Budget	"Net result"	Invoiced amount
Personnel costs	€ xxx,xxx	€ xxx,xxx	€ x,xxx-	€ xxx,xxx	€ xx,xxx-	€ xx,xxx	X
Pallet usage	€ xx,xxx	€ xx,xxx	€ x,xxx	€ xx,xxx	€ x,xxx-	€ xx,xxx	
Non-capital equipment	€ xx,xxx	€ xx,xxx	€ x,xxx-	€ xx,xxx	€ x,xxx	€ x,xxx-	
<b>TOTAL DIRECT COSTS</b>	<b>€ xxx,xxx</b>	<b>€ xxx,xxx</b>	<b>€ x,xxx-</b>	<b>€ xxx,xxx</b>	<b>€ xx,xxx-</b>	<b>€ xx,xxx</b>	
<b>TOTAL INDIRECT COSTS</b>	<b>€ xxx,xxx</b>	<b>€ xxx,xxx</b>	<b>€ -</b>	<b>€ xxx,xxx</b>	<b>€ xx,xxx</b>	<b>€ xx,xxx-</b>	
<b>GRAND TOTAL</b>	<b>€ xxx,xxx</b>	<b>€ xxx,xxx</b>	<b>€ x,xxx-</b>	<b>€ xxx,xxx</b>	<b>€ x,xxx-</b>	<b>€ xxx,xxx</b>	

ABC Result details (Allocation vs. Budget)				
Cost Driver	1/12 Budget volumes	January '09 volumes	Δ Volumes	
			Numbers	%
Pallets in	x,xxx	x,xxx	x,xxx	xx%
Orderlines	xx,xxx	xx,xxx	-x,xxx	-x%
Full pallets	x,xxx	x,xxx	xxx	xx%
Cross dock pallets	xxx	xxx	-xxx	-xx%
Orderlines mixed	xx,xxx	xx,xxx	-x,xxx	-x%
Sold-to-days	xxx	xxx	-xx	-xx%
Total pallets	x,xxx	x,xxx	x,xxx	xx%
Orderlines air	xxx	xx	-xxx	-xx%
Export ship-to-days	xxx	xx	-xx	-xx%
<b>TOTAL PERSONNEL</b>				
Total pallets	x,xxx	x,xxx	x,xxx	xx%
<b>TOTAL PALLET USAGE</b>				
Air weight	x,xxx	x,xxx	-x,xxx	-xx%
Road weight	x,xxx,xxx	x,xxx,xxx	-x,xxx,xxx	-xx%
Sea weight	xxx,xxx	xxx,xxx	xxx,xxx	xx%
<b>TOTAL NON-CAP EQUIPM</b>	<b>x,xxx,xxx</b>	<b>xxx,xxx</b>	<b>-xxx,xxx</b>	<b>-xx%</b>

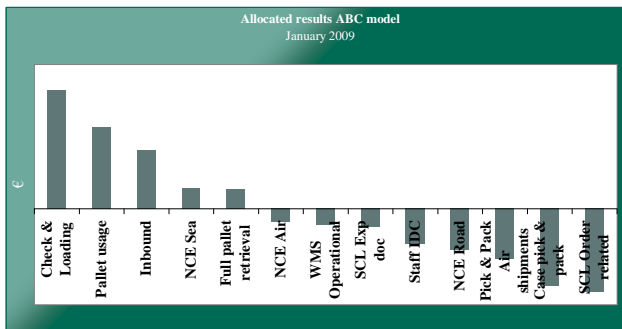


FIGURE 11: EXAMPLE REPORT ACTUAL VERSUS BUDGET COMPARISON ON ACTIVITY LEVEL



If the cost according to the ABC calculation is higher then the actual cost, this is a signal that the operational department has been more productive then expected, against the same cost. When both the actual cost and the ABC allocation are higher then the budget, this indicates that the operation has overspent but due to a higher level of activities, which immediately explains the discrepancy. The report includes details on the volumes per activity and graphs which help understand specifically which volumes are higher or lower then expected, including allocation consequences per activity.

The comparison between required ABC allocation and invoiced amount is an indicator for the correctness of the allocation method.

1b. Actual comparison on customer level

Since the ABC model is based on the budget, all information is available to compare during the year how customers are performing against their forecast. This can be done on a monthly base or year to date. The information can explain deviations

between actual cost and budget and help in discussions with customers on their volumes.

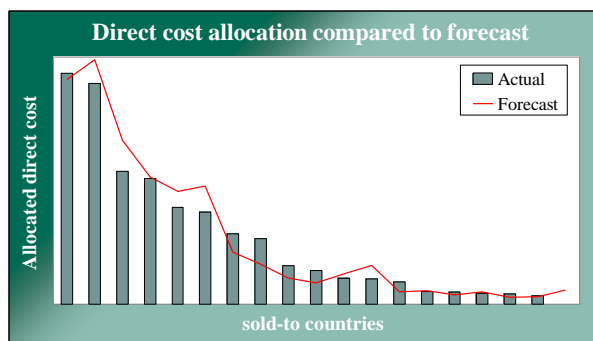


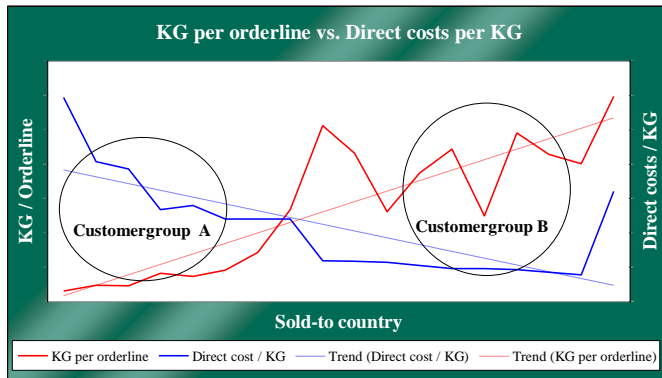
FIGURE 12: EXAMPLE REPORT ON CUSTOMER ACTIVITY

2. Order pattern comparison

The availability of data within the model provides an opportunity to perform other analyses which both benefit the customer and the operations department.



The IDC has different customer groups which cannot simply be compared with each other. Some countries still have a central warehouse, where in other countries the network is decentralized. The different network structures partly dictate the order pattern.



Yet comparison within a customer group identifies potential for cost optimization, through improving the number of kilogram/order lines.

Since certain customers within the group have a higher direct cost/kg and lower kilogram/order lines than others.

FIGURE 1.3: GRAPH TO COMPARE ORDER PATTERNS

This report was also used to validate the output of the ABC model. Both operations and customer representatives were able to predict the probable result of the analysis, based on their knowledge and experience. The value of the model and report is the ability to confirm and visualize for customer dialogue.

The outcome confirmed the validity of the model, completing the validation phase successfully. Except for some small changes in the cost elasticity and the change of the cost driver for administrative tasks, no major issues were detected.



### 3.3 Lessons learned and next steps

In summary the developed activity-based costing model for AkzoNobel looks like demonstrated in figure 14. The objective of the project was to develop a new ABC model:

- Supporting the allocation process
- On customer/destination level (rather than country level)
- With realistic prediction of cost impact of activity changes (what-if analysis)
- Reliable allocation of cost
- Suitable for cost comparison
- Enabling customer conversation on order patterns.

Although not explicitly mentioned the new model should be as simple as possible, since one of the disadvantages of the old model was that it was considered complex. The end conclusion of the team was that the model was meeting all the objectives of the project. The new model is less complex and more transparent than the old one. An additional benefit is the insight in the operational performance the model is providing, via the reports developed. During the validation the model proved to be correct, accurate and ready to implement.

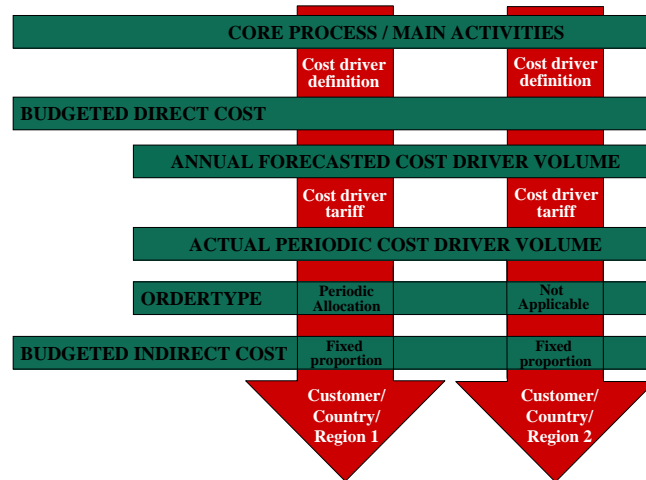


FIGURE 14: SCHEMATIC VIEW OF AKZONOBEL ABC-MODEL

The ABC model developed consists of a blueprint and an access database. In the blue print all fundamental information leading to tariffs are captured. The access database is used to determine the monthly allocation based on actual volumes and the tariffs from the blue print. This information is used on a monthly basis to evaluate actual versus expectation especially from an operational point of view and quarterly to look at coverage issues and required invoice corrections.



### 3.3.1 Lessons learned

The lessons learned specifically for this project were:

- What-if analysis is a sensitive topic
- Allocation method AkzoNobel is not in line with the cost drivers of the operations.

#### *What-if analysis is a sensitive topic*

When discussing the results of the what-if analysis, it is key that there is a clear understanding of the objectives of the what-if analysis, being:

1. Validation of the ABC model
2. Providing a first impression of the impact of changes, on resources and cost.

This to prevent people to jump to conclusions on the (cost) impact both on customers and operations.

The completeness of what-if analysis is depending on the direct/indirect categorization and how these costs are included in the activities. In the case of the AkzoNobel, equipment and IT cost were categorized as indirect and not included in the tariff by activity. The AkzoNobel what-if analysis consequently does not give any indication on the effect of the network changes on these assets. So these elements and other essentials like the impact on service levels and order scheduling need to be integrated in a more extensive business case.

#### *Allocation method AkzoNobel is not in line with the cost drivers of the operations*

When reviewing the results of the actual versus budget reporting, it appeared that the invoiced amount (paid by the customers) was considerably lower then the required allocation and the actual cost.

After further research it was determined that the allocation method, in place, charged the customers fully based on kilogram sent, where the workload of the operations is mainly driven by number of order lines and pallets out and only limited by kilogram sent.

The number of kilogram sent was considerably lower than budget, influencing the invoiced amount negatively. However the number of order lines and pallets out were close to budget, stabilizing the operational cost.

### 3.3.2 Next steps

Since the model meets the objectives of the project and passed the validation, it was implemented as a reporting and analysis tool.

Next step is implementation in the allocation process. This requires:

- Customer agreement and negotiation on how to deal with indirect cost allocation
- Review and decision on the allocation method
- Dialogue and description of the full allocation process, including the topics above and how to deal with over- under coverage in direct cost.

Although the team has made proposals for some of these items, they need to be agreed with the customers and captured in the commercial agreements, which was out of the project scope.



### 3.3.3 The view of the AkzoNobel team

What was the AkzoNobel team experience concerning this project?

Below the quotes of 2 project members, being:



*Willem Brands*

Manager International Distribution Center & Services  
main representative of the operations.



*Aad Hartveld*

Logistics manager operations EMEA, who represented the customer in the project.

- The experience of the AkzoNobel project team related to this project is very positive. There is a better underpinned view and discussion concerning the actual influenceable costs which the supplier (cost center) allocates to their customers.
- The level of acceptance of the ABC model is very high due to the transparency (one set of data!) and the united approach during the design of the model. This joined and systematic approach also improved the mutual understanding between (internal) customer and operations.

- A more difficult phase was the definition of activities, especially in ensuring everybody had the same understanding of a certain expression, like what represents a shipment best a delivery or a ship today.
- The final result is a management tool which can be used for much more than allocation of cost, like:
  - Providing internal and external transparency on actual cost and efficiency of the IDC process
  - Optimization of the Supply Chain in terms of expected unit cost
  - Internal process and efficiency improvement of the warehouse
  - What-if analysis as starting point of a business case. Since knowledge and experience are still required to interpret the data and come to the correct solution.



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#### 4 SYSTEMS AND TOOLS

In the business case, the main element of the activity-based costing model was built in Excel. Groenewout has developed a tool to support businesses for example with analyzing cost, defining activities and cost drivers. The tool takes the user through some steps resulting in an excel file which shows the ABC blue print including cost elasticity.

		DIRECT COST ALLOCATION MODEL										USAGE COST																		
		Inbound					WORKLOAD RELATED COST					Pallets	Packing material																	
		Unloading, Check & Putaway	Full Pallet Retrieval	WMS Operational	Case Pick & Pack	Pick & Pack Air shipments	Check & Loading	SCL Order related	SCL Export documentation	Admin																				
Budget & Productivity	Number of FTE incl. flex	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX																			
	Number of FTE flex	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX																			
	Budgeted personnel cost 2009 direct	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX	€ XXX.XXX																	
	Yearly cost / FTE (incl. staff related costs)	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX	€ XX.XXX																	
	Calculated productivity (cost drvr / hr)	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX																	
Cost driver	Pallets in	Full pallet out & Cross dock pallet	Orderline	Orderline mixed	Orderline air	Pallets out	Sold-to-days	Export ship-to-days	Sold-to-days																					
Cost driver volume 2008	XX.XXX	XX.XXX	XXX.XXX	XXX.XXX	X.XXX	XX.XXX	X.XXX	XXXX	XXXX	XXXX	XXXX	XX.XXX	XX.XXX																	
Flexibility determination per process step / activity	Mixed pallets		N/A		€ XXX		€ XXX																							
	Cross-dock (full pallets only)	€ X.XX					N/A		€ X.XX	€ XX.XX	€ XX.XX	€ XX.XX	€ XX.XX																	
	Full pallets		€ X.XX		€ XXX																									
	Air shipment full pallet						€ X.XX																							
Air shipment mixed pallet																														
Flexibility determination per process step / activity	# Pallets in	# FTE	Tariff	# Full pallets out	# FTE	Tariff	# Orders	# FTE	Tariff	# Order lines	# FTE	Tariff	# Order lines air	# FTE	Tariff	# Pallets out	# FTE	Tariff	# Sold-to-days	# FTE	Tariff	# Export orders	# FTE	Tariff	# Orders / S-to-D	# FTE	Tariff			
										XX.XXX	X	€ XXX																		
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FIGURE 15: POSSIBLE EXAMPLE ABC MODEL OUT OF GROENEWOUT EXCEL TOOL

There is a substantial amount of ABC applications on the market. Players in the market are, for example SAS, Oracle, Acorn Systems and Prodacapo. Some of them are standalone and some are or can be integrated in ERP systems. In some cases the ABC application is part of a broader business process reengineer tool. With the help of the internet in a short time loads of options can be found on different tools.

Implementing a software package can be very costly. This should not be a reason to keep away from an activity-based cost project. There are many advantages of reviewing cost in detail and as shown in the business case this can be kept simple in the first instance. Extension to a software tool can be investigated and applied in a later stage, when all parties involved start to feel more comfortable with activity-based costing and the need is developed to further extend functionality and/or level of detail.

## 5 CONCLUSIONS

Activity-based costing and activity based management are definitely undervalued in the supply chain when the following points are taken into account.

*Data availability issues can be overcome.*

In the AkzoNobel case there were issues around the availability of the inbound information. By using the knowledge in the organization this can be overcome by looking for example to relationships to other processes and adjusting the level of detail. Key words are measurable, repeatable and transparent.

*Be pragmatic!*

Do not limit yourself by the theory. In figure 16 the approach of the AkzoNobel ABC model is visualized. In traditional ABC all costs (direct and indirect) are assigned to activities. In the business case the approach is adjusted in line with the objective of the ABC model. These were fair allocation of cost to (internal) customers and influencing the order behavior of these customers. Therefore only costs which are influenced by the customers were included.



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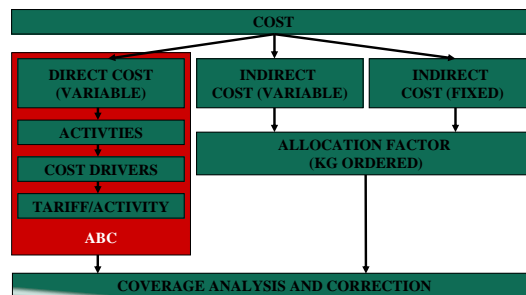


FIGURE 16: APPROACH AKZO NOBEL ABC-MODEL

*When building an ABC model don't forget to look at cost elasticity.*

As illustrated in the AkzoNobel case, the tariff by activity as calculated in an activity-based costing model is not applicable for every volume range, since the level of flexibility for most companies is limited. It can be very helpful to demonstrate the volume range in which a tariff is applicable, as part of the model.

*Review the model/tariffs periodically.*

The tariffs calculated in the ABC model are depending on (operational) circumstances. The model needs to be checked at least once per year. However it would be advised to review the model, when the business changes. For example when people are laid off because of economical circumstances or a new customer is won, requiring extra equipment. But also when productivity has been improved significantly. All these changes can directly impact the tariff and level of flexibility (cost elasticity) of a business/department.

*Do not disregard the processes.*

Before implementing the activity-based costing model and starting with activity-based management, document the processes and agree roles and responsibilities.

When using ABC for your allocation process, ensure that:

- Your allocation method is aligned with the drivers of the ABC model
- An agreement is made on how to deal with coverage issues
- Everything is captured in the commercial/partnership agreements.

*Take a broader view*

Activity-based costing is not only a financial tool. The power of engaging in activity-based costing is providing insight in cost and their drivers and the impact on the operations. When possible work in a multi-disciplinary team for discussion on and understanding how decisions impact each other.



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Arthur Zondervan joined Groenewout in 1999 as a Consultant. He was promoted to Senior Consultant and Team Leader in the following years after being responsible and successfully completing complex studies and several project realizations. His current role is Managing Consultant and member of the Management Team with the additional responsibility of Manager: Accounts, Sales and Projects. Prior to working at Groenewout, he worked for Philips Semiconductors and Yamaha Motor Distribution. His educational background is a master's degree in Mechanical Engineering at TU Delft in 1993.

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