Ewa Łosiewicz*, Thomas Keul**

MODELLING TRADING SECURITIES PROCESSES WITH THE SIMULATION TOOL IN THE GERMAN RETAIL BANKING

This paper presents modelling of retail-banking processes on the example of securities trading, with a module of ADONIS® business process management system as a simulation tool. The process models of the trading securities were created and analyzed on the basis of the real data given by German bank.

Keywords: process modelling, trading securities, simulation, ADONIS system, German retail banking, process improvement

INTRODUCTION

The success of every company depends on the customer's overall satisfaction. Banking services are divided in the period of time, what gives them process character. In the banking service process both the external and internal customer (bank's employer) are important. The satisfied internal customer carries out his duties well, and the satisfied external customer still is a customer of this bank and as the final recipient assesses the service provided.

This paper presents the results of modelling the retail-banking processes using the computer system as the simulation tool. The example of the modelled processes is trading securities – processes performed in the front and back office in the bank, depending on the kind of customer and his problem. The goal of the paper is showing that trading securities processes are more efficient with the help of IT.

The ADONIS business process management system is used as a simulation tool which can help prove that some changes in trading securities processes is a good solution for improving that process.

* Department of Bank Management, Wrocław University of Economics

** Consultant in cooperation with Pass-Consulting Group, Aschaffenburg; Faculty of Business and Law, University of Applied Science, Frankfurt/Main

The banking services are assessed with by execution time of a process and number of failures during this process execution. Process time and failure analysis are used for improving the whole process and satisfaction customers. The best way for this kind of process analysis is using any kind of computer system with modelling and simulation components. This paper presents the banking process improvement with ADONIS business process management system.

The example of the banking process models presented in the paper is the process of trading securities, which was created and analyzed on the basis of real data given by a German bank.

The modelling component of the ADONIS system lets us give a graphic form of service processes: an advisory service contact with sales consultant and CRM data process and next the improvement of those processes is possible with a simulation component. In the paper we present a new model of trading securities process with a shorter execution time and lower costs of execution.

1. BANKING SERVICES PROCESSES MODELLING WITH ADONIS SYSTEM

Banking services, because of their intangible nature, heterogeneity and impermanence (Philip, Hazlett 1997), are an example of a business process rather than a physical product. In the financial services, a customer is the part of the "production" process (Barlow, Møller 2001). The provision of the financial service is a different challenge than provision and creation of physical goods for the market. The banking service process can be described as a chain of activities designed in such a way that they could give a valuable service for the customer (Rummler, Brache 2000). The value of this service represents the ability of fulfilment of customer needs and for giving them more than they expect. Such a lofty goal, customer satisfaction, called the cornerstone of service industries (Gardiner and Mitra 1994) and based on the service provided, is necessary to make improvements to services which can be achieved by business process management.

The business process management requires a suitable approach to the process, e.g. process modelling, which in a narrower meaning is a process model construction, i.e. its formal representation, followed by its analysis within the scope of cohesion evaluations, simulations and cost estimation. In a wider meaning, process modelling means not only the construction of a

process model but also all the activities towards it, and subsequent activities connected with verification and estimation of the process model.

Business process modelling can be provided using an IT system, especially with a simulation component. Simulation is a valuable tool for improving not only industrial organization (Aghaie and Popplewell 1997; Aksu 2001; Kim H.-W. and Kim Y.-G. 2001; Towill 2001). In the area of financial services one of the most crucial factors of customer satisfaction is waiting time for completing the service (Gardiner and Mitra 1994; Verna et al. 2001).

The activities times optimization in the service banking process is possible by means of cutting waiting times and next, redesigning the process model. This way supports using simulation tools. Since processes in service organizations, especially banks, differ from manufacturing processes in many ways, there are many specific requirements a simulation environment for service organisations must meet in order to allow effective use. The main differences and resulting requirements are (Herbst et al. 1997):

- There must be a clear separation of the process model and the organizational model: in financial service organizations the same business processes are performed in many different locations with a different organizational setting.

- There are a great variety of the terminology and graphical representation used to describe processes and organizations.

- Process actors (activities performer) have a high degree of freedom: they decide which activity to perform next.

- The customer is involved in many process steps: this is an external influence on the process, which needs to be modelled adequately.

- Co-operative activities: many activities are performed by a group of actors rather than by a single actor.

- It is difficult to find and describe the responsibilities of members of the organization.

- The service time depends on the human actor's workload.

The ADONIS business process management system is an example of a tool for modelling processes in financial organizations. ADONIS consists of seven application components: acquisition, modelling, analysis, simulation, evaluation, transformation, import/export. which are described in (Herbst et al. 1997, Gospodarowicz 2002).

The process modelling with ADONIS in a bank is a process as well and can be provided in the stages illustrated in Figure 1.
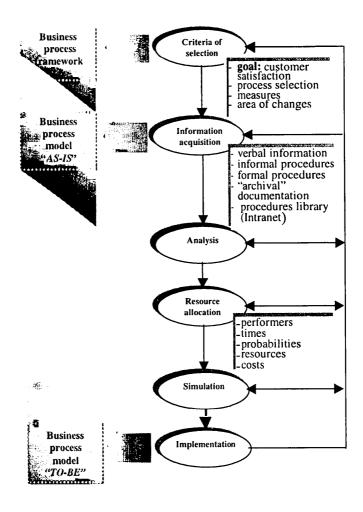
Figure 1. Stages of banking process modelling with ADONIS system
Source: Łosiewicz and Wieczorek, 2002

The first stage involves criteria of selection, i.e. establishing the goal of
process modelling as the highest customer satisfaction achievement and
next, selection of processes for modelling, defining of measures for process
changing and establishing the area of future changes in the process. As the
result of work at this stage, the business process framework should be
defined.

The second stage is connected with the identification and acquisition of information from all available resources. The specific business process model "AS–IS" should be defined at this stage, which starts the support of the ADONIS system during the modelling process.

The analysis of the model "AS–IS" is carried out at the next stage. More or less petty mistakes are to be noticed and must be corrected, followed by resources (performers and times of activities, probabilities of events, equipment and costs). The process model with allocated resources is then simulated and finally, after necessary correction and improvement, business process model "TO–BE" is done. The process of modelling should be continuously performed for the purpose of business process continuous improvement.

2. SELECTION PROCESSES IN A BANK

2.1. Processes in the back office and the bank's branch office

The bank is an organization where a lot of business processes take place. In order to have a large overview of the front and back office processes within the range of sales of securities and settlement of investment funds, a verbal description follows. These processes act better with the help of IT. To efficiently work here it is important to receive orders without using vouchers. Different divisions, or even the customer, give their information electronically to the back office. Usually there is more than one interface in the system: a graphic user interface to the branch offices, to the customer (for example in the Internet), a file interface for other systems (for example a savings plan for investment funds). The IT system checks the attributes of the orders, so that there are no mistakes.

A routing mechanism is implemented in the IT system. This depends on the attributes of the order, internal tables and external influences such as the partner's opening hours (for example exchanges) or electronic transfer routes and costs of routing. Some fund orders can directly be routed to an exchange. In Germany, Xontro (Deutsche Börse AG 2003), Xetra (Meyer zu Selhausen 2000) or Max-One can receive orders via electronic transfer (this was started by a broker in 1999; Xetra started with the XTF Segment "Exchange Trading Funds" on 20.11.2000).

In October 2001, the BrainTrade company (BrainTrade 2002) started
Investro. This is an IT system (platform Xontro) where straight through
processing for ordering and clearing of funds is possible. The banks
which already trade with Xontro can use Investro. They send orders for
external (not in-house) investment funds. The clearing process for these
funds is like Xontro (with trade confirmation and settlement via IT
Systems from the Deutsche Börse AG). Most banks have already
implemented a completely automatic process for this order flow.

All open orders in the bank are now captured in a database. If this
fund order is not an Investo order or an order for an exchange, the back
office has to produce a file with attributes for the customer settlement
like price, profit, business day and value date. There are two ways to
obtain the information and produce this file: the information is sent
manually from the investment fund to the back office or automatically.
The attribute quality (error rate, availability – correct time, date) as well
as entry errors are a big problem. The assignment of this file to the open
order database produces the settlement information for the customer.
The fees, conditions, cash account number etc. are taken either from the
order and the general parameter tables (for example depending on the
type of security), or from the master customer files.

If one or more of these parameters are not correct, either the back
office must take manual corrective action, or if the settlement is
incorrect, a cancellation must be generated. There is a form to be filled
out for the Bundesbank in cases when the payment goes outside
Germany and the value of the transaction is more than 12,500 euros
(Bundesbank 2003). This form is generated automatically by a
program.

The printed settlement details must be sent to the customer. The
booking to the cash account and the booking of the securities to the
investment funds must be processed. The bank must reconcile the
accounts internally, in the back office. If everything is correct, the sales
figures for the investment funds are scheduled and sent to the funds.

Settlement for the investment funds must also be processed, booked
and the details sent to the investment company. If there are foreign
currencies involved, the internal department responsible for foreign
exchange transactions must be informed. Finally, the documents must
be archived.

2.2. Advisory service contact with sales consultant

The bank services for a customer are: payment transaction, financial investment, lending, or other bank services (e.g. asset management). Some of these services are standardized (e.g. via a form) and do not need much consultation, in other services, like financial investments, the customer needs consulting help.

In the case when the customer needs consulting, many banks in Germany spread a huge branch network across the country. The customer can activate his service within the opening hours of the bank branch or additionally the bank accepts orders via Internet, fax, letter or telephone.

In the range of investment funds extensive consulting needs usually exist: in the discussion the banker must bring together the desires of the customer with the condition of the capital market and its bank. There are various situations which trigger customer advisory service requirements:

1. The customer consults the banker without prior knowledge of a product (such customer wants an advisory service).

2. The customer consults the banker about an idea for a specific financial product (the customer already has some knowledge about a product and just wants to make sure it is correct; this customer also wants an advisory service).

3. The banker persuades the customer that he requires an advisory service.

4. The customer places an order without prior personal contact with the branch office (for example: via Internet, fax or in writing).

From the banking process point of view, the first goal is to obtain with a contact customer for a sales consultation. It is necessary to find a customer with potential sales consulting needs. Either the customer and the bank officer have already made personal contact (see trigger 1 or 2) or the banker must find the right customer (see trigger 3). Trigger 4 fits the parameters of this process: The chance presented to the banking officer is an opportunity to arrange an appointment with the client.

A process is needed to find an appropriate client for a sales consultation, especially when the initiative comes from the banker. During this process (see Figure 3) the banker looks for a customer with prospective consulting needs. He either goes through his customer list or through proposal lists and analyzes information from various IT-systems. Most banks have also installed customer relationship management systems (CRM) to assist employees. All contacts and conversations are recorded in this system.

The information recorded is important for successful sales talks, as well as for the selection of appropriate customers (see trigger 3): In a bank, this system can lead to a 6-8 % increase of profits, and an increased customer lifetime value of up to 28% (Michale 2003, p. 38). In this CRM process (see Figure 3) a loop of the activities selecting a customer, obtaining information about the customer and analysing data is necessary. An IT system is needed to document these activities (e.g. PFM CRM system).

To set up a correct process model in ADONIS it is necessary to set the system's borders: We have restricted the model to observe the internal banks processes only (no customers or partners processes).

This process and view of activities has nothing to do with the salesman's sales strategy or his sales talk. Marketing literature and conversation research offers strategies and procedures for this main process of conversation or sales talk. A discussion of this particular process is not a part of this paper. A procedure is illustrated in Figure 2.
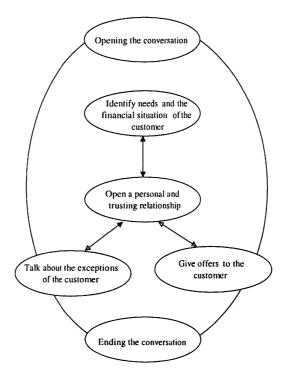
Figure 2. Procedure for a financial investment conversation
Source: Hablützel, 2002, p. 187

2.3. CRM data process

In discussions with the operations department the CRM data process was defined. The goal of this process is to identify customers as useful contacts and to get an appointment for a sales talk.

The banking officer picks the customer name from the customer card index or list. He gets information from different systems or available records. By analyzing the data, the banker decides if it would be useful to approach the customer for a sales talk or not. In order to contact the customer and to make an appointment, the banker must identify the customer's requirements. Only once the banker has approached the customer does he have a chance of obtaining an appointment. If it is not worth calling the customer, the banker has to proceed to the next customer. In ADONIS, the probabilities are indicated by variables and conditions. The probability of making a contact (question "useful to contact"?) is 0.2. The variable of this probability is "contacting" (see Figure 3).
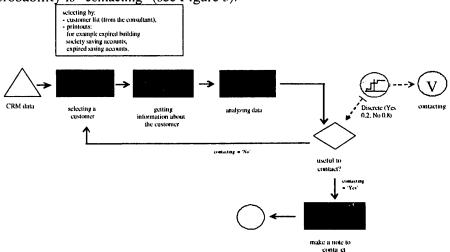

Figure 3. Process model of CRM data (the possible customer selection by the bank consultant)
Source: own preparation with ADONIS system

The operation time for the banking officer is shown in Table 1. The values, which have not been measured, but based upon past experience, must

be verified. It is also possible to take average values and not to think of individual cases.

In practice, the bank's advisor has instructions to carry out 8 to 10 customer advisory consultations on his own initiative. This can only be done by active conversation.

2.4 Advisory service process and obtaining appointments

The processes involved in the sales conversation, for example, questions about requirements, the customer's financial circumstances, the intended maturity (short, middle or long) and the risk (what level of risk is acceptable?) can be described and standardized (Breiing 2002, p. 804). During the conversation, the banker also has to provide explanations depending on the customer's knowledge of the basic principles and financial expressions (for example, what "share risk" means etc.). Some banks have special systems (should be part of a CRM system) for assisting the consultation to think of all advisory regulations, to document the customer's knowledge, to document contact with the customer and help the banker make recommendations. Only with the active management of these events, technical support for the banker, and of course a good salesperson, can the bank increase profits and satisfy the customer.

Once the banker and the customer have made the decision to invest money in a particular in-house investment fund, and documentation of the advisory service, including all advisory regulations and instructions, has been completed, the banker must enter the order for the particular investment fund in an IT system. This also happens of course, when the customer places an order without prior personal contact with the bank's branch (trigger 4).

Order processing in banking should not involve many manual processes or media breaks (entry in an IT system, printout and re-entry in the other IT system). STP processing (Straight Through Processing) is necessary to reduce costs and to work efficiently (Scheel 2003 or Kumar and David 2000).

Some necessary attributes (for example, account number, volume, the investment fund, the client's name, etc.) are entered into the IT system. Processes are implemented in the IT system (for example, checking the cash account for sufficient funds, if the ISIN number of the investment fund is correct, if the account number is correct). After an acknowledgement of the order from the banker, the bank's branch office has finished their part of the process. It is continued in the back office.

In the first process draft, the subprocesses "advisory service" and "getting appointment" were separate. It is easier and more correct to combine them as one large process.

There are many different paths possible in this process as a result. The different paths, activities and probabilities are shown in Figures 4 and 5. The probabilities are documented in different variables. Some subprocesses are also shown in this figure: "get appointment" is a part which is important in attaining the goal of obtaining a sales consultation. Then, in the subprocess "advisory service contact", there is the fact that a new customer has other different activities and different operating times for the simulation.
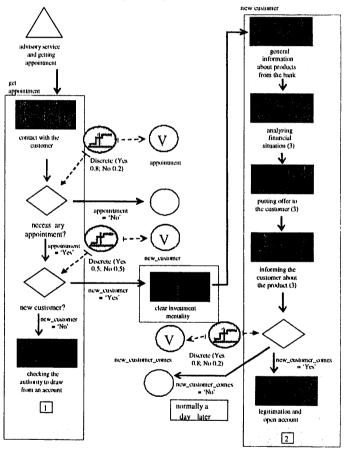

Figure 4. The process model of the advisory service and obtaining an appointment (part 1)
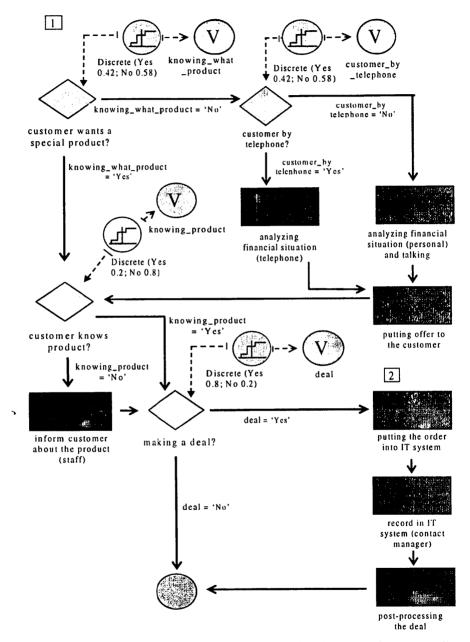Source: own preparation with ADONIS system

Figure 5. The process model of the advisory service and obtaining an appointment (part 2)
Source: own preparation with ADONIS system

If the customer already has had any contact with the bank (has an account etc.) he or she can conduct the sales consultation via the telephone or personally. This is not possible in the case of a new customer. Some of the activities appear identical but require different operation times for the sales consultation. Some customers know exactly what product they want, so the path is different: then the sales talk process is much shorter.

The process of obtaining information and administration is necessary for a complete overview of the consultant's activities. It consists of one activity only: "obtaining information and administration". This activity was defined as requiring 8 minutes of consultant's time (daily approx. 50 minutes).

3. SIMULATING PROCESSES

The features of processes must be defined before starting the simulation. An example of simulation's criteria could be:

- processing time,
- manual processing time,
- error rates (due to necessary cancellations, process costs or process unit costs, process incidental costs, other costs (e.g. paper, mail, checks),
- flexibility (e.g. ability to make changes, amount changes or reductions, implementation of special factors, catch peak periods, process transparency (customers and employees),
- 24 hour business,
- reduction of manual activities,
- reduction of capital expenditure,
- increasing customer loyalty,
- increasing sales.

In order to reduce the complexity of the examined attributes, only the manual processing time and hence the personnel costs are analyzed and reduced.

The extent of utilisation of the employees, waiting periods as well as empty times is also determined with the simulations. The results where not examined any more (the numbers where normal, e.g. extent of utilization of the employees were at 90%).

The modelled processes with the implemented operating time should be calculated with the current process numbers. The operations department checked that the values from ADONIS were an accurate reflection of the actual figures. It should be noted that the numbers in this example relate only to a branch with 2.5 sales consultants. The numbers for the bank overall, should be multiplied by a factor of 800-1000 (assumed for the examined bank).

The actual situation using the given number of processes per year is shown in Table 1 (ADONIS time format "YY:DDD:HH:MM:SS" means: years: days: hours: minutes: seconds). On the basis of that it can be recognised what activities and/or processes should be improved.

Table 1

Operating times and simulation results for the processes "CRM data process" and "advisory service process and process of obtain appointments" – actual situation

No	Description	Operating time per process	Number of processes per year	Processing time per year	Processing cost per year
1.	CRM data			42:16:53:44	€ 153,734.35
1.1.	obtaining information about the customer	1:00	20279	14:01:59:25	€ 50,698.53
1.2.	analysing data	1:30	20276	21:02:54:12	€ 76,035.48
1.3.	selecting a customer	0:30	20263	7:00:51:30	€ 25,328.73
1.4.	make a note to contact	0:10	4012	0:11:08:39	€ 1,671.61
3.	Advisory service and obtaining an appointment			106:15:53:53	€ 383,984.72
3.1.	clear investment mentality	10:00	184	1:06:40:00	€ 4,600.00
3.2.	analysing financial situation (telephone)	4:00	3729	10:08:37:08	€ 37,292.83
3.3.	analysing financial situation (in person)	10:00	854	8:21:34:17	€ 32,035.69
3.4.	analysing financial situation (3)	15:00	184	1:06:40:00	€ 4,600.00
3.5.	putting an offer to the customer	2:00	4584	6:08:47:08	€ 22,917.84
3.6.	informing the customer about products	4:00	6506	18:01:42:50	€ 65,057.10
3.7.	checking the authority to draw from an account	1:00	8086	5:14:46:08	€ 20,215.34
3.8.	entering the order in the IT system (WPO)	1:00	6719	4:15:59:17	€ 16,798.20
3.9.	recording in IT system (contact manager)	3:00	6723	14:00:07:42	€ 50,419.25
3.10.	post–processing the deal (everything ok?)	2:00	6719	9:07:58:34	€ 33,596.40
3.11.	putting the offer to the customer (3)	5:00	184	0:15:20:00	€ 2,300.00
3.12.	informing the customer about a product (3)	10:00	184	1:06:40:00	€ 4,600.00
3.13.	legitimation and open account	17:00	164	1:22:32:51	€ 6,982.14
3.14.	general information about the bank's products	10:00	184	1:06:40:00	€ 4,600.00
3.15.	contact with the customer	3:00	10396	21:15:47:59	€ 77,969.94

Source: own preparation with ADONIS system

Some of the examined activities and processes are highly individual (for example the sales talk). It should also be noted that the simulation only provides an indication of the actual situation and does not consider all factors (e.g. acceptable waiting periods for customers or the relationship between customers and consultants).

Once any weaknesses or areas which need improvement have been identified, the simulation with the redesigned processes can be rerun. An example of where the

consultant's time could be saved would be integrating customers into the process more, by having them become more proactive.

"Advisory service and obtaining an appointment" can start the order into the IT system, record the contact manager (partly), post-processing the deal (everything ok?) or inform the customer about the product. In order to simulate the activity of informing the customer an example can be used when the customers could find out themselves about the product. Aids could be prospects or computers (e.g. self teaching). For this purpose a decision making process (probability 60% to 40%) could be implemented. Also, a new activity of informing the customer about products (on paper or via computer) can be added to the model presented in Fig. 6.
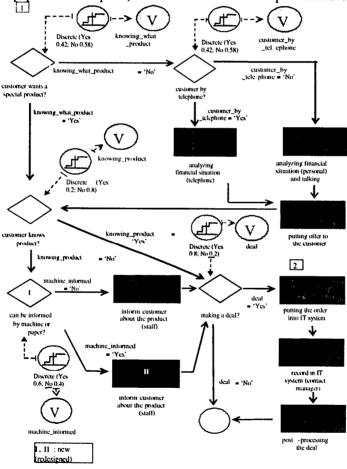

Figure 6. Redesigned process model of advisory service and obtaining an appointment
Source: own preparation with ADONIS system

Table 2

Part of simulation results for the advisory service process and process of obtaining
appointments, with the redesigned process and actual figures

No.	Description	Number of processes per year	Processing time per year	Processing cost per year
3.6.	informing customer about the product (personnel)	2591	00:007:04:44:10	€ 25,910
3.16.	informing customer about the product) (on paper or via computer)	3970	00:000:00:00:00	€ 0

Source: own preparation with ADONIS system.

If this redesigned process is simulated again with actual figures, potential
savings and other effects are recognizable. In the case above, the simulation
results for a branch office (2.5 consultants) shows a potential saving of
39,147 euros (see Table 1 row 3.6 and Table 2).

This must be offset against the costs of introduction and any necessary
maintenance of such aids. If one still considers that only one branch is
examined here (factor of 800-1000 for the total bank), simulations of this
sort for non-highly standardized processes makes a lot of sense.

4. CONCLUSION AND FUTURE PROSPECTS

By a detailed investigation of the bank processes and following a
simulation of the actual world with a tool like ADONIS, the processes and/or
activities are found which could be changed in order to achieve the goals.
The simulated effects can be regarded by comparing the results of the
changed processes against the current simulated processes.

It can be pointed out to a specified example (see section 3) by means of
simulation of the processes that at a branch in accordance with the
simulation already € 39,000 or eleven working days per year could be saved.
The reality must still improve these figures.

Further reasons for the modelling of the processes are legal defaults like
the principles of accounting in Germany, the minimum requirement for the
operation of commercial transactions as well as the coming minimum
requirements for the IT. Also certifying is possible according to the standard
ISO 9000/90001 only with documented processes.

The trend of today's new society is the rationalization of business
procedures using computerized support (Moormann 2000, p. 14), i.e. the
partially manual banking processes carried out in the past and to date can be
almost completely processed using data processing and thereby rationalized.

Many banks have not yet begun this task: they currently invest enormous amounts in their IT capacity (the current IT expenditure for all German banks is estimated at between 9 and 11 billion euros). However, the old systems and refuse dumps are so large and complex to maintain that at present explicit interface management has yet to be introduced in one particular bank (Schüller 1999, p. 11).

The start of the offensive should be the documentation of in-house business processes. As part of this work, it is necessary to simulate these processes to find inherent weaknesses and improve them. After this, it is possible to build up collaborative business: the biggest problem is setting up flexible interfaces between internal and external customers. The rationalization potential is enormous (Scheer, Feld, Zang 2002). Afterwards modern steps such as the outsourcing of IT and/or whole business processes can be economically undertaken.

The IT instruments exist: Merit and/or interfaces such as XML, internet, software tools as ADONIS (process modelling) or EAI (Enterprise Application Interface). Also, as a result of the falling communication costs in recent years the reworking of processes throughout companies can now be undertaken, but can only make sense if data processing is developed and updated accordingly (e.g. proper interfaces).

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