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WHITE PAPER

Economic Advantages Resulting from the Use of DISKOVER as an **Add-on System** in Supply Chain Management

Advanced Planning & Scheduling Systems (APS) are the key to success when it comes to transforming complex and individual business problems into economic benefits.

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Economic advantages resulting from the use of DISKOVER as an add-on system in supply chain management

Like every operational measure, the use of DISKOVER in a company must be worthwhile from an economic perspective. For this reason, this document is intended to provide you with information and assistance so that you can judge for yourself whether a DISKOVER implementation makes sense.

The effects and numerical values listed below come from discussions with user companies, from empirical measurements and from project experience. They do not meet the requirements of a statistically representative survey. Due to the different application variants of DISKOVER in the various companies as well as the very heterogeneous initial situations and the great variety of different sectors in which the DISKOVER user companies work, there is no basis for a statistically representative survey.

Regarding the benefits of a DISKOVER deployment, a distinction must be made between quantifiable economic improvement effects and qualitative improvement effects, whereby not all quantitative effects can be converted into hard economic figures and many qualitative improvement effects can have drastic monetary effects.

The hard facts

The main quantitative effects that result from the use of DISKOVER relate to

- the stock reduction,
- the improvement of delivery readiness as well as
- the reduction of the planning and scheduling effort.

Inventory reduction leads to liquidity release and reduced warehousing costs

With regard to the achievable inventory reduction through the use of DISKOVER, extensive findings are available. Since DISKOVER is also used by our parent company, the Abels & Kemmner Group, in consulting projects as an analysis and simulation tool, the findings here result not only from the operational use of DISKOVER, but also from its use in consulting projects.

In 75% of the cases DISKOVER achieves a stock reduction of at least 20% (Fig.1).

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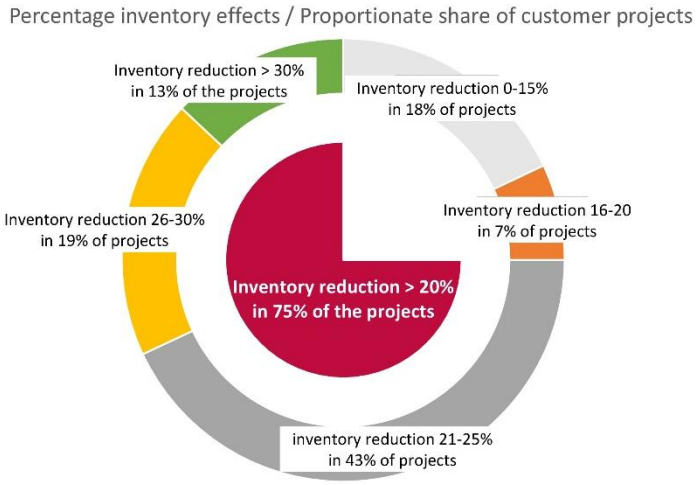

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The reduction of inventories not only brings about a reduction in capital commitment, but also leads to reduced running costs. The economic benefit of being able to use the released liquidity elsewhere depends on the liquidity needs of the company and cannot be answered in general. However, the reduction in current stockholding costs can be estimated by determining the stockholding costs for the inventory under consideration. The range of the individual components of the stockholding costs, as they have resulted from analyses in numerous consulting projects, can be taken from Fig. 2:

Stock holding costs are made up of more than just capital commitment:

Average values based on the value of stored goods:

• Interest on committed capital:	6,5	to	8,5 %
• Aging, wear and tear:	3,5	to	5 %
• Loss, breakage:	2	to	4 %
• Transport / handling:	2	to	4 %
• Storage, amortization:	1,5	to	2,5 %
• Warehouse management:	3	to	5 %
• Insurance:	0,5	to	1 %
• Total:	**19**	**to**	**30 %**

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The table may serve as a suggestion to determine one's own stockholding costs. The allegedly high values for the interest on tied-up capital result from the fact that many companies use imputed

internal rates of return (IIR) for the costs of capital employed, which are significantly higher than the usual market capital costs and at least partially consider the opportunity costs for alternative investments that cannot be realised due to the tied-up capital.

Since the components of the stockholding costs are imputed costs, it is necessary to assess on a company-specific basis whether the respective cost items are directly proportional to the inventory reduction, whether the costs change in a fixed manner or are independent of the inventory level. Since inventory reduction effects, which are aimed at using DISKOVER, should have a long-term effect, the consultants from Abels & Kemmner recommend multiplying the imputed cost items by a factor between 0 and 1 and then adding them up.

Cost items that are fully proportional to the inventory level are weighted with 1 and thus fully applied, items for which no changes are expected for the company even in the long term despite inventory reduction are weighted with 0 and thus excluded. Cost items with medium-term potential for change are pragmatically weighted with a factor of 0.5.

However, warehousing costs do not only incur as imputed costs. They can also occur as directly allocable costs. If, for example, external warehouses must be rented, concrete costs are incurred for this. Typically, in such cases, costs are charged per storage process, per retrieval process and per storage day. If the stock reduction to be achieved with DISKOVER makes it possible to close an external warehouse completely, all costs are eliminated. If it is only possible to reduce the stocks in the external warehouse by a certain percentage, then the costs per day of warehousing decrease by the same percentage on average.

As a precaution, we recommend that you only reckon with the reduction of this cost item. It is far more complex to assess in advance how the number of storage and retrieval operations will change through the use of DISKVOER. If this is an essential factor for your economic evaluation, the expected change in goods receipts and issues in DISKOVER can be determined by means of simulation as part of a pre-analysis project.

On average, the savings potentials in the work-in-progress are 40% to 50%, with considerable variation in the results of the individual companies due to their very heterogeneous starting situations and manufacturing structures.

In a number of cases, the use of DISKOVER has made it possible to avoid building new warehouses or renting external warehouses. In this case, the quantifiable economic effects are directly on the table.

In addition to assessing the economic efficiency using DISKOVER, it may also be interesting to look at the performance in comparison to other systems. Since Abels & Kemmner uses the simulation functionality of DISKOVER in consulting projects for logistical optimisation, constellations occasionally arise in which DISKOVER is used to determine inventory improvement potential and the measures required to achieve this, even though the consulting clients use add-on systems from market companions. Experience from such cases shows that DISKOVER achieves the same delivery readiness with 10% less inventory compared to other systems.

By using DISKOVER, not only liquidity can be gained, and warehousing costs can be saved. A more skilful scheduling of production orders allows to reduce work-in-progress in production.

Improving the readiness to deliver

In almost all use cases of DISKOVER, the value-weighted total delivery readiness of the item portfolio improves while simultaneously reducing the stock levels. This double effect results from the fact that in many cases the wrong stocks are on the wrong items.

In practice, however, the economic advantage of an improved readiness to deliver cannot be calculated with a simple formula. In addition, a distinction must be made between the product availability of an item, the product availability at the customer order item level and the product availability at the customer order level. Only the item-related readiness to deliver can be recorded statistically and defined as a default value. However, a better overall readiness to deliver at the item level also leads to better readiness to deliver at the customer order item level and at the customer order level.

As a general tenor of numerous calculations, an earnings growth potential of 4-7% can be achieved through improved delivery readiness.

An item-related readiness to deliver of e.g., 98% means that 98% of the material quantity required within the period under consideration can be provided on time, while 2% of the quantity cannot be delivered immediately. Only if the non-deliverable quantity leads to an immediate loss of sales, a change in the readiness to deliver can be directly converted into a change in sales and in earnings. However, in many cases, both in the b-to-b and b-to-c environment, often missing delivery quantities can be delivered later or can be added to the next shipping, so that a slightly reduced or increased readiness to deliver on the part of customers is not rewarded or penalised by a drop or an increase in turnover. If customers' order quantities are regularly not completely fulfilled, however, this will most probably lead to a loss of customers and thus turnover and earnings in the medium term.

For a pragmatic estimation of the advantages of an improved readiness to deliver, it may be sufficient to weight the theoretical additional turnover or additional profit with a factor between 0 (even in the case of persistently incomplete deliveries, the customer does not drop out) to 1 (missing delivery quantities are immediately procured by the customer elsewhere and mean a complete loss of turnover).

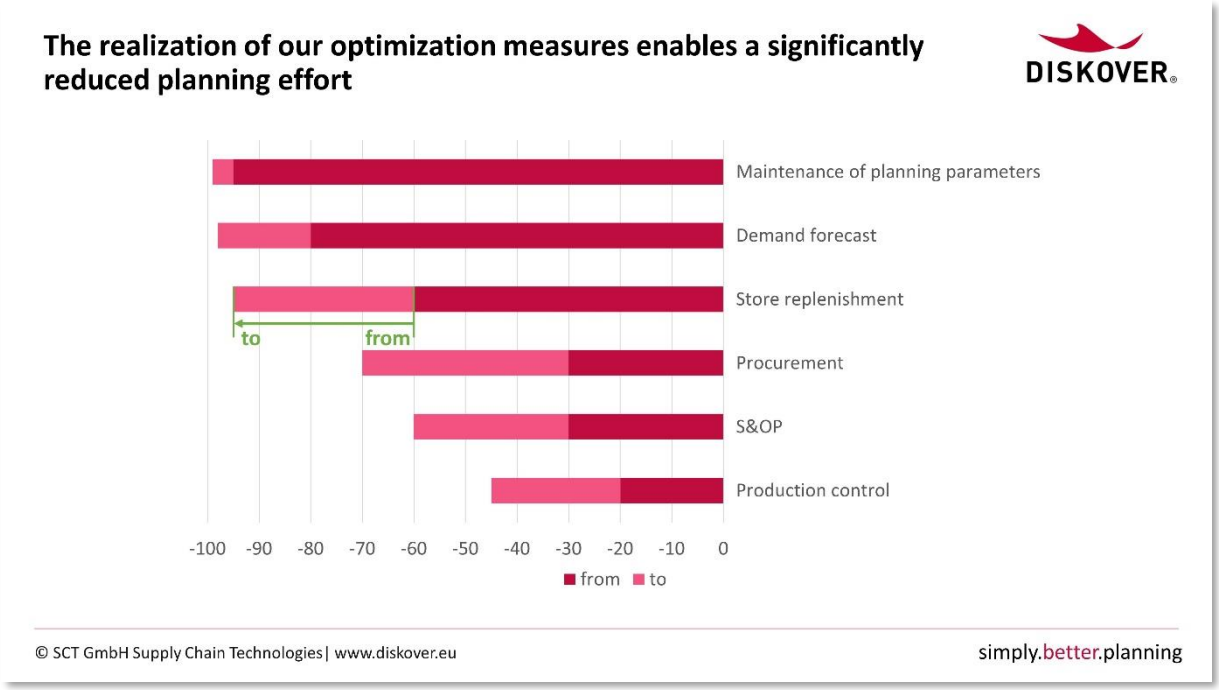
For many companies, insufficient readiness to deliver requires extra delivery tours or leads to contractual penalties, so that it can be assumed that improved readiness to deliver will result in reduced operating costs. How much these costs are likely to be reduced must be assessed individually.

Process automation

A significant further economic advantage applying a DISKOVER system results from the reduced planning and maintenance effort for the users, from the relief of the users and from the higher automation.

The extent to which planning and control processes can be automated depends on the type of planning involved. The greatest potential for effort reduction arises in the replenishment of branch stocks (store replenishment), the least in production control.

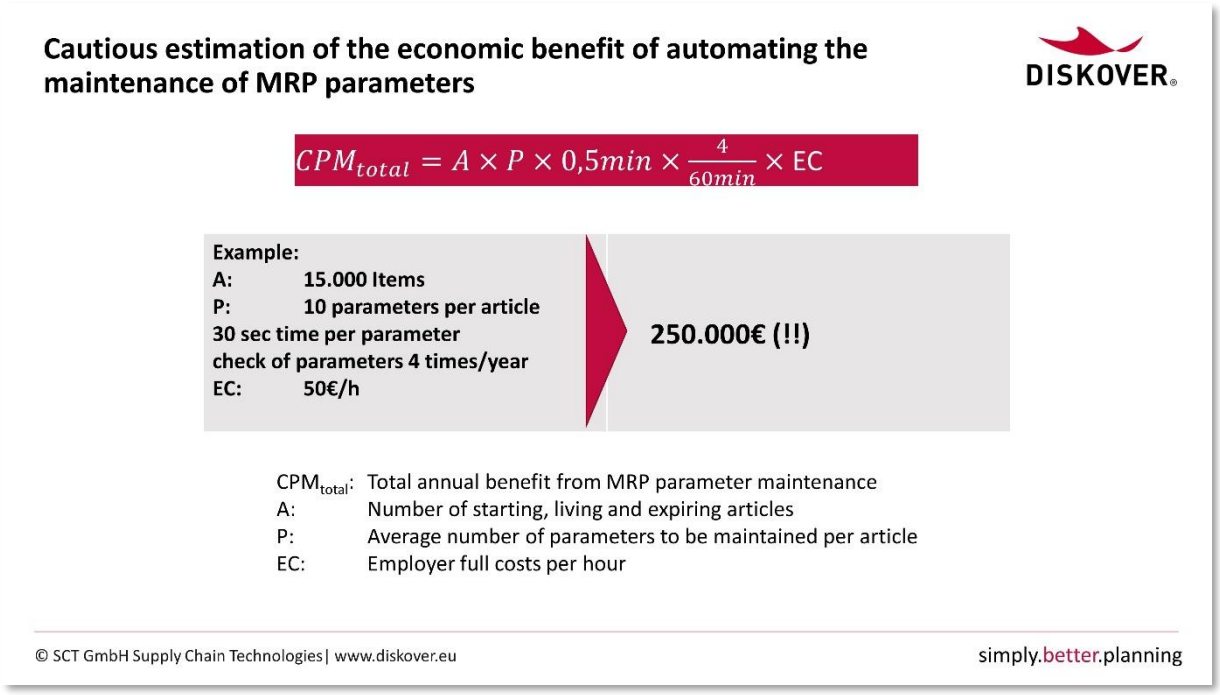
Fig. 3 shows the spectrum of reduction potential for different planning processes.



Maintenance of planning and control parameters

Thanks to the sophisticated rule sets, verified and optimised by means of simulation, the maintenance of the planning and control parameters can be carried out automatically in DISKOVER. Maintenance effort can thus be reduced by 59% to 99%. But what if your master data has been poor up to now and has not been maintained, so that up to now no maintenance effort has been incurred at all? In this case, the benefit is far greater than the time that would have been saved if the MRP parameters had already been properly maintained. In this case, we recommend that you estimate the benefits of maintaining the MRP parameters in terms of the staff costs that would have incurred for a proper master data maintenance before using DISKOVER.

The saved effort can be calculated as shown in Fig. 4.



This calculation, as large as the numerical values may appear, is very conservative, because it does not consider the economic benefit that results from correct master data but assumes that if staff had sufficient time to maintain the data, they would be able to set the MRP parameters correctly, which is not true in most cases. Even experienced specialists might not have done better. Even with good theoretical and practical knowledge, it is almost impossible to set MRP parameters correctly, without an empirical simulation. The dynamic interaction of requirements, forecasts, value flows and planning decisions in the company and throughout the entire supply chain is so complex that it cannot be understood with common sense alone.

Higher automation of planning and control processes

The economic potential of a higher automation of planning and control made possible by DISKOVER can be easily operationalised via the full-time equivalent. The full-time equivalent represents the calculated number of full-time employees resulting from the time shares of different employees. Especially in the replenishment of branch stores, there are often many people involved who only spend part of their working time on this task.

Fig. 5 shows the procedure for determining the total annual benefit and a calculation example.

Cautious estimation of the economic benefit from the automation of planning and control processes

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$$CPA_{total} = (PC \times A_{PC} + OP \times A_{OP} + SR \times A_{SR}) \times PK$$

Cost factors		Example	Result
CPA_{total}:	Annual total benefit due to higher automated planning		305.000€/year
PC:	Number of employees in production control	3	
A_{PC}:	Expected automation potential in production control	20%	
OP:	Number of operational planners (employees in operational purchasing)	5	
A_{OP}:	Expected automation potential in operational purchasing	40%	
SR:	Number of employees for material planning in branch stores	5	
A_{SR}:	Expected automation potential in store replenishment	70%	
PK:	Average annual salary at employer full cost	50.000€	

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It is a mistake to assume that the productivity potential that results from automating processes can only be raised by freeing up staff. Particularly in production and supply chain planning and control, employees rarely manage to complete all the tasks that actually need to be done. The lack of maintenance of the dispatch parameters is just one example of this. Relieving employees of routine tasks so that they can take care of the tasks that have remained open up to now sometimes brings a much greater economic advantage for companies. Replacing staff with software only saves on staff costs but does not eliminate the problems arising from the tasks left undone. It often makes more sense to use the staff capacity gained for these unfinished tasks. This often yields more benefits than the associated staff costs. For this reason, the results of the formulas in Figs. 5 and 6 are called “total benefit“ and not “staff cost savings“.

Automation of demand forecasting

Evaluating the benefits of higher automation in demand forecasting, requires considering three different constellations. Either the ERP system determines and processes poor forecasts, or the MRP controllers do their own guess work on future requirements when taking replenishment decisions, or there are indeed people in the company who are explicitly responsible for creating demand forecasts.

In the latter case, the benefit of a more automated demand forecast is calculated analogously to the calculations for planning automation. In the constellation that planners use their own expectations of the future demands when generating order proposals, the benefits result from better forecasts, which are coined as inventory reduction and improved product availability; freed-up staff time can be neglected.

In the third constellation, in which poor forecasts previously prepared by the ERP system were simply used for planning, the economic benefit of DISKOVER again results from inventory reduction and improvement in delivery readiness.

Qualitative potential for improvement

In addition to economic benefits that can be quantified in monetary terms, there is also a whole range of improvement effects that are not, or only with difficulty, quantifiable in monetary terms. In many selection projects, these criteria play an important, sometimes the most important role.

The essentials in view

Through the alarm signals displayed by DISKOVER and the associated management by exception, users can intervene specifically where necessary and decide fast.

All info at a glance

DISKOVER provides and presents a wide range of important data in a single view. Each user gets exactly the information needed to make decisions. The risk that users overlook the need for is eliminated.

Transparency in the supply chain

The supply network overview in DISKOVER gives a direct overview of all the essential parameters of the supply chain. Missing availabilities in the supply network are recognised at a glance.

For the sake of the environment

The optimisation algorithms in DISKOVER help to skilfully for skilfully fill up transport units (full truck load, full container load, set-up campaign-based production), help to reduce freight costs and CO_2 emissions and to minimize set-up effort and costs. The powerful functions for start-up and discontinuation management of items reduce the scrapping volume for material that is no longer needed.

Close to the needs of the customer

Sophisticated functions for project planning and action planning as well as for sales and operations planning (S&OP) help to identify material or resource bottlenecks at an early stage and thus improve the possibilities to react.

Real economic batch sizes

Economic batch sizes represent a major lever for cost reduction. However, the theoretically simple calculation of economic lot sizes often does not improve costs in practice. Since different economic batch sizing formulas lead to different results, it is indispensable to identify the correct formula in relation to the situation of the article considered. In contrast to all other systems known to us, DISKOVER can determine the correct economic lot sizes by means of empirical simulation based on historical data.

Job upgrading

The interaction of simulation, rule sets and optimisation algorithms in DISKOVER not only relieves users of routine tasks and allows them to concentrate on the essentials. Users will not run behind the situation anymore; they won’t have to make ordering decisions themselves or permanently readjust the suggestions of the ERP system. Using DISKOVER, they finally get "in front of the situation" and become the masters of the action. This is an important prerequisite for attracting qualified staff for the challenging task of forecasting and material planning in the future.

Better overview

Users of DISKOVER gain a much better overview of the supply and inventory situation in the entire supply chain. This increases the motivation and reduces physical and mental stress.

Continuous improvement

The simulation possibilities of DISKOVER make it easy to improve the planning and control mechanisms without a broad theoretical background. In our experience, this boosts the motivation of some of the users to keep improving the processes and mechanisms.

SCT GmbH

Supply Chain Technologies
TPH - Technology Park Herzogenrath
Kaiserstr. 100
D-52134 Herzogenrath near Aachen

Tel.: +49-2407-9565-70
info@diskover.de | www.diskover.eu