

# Developing and Implementing Successful Key Performance Indicators

Marie Mikušová, Viktorie Janečková

**Abstract**—Measurement and the following evaluation of performance represent important part of management. The paper focuses on indicators as the basic elements of performance measurement system. It emphasizes a necessity of searching requirements for quality indicators so that they can become part of the useful system. It introduces standpoints for a systematic dividing of indicators so that they have as high as possible informative value of background sources for searching, analysis, designing and using of indicators. It draws attention to requirements for indicators' quality and at the same it deals with some dangers decreasing indicator's informative value. It submits a draft of questions that should be answered at the construction of indicator. It is obvious that particular indicators need to be defined exactly to stimulate the desired behavior in order to attain expected results. In the enclosure a concrete example of the defined indicator in the concrete conditions of a small firm is given. The authors of the paper pay attention to the fact that a quality indicator makes it possible to get to the basic causes of the problem and include the established facts into the company information system. At the same time they emphasize that developing of a quality indicator is a prerequisite for the utilization of the system of measurement in management.

**Keywords**—performance, measurement, firm, indicator

## I. INTRODUCTION

It is obvious that measurement and the subsequent performance evaluation represent nowadays a very important part of management. Their significance can be illustrated by the following brief statement:

Management formulates strategies in order to determine the direction of organization's development. To maintain strategies of the determined direction it uses various criteria of evaluation. Adjusting performance evaluation to a certain strategy enables company's managers to determine and apply just the criteria showing the direction of company's further development, not only its current position but also its recent position. These days, when organizations are forced to adjust to more and more quickly changing environment, the application of this possibility is strategically significant.

Recently, several fundamental characteristics have been defined. They are considered as decisive for company operation in the current knowledge society:

*Knowledge* is becoming the basis of wealth growing,

successful firms produce new knowledge, they spread it through the whole firm and quickly transform into new technologies and products.

*In the global world*, competition is growing very intensively, distances play almost no role.

*Network orientation* with changeable and quite open borders (limits) is putting through in the management on the contrary to the tough hierarchic structure.

*New market environment* is influenced by the use of technological progress. Thanks to a permanent up-to-dating of information databases a company is able quickly to react to customers' wishes and adapt itself to changing market conditions.

*Social problems* accruing and inequality deepening.

The above-mentioned characteristics are the reason for growing interest in performance measurement, especially performance measurement of strategic areas that are important not only for company expansion but more and more frequently and in the first place for its survival.

Newly arising competition environment puts pressure on the reappraisal of company reporting nature and the implementation of changes in the performance measurement systems. Performance and its observing and maintaining have become not only an instrument of competitiveness but also a prerequisite for company's existence.

It is necessary to emphasize that measurement and a subsequent evaluation of performance are only part of the whole process of management. Ensuring a feedback the result of which is performance maintaining or its improving is the essential condition of meeting the purpose of measurement system implementation.

## II. STANDPOINTS SYSTEMIZATION FOR INDICATORS ANALYSIS

Indicators are the basic element of performance measurement system. Examining requirements for quality indicators so that they could become part of the useful system is necessary. The following systematic division of indicators has been worked out in such way that it can have an informatory value of background sources as high as possible for searching, analysis, indicators devising and using.

### A. Reproducibility of the Use

#### *Continual indicators*

They are used for factors that can be measured on infinitely divisible scale or continuum. Among known continual quantities can be ranked e.g. weight, time and money. Their measurement is carried out repeatedly in advance determined

M. Mikusova and V. Janeckova are with VSB-Technical University Ostrava, Faculty of Economics, Department of Management, Sokolska tr. 33, Ostrava, Czech Republic (e-mail: marie.mikusova@vsb.cz, viktorie.janeckova@vsb.cz).

periodicity.

#### *Discrete indicators*

Discrete indicators are e.g. characteristics having the nature of description (e.g. primary, secondary, bachelor and university full education etc.), frequency of particular items (e.g. a number of processed orders) and artificially determined evaluating scales (excellent, satisfactory, unsatisfactory etc.). These indicators are repeatedly observed in advance set time terms.

Discrete indicators sometimes pretend deceptively to be conjunctive - mainly properties and frequencies expressed in per cents. To make it easier conjunctive continuous indicators are sometimes transformed into discrete ones. For example, the time of delivery is transformed into the category 'in time' and 'with the delay', which is easier than counting of days or minutes.

TABLE I  
EXAMPLES OF MEASURED QUANTITIES: DISCRETE, CONTINUOUS AND CONTINUOUS HAVING BEEN TRANSFORMED INTO DISCRETE

Discrete	Continuous	Discrete
The number of customers attended to in the period of one hour	The length of waiting of coming customer to be attended to	The number of coming customers who had to wait to be attended to more than 3 minutes

Advantages of discrete indicators: Some data cannot be described in any other way than by the discrete or verbal description. A type of a customer (new, steady, professional, consumer...) can serve as an example. Intangible quantities can often be transformed into measurable discrete indicators. For example, when customer's satisfaction is examined, an evaluating scale having a discrete nature is usually used. To observe and record discrete data is generally easier.

Disadvantages of discrete indicators: To obtain testifying information it is necessary to have a higher number of observations. Some statistics mention that continuous indicators can be reliably measured already on a sample of two hundred items [4]. Therefore, obtaining discrete data can be more expensive than measurement of continuous quantities.

Discrete indicators may conceal important information. Placing data 'into columns', without the presence of specific continuous data need not to provide necessary data about the reasons of the state. In case of continuous indicators there are more efficient analytic instruments. Discrete indicators, however, cannot be avoided and the new trends in the development of models and framework of performance measurement take them, of course, into consideration.

#### *B. Subject of Measurement*

##### *Hard indicators*

These are objectively measurable indicators observing company's aims development or its activities or they are focused directly on a customer. They should be ranked among

areas directly influencing competitiveness. Their basic properties: they are easily measurable, are available without additional costs, they can mostly be transferred and expressed in terms of money. Hard indicators determine desired borders or limits with which a real value is being compared and evaluated.

##### *Soft indicators*

They serve to the assessment of the level in the auditing way. They cannot be usually transferred and expressed in terms of money [e. g. 31, 32].

#### *C. Area of Measurement*

##### *Indicators of efficiency (economy)*

They observe sources consumed in product manufacturing or delivery of services. Efficiency considerably influences organization's performance. Although customers may experience the improved efficiency thanks to price reduction, in principle, however, it concerns interdepartmentally focused indicators.

##### *Indicators of effectiveness*

Effectiveness evaluates the results by the view of a customer. It observes to what extent their needs and requirements have been successfully met.

*Indicators of the result* (other variants of the term: indicators of output, delay, reactive, retrospective, external, dependant...)

They characterize output of the process. They are consequences of activities performed during the process and describe the output, they are associated directly or indirectly with events a customer can measure or suppose. Customers paying for the process can directly see indicators of the result. These are indicators showing how efficiently the process meets customer's needs.

Their aim can be to involve a supplier or customer in reaching benefits and at the same time to create an efficient basis for uniting company's aims and its suppliers and customers (buyers). At the same time the results can be immediate (delivery on time) or long-term (maintaining the customer).

*Indicators of the process* (other variants of the term: indicators of input, managing, leading, internal, proactive, predictive, dynamic, causal, future, independent...)

These are internal indicators coming from the inside the process determining the results. Indicators of the process are mostly invisible for customers. They capture internal events of the process and describe the way of reaching the results. They have a closer relation to process's economy.

In most cases a customer has a small or even no interest in knowing them. Their aim is to support a motivation system for management and employees, evaluate the internal level of processes and evaluate the efficiency of invested means, and to identify a real effect of changes.

Indicators of results represent a real aim of every process. They create a basis for customers' decision-making when they choose their suppliers. It is necessary to emphasize that those

indicators of results and indicators of the process are not separated from each other. Together they create a system of measurement ensuring providing ever greater values for customers.

Interlocking of indicators of the result and of the process can be demonstrated by the following example:

Customers usually require a high quality (determined by technological data and suitability for various kinds of use), low costs and delivery on the required date. Indicators of those characteristics are indicators of results. To be able to reach such results, suppliers often concentrate on the area such as shortening the production cycle, controlling of actual supplies, decreasing the rate of waste, constructions ensuring production without problems, statistic management of the process and etc.

Indicators of the above-mentioned areas are indicators of the process. Subset of process indicators are indicators relating to activities as e.g. a percentage of workers who are members of innovation teams or the annual number of hours an employee spends in training courses.

Conception of internal customers slightly shadows this differentiation of result indicators and those of the process because it can be said that in the eyes of the internal customer of the certain partial process, any indicator of the process is the indicator of the result. The usefulness of this differentiation unfolds from customer's opportunity to choose among various suppliers, which is what internal customers usually do not have.

Quality system of performance measurement should include all four types of indicators. To limit measurement only to results is a frequent mistake in practice. In the effort for improvement the attention is paid to effectiveness growth that will influence results but at the same time the effectiveness is often overlooked. Its aim is to meet customer's requirements by the promised utility value.

#### *D. Level of Management*

##### *Strategic level*

In the first place it concerns continuous hard indicators.

##### *Tactical level*

A share of soft indicators is growing. As far as hard indicators are concerned they are mostly indicators of resulting character.

##### *Operative level*

The ratio of hard and soft indicators is becoming well-balanced. For hard indicators a share of continuous and discrete indicators is compared.

#### *E. Leading and Lagging Indicators*

Simmons [7] mentions leading (predictive) indicators and lagging indicators. Lagging indicators provide a feedback to the performance in the past, e.g. profit in the last month but do not usually provide any prospect of the future performance. On the contrary, leading indicators have been developed to measure the future performance and also the future financial

performance. Some leading indicators of the future performance may include information on the number of customers who have left to join a competitive company, data about satisfied customers or changes in customers' confidence. Content of those indicators concurs with already mentioned division into the indicators of result (outcome) and those of process.

Also Kaplan and Norton [8, 9] and Horvath [1] as well as a number of other authors work with leading and lagging indicators.

Certain indicators suggest the future performance while others provide an insight into past activities. The above-mentioned authors use that concept to argue that customers' satisfaction is a major indicator of financial performance. If customers are satisfied today then they will probably come back tomorrow again. As a result, a prospective financial performance should be ensured. This reasoning can be furthermore extended. Not only will satisfied customers come again but they also will recommend the firm to the others and they will possibly be willing to accept higher prices. So customers' satisfaction just now may play an important role in prospective sales.

Experts (e.g. Kaplan and Norton) state that customer's satisfaction is a lagging indicator of employee's satisfaction. When employees are unsatisfied and do not enjoy their work and they do not see any value in the organization then they will provide bad services and customers will recognize it. Therefore, the result of unsatisfied employees is unsatisfied customers. If the argument is brought to the logical conclusion then customers' satisfaction acts both as the main leading indicator of financial performance and the lagging indicator of employee's satisfaction. So, is customer's satisfaction a leading or lagging indicator? The answer in practice is obviously that both of them. The only way how to use the concept of leading and lagging indicators is to explain a just mentioned context.

Neely [18] is a critique of the mentioned denomination. According to him many experts are not able to differentiate continuities of indicators and that is why they operate with words like leading and lagging indicators. Advocates of balanced scorecard sometimes say: 'Scorecard is well-balanced because it includes leading and lagging indicators in balance.' But every set of indicators will contain leading and lagging indicators in balance because every indicator can be defined as leading or lagging in dependency on the context. According to Neely, the terminology connected with leading and lagging indicators is not very useful.

#### *F. Further Standpoints*

According to Simmons [7], indicators can be *objective* and *subjective*. Objective indicators can be measured and verified independently. It is different with subjective indicators.

Indicators are usually classified as *financial* and *nonfinancial*. Financial indicators derive from or are directly relate to accounting, and background papers can be found on the profit and loss account or in a balance sheet. Background papers in order to determine the rate of nonfinancial indicator

such as customer's satisfaction or employees' satisfaction cannot be found in bookkeeping.

Indicators are furthermore classified as either *complete* or *incomplete*. Complete indicators capture all relevant attributes of the reached success. This does not apply to incomplete indicators. The field in which incompleteness is most often ignored is the field of human resources management, e. g. *the indicator of employees' training*. 'Percentage of trained employees' is often the only used indicator. Without the indicator, however, is not possible to measure the effectiveness of education it is not possible to measure its value. In practice, the way of applying the obtained education to practice testifies its value. A complete set of education and training indicators comprises both the percentage of trained workers and the percentage of trained workers who in the period of three months after the end of training efficiently applied knowledge acquired in training courses.

Indicators are also *reacting* or *not reacting* to something. Individuals can influence reacting indicators while not reacting indicators are, according to Simmons [7] above the influence or control by the individual (e.g. customer's confidence).

Indicators can relate to human performance, performance of the process or market conditions. Some indicators, although not all of them, directly relate to the firm's strategy and are critical for its successful implementation. They are called critical or performance key indicators. Indicators may also relate to material things, often recorded in bookkeeping such as inventory levels, claims accounting level, the number of employees, or they may relate to intangible things such as the level of skills and knowledge, creativity and innovation.

### III. REQUIREMENTS FOR QUALITY INDICATORS - SYNTHESIS OF KNOWLEDGE

Quality of indicators can be verified on the basis of chosen criteria either separately or in summary as part of the system of indicators.

According to Schneiderman, the most important requirement for a quality indicator is to be a reliable indicator of stakeholders' satisfaction [10]-[12]. In other words, the improved quality indicator should directly lead to higher stakeholders' satisfaction. This linkage should be visible and clear. Indicator's value improvement should always reflect in the increase of stakeholders' satisfaction. For example, the time of delivery defined as the time from the date of order to the date of expedition will not be appropriate because customers mostly let their supplier know when they want to receive the delivery. Its earlier expedition (a shorter delivery time) increases their stock inventory and therefore it is not desired [10].

Jensen and Sage [16] enumerate indicators' desired properties: cost-effectiveness, strategic grouping, acceptability (buy-in), usefulness, attainability and feasibility, consistency, accuracy, reliability, repeatability, credibility, punctuality, rightness, the ability to react (perceptivity), set responsibility for its reaching.

Schneiderman [10] thinks that quality indicators' characteristics are: unambiguous working definitions based on properly processed documentation, continual values (indicators should continuously capture incremental values), meeting metrological criteria (indicators should always meet metrological criteria such as accuracy, aptness, reliability and a considerable orientation to the required area). To be useful part of efforts aimed at performance improvement, Schneiderman extends his requirements for indicators' properties [11]:

*Indicator's accessibility* to persons responsible for improving the process.

*Completeness*. With the incomplete set of indicators, intentional or unintentional manipulation may occur. Its aim, however, is to improve indicator's value.

*Focusing on weak points or drawbacks*. Indicators should measure weak points or drawbacks of the process. It is possible to argue with that view because according to the author improvements of performance need not to be based only on the findings what is wrong and where the fault can be found. Getting acquainted with what has been carried out well what has led to obtaining the excellent result is also an efficient means of motivation to the improvement.

*Linkage to information*. In other words, if the indicator's value asks for interference then such information should be available which will enable a responsible person to explain the reason of irregularity.

*Timeliness*. As regards that property Schneiderman points out a possible problem with processes having a long length of cycle where it is very difficult to develop indicators of results as e.g. return of investment into research and development because the results of new products development are often unknown even years after the investment. Whereas, the initial process may change and the involved workers may take another job. Moreover, it is not guaranteed that the finding what failed in yesterday's situation would be significant for the present situation. The author inclines to the opinion that for these long-term processes it will be more appropriate to use indicators focused not on the results but on the process.

Učeň [5] considers as critical factors of success of indicators deployment also their basic properties:

Indicators have to be derived from the structure of company goals and activities that are decomposed from company's strategy.

They help determine priorities for which the company should strive in order to maximize its added value.

They guarantee equilibrium in fulfillment of long-term, medium-term and short-term goals.

They should not be financial indicators only but their interlocking with a financial and value creation system should be ensured, it means applying a well-balanced ratio of hard and soft indicators.

They can be processed through mathematical and statistical methods as e.g. trends, time series and so on.

They are objectively measurable, measurement is repeatable they maintain consistency in time.

They have to be attainable and understandable to workers who work with them and influence them.

They are objectively interpretable.

Cost of their use should not exceed a sustainable limit or to be even higher than the reached effect.

Učeň [5] considers as suitable for the successful deployment of indicators to evaluate development trends rather than results of particular measurement, face opacity (non-transparency) - the owners of indicators have to receive the observed values in time, determine clear responsibility for the rightness of measurements for individual indicators, the structure of indicators have to be adequate to the stage of firm's development, knowledge and skills of the involved workers who develop and evaluate the model.

Jensen and Sage [16] add to the desired properties of particular indicators requirements whose fulfillment is a prerequisite for their successful implementation and use: a balance across indicators' types, coverage of the whole organization, completeness, minimum overlapping, costs effectiveness, the total number, the number on measured area, standardization, documentation, coverage of company's strategy, measurement of the current status and trend and communication with employees.

One of holistic approaches to the drawn management indicators was presented by Mateiciuc [28-29] in his organizational diagnostics concept that is focused on organisations acting in highly complex and dynamic environment with excessive demands on the organisational adaptation. General purpose of every management is to generate, design, and maintain a managerial optimisation of the organisation along the "axis products – processes – potential" of the organization with reference to its strategic goals that were set in accord with the mission, principles, and rules that were stated on the normative management level. This managerial optimisation is practised in the context of the organization task and operational environment that means considering on-coming demands and organizational tasks as well as disturbing and facilitating environmental influences [25]-[27], [30].

#### IV. SOME PROBLEMS CONNECTED WITH INDICATORS

##### *Variety of definitions of the same indicator*

When the same or similar indicators are used, different results often occur. It is important for the definition of a particular indicator to be the same for all involved, they should know it and consistently observe it. This uniformity of indicators' definition should be ensured by publishing written principles for indicators.

Indicators based on a personal judgment or in other respects subjective indicators often cause problems. For example, it is difficult to define visual drawbacks (e.g. scratches, flaking off, loss of color, staff's behavior). As long as they are included in the definition of drawback, then objective criteria should be determined for the minimization of a difference in particular indicator evaluation caused by differences in its

interpretation.

##### *Averaging*

To decrease indicators' variability the calculation of average value is often used. The longer the period is the more the resulting value of the indicator will seem to be depreciated by the calculation of the average. But the longer the period is the longer the time needed for finding out the trends will be [14].

##### *Using of too complicated indicators*

There is always a danger that too complicated indicators will be used with the aim to transform them into 'better' indicators of customers' satisfaction.

##### *Control limits and variability of processes*

Part of indicator's working definition should be the determination of desired limits. The need of interference should be signaled only when the change of indicator's value is statistically significant, as a majority of processes cannot show a zero number of drawbacks (undesired results) because of their inherent variability [14].

It is obvious that indicators are an indispensable instrument of efficiency and performance, mainly with the focus on company's goals, critical factors of success, processes and sources efficiency.

Indicator is a complicated phenomenon that can be searched from various angles. With changing conditions of the environment the indicators themselves will be developed so it is really not possible to give a detailed survey of indicators' analysis standpoints and their classification.

There are a number of views of a quality indicator. In a simplified way it can be said that quality indicators are as follows:

- they are in harmony with company's strategic priorities and customers' priorities,
- they are appropriately chosen for company's operation as well as for work of individuals,
- it is easy to develop and adjust them,
- they can be quickly implemented,
- they are easily understandable,
- they lead to the improvement,
- they are not an inviolable thing,
- they are not left to exist forever.

Indicators can be generally divided into two big groups. The first act as *external* indicators visible also for the surrounding area, and they are a motivation for its behavior, the others act as *internal* and serve to internal control and improvement and they remain hidden for the surrounding area.

Whatever field we take into consideration and choose a type of indicator (combined, of the result, of efficiency, financial etc.) it can be concluded that the obtained result is either meant or directly accessible for company's subjects around and it influences their decision-making or it is solely meant (or mostly) for internal decision-making, and for the subjects around is 'kept in secret' most probably from the strategic standpoint (then, of course, it would also influence

their decision-making) or it is of no importance for these subjects.

Customers and care of them are promoted as a factor determining not only the firm's development but sometimes its very survival. The idea of a customer has penetrated also into the system of performance measurement and thus into the system of indicators and their right application and meaningful usage.

Some authors went far and extended the sphere of customers for the sphere of stakeholders e.g. [19], [10-13]. Even though they talk about stakeholders they always return to the customer. On the other hand this is not surprising because a customer is the sense of firm's existence.

The author claims that indicators can be generally considered as an indicator of stakeholders' satisfaction. The expression stakeholder relates to buyers, customers, shareholders and employees, citizens around, the public, state authorities, suppliers and also future generations. If a quality indicator is improving then stakeholders' satisfaction is growing either directly or indirectly. The relation between improving the results according to indicators and stakeholders' growing satisfaction has to be much closed.

At the same time the author emphasizes that a priority position of the customer can be and in some cases must be cancelled (e.g. when their health is at risk or the public is in danger).

#### V. CONSTRUCTION OF THE INDICATOR

Over the process of indicator' drawing up it is necessary to keep in mind what exactly we want to measure. From the previous text the basic questions follow:

Why to measure

What will be measured

How to measure

These questions are worked out and completed in the following text. The result will be a draft of questions that should be answered during the construction of the indicator.

In the discussion the students at the Faculty of Economics identified without problems the questions what to measure and how to measure. The author is sure that manager's attitude is similar. After the manager acknowledges a need to measure he/she moves to the questions: what they should measure and how they should measure. The order of questions, however, is wrong. On the first place there must the question why to measure: Measurement is carried out because we have a need to be able to answer questions on organization' performance efficiency.

##### A. Indicator card

In the process of drawing up and choice of performance indicator, the name of the indicator is thought about and then there are attempts to define its content. It determines what data will be collected. These questions are important but there are others that should be primary:

What is the reason to implement just this indicator?

Why we want to measure the chosen phenomenon?

Who will react to the indicator as soon as the data are available (who 'owns' the indicator)?

What will 'the owner' of the indicator do with the obtained information?

What are their competences and responsibility?

These questions: What is the purpose of the indicator (measurement)? Who will react to them? And how he/she will react? are often neglected at defining the indicator. They are important if the loop is to be closed and an action is to follow after the measurement [19].

It is not possible to suppose that indicator's owner can be determined simply from the type of measurement, e.g. a financial manager will not own all financial indicators. Answer to the mentioned questions yet does not guarantee that the indicator will be fully defined. There are other problems that have to be dealt with, e.g.

Where will we draw the needed data from?

Who will collect the data?

How often will the data be gathered?

In what way will the data be judged?

How often will the data be judged?

Who will judge the data?

In what way will the data be handed over?

How often will the data be handed over?

What is the required value of the indicator?

By combination of these questions 'Card of the indicator' comes into existence. It will serve as background for the record of performance measurement. The list of questions is not detailed and most probably it will not be the same for companies and sections of different orientation. Some questions reflecting the specificity of activity may be missing in the following card. Any of them, however, cannot be considered as redundant.

TABLE II  
INDICATOR CARD

Indicator - name	
Verbal description of the indicator	
Purpose	
It relates to...	
Formula for hard indicators, Definition for soft indicators	
Value of the goal	
Tolerated dispersion, deviations	
Source of data	
Frequency of measurement	
Measurement:	Verification of the results
- Who performs the measurement	- Who verifies
- Method of measurement	- Method of verification
- Way of measurement	- Way of verification
- Periodicity of measurement	- Periodicity of verification
- Schedule	- Schedule
- Way of reporting the results	- Way of reporting the results
Owner of the indicator	Notes, comments
- How they use the indicator	
- Activity of indicator's owner	

The card should help in the stage of drafting the indicator's definition because it pays attention to questions that should be dealt with. It makes the author of the draft highlight the appropriate formula for each indicator, specify the source of data and realize that obtaining the measured values is only the beginning of the use of performance measurement system.

It is obvious that particular indicators require accurate and careful draft as long as they are to attain expected results and provoke appropriate behavior.

In the Appendix I is given the basis of the construction of indicator, in the Appendix II is given an example of indicator's card - cash flow of an actual small firm.

## VI. CASUAL LINKS AMONG KEY PERFORMANCE INDICATORS

Quality indicator makes it possible to get to the very roots of the problem, to the basic causes, and to integrate the established facts into the information system so that the managers could use the information to the improvement of the process. At doing so the managers, however, have to take into consideration that the indicators themselves, even though being quality defined, will not fulfill that function. If indicators' resulting values in the system of management are to be used usefully, it is necessary to determine their mutual links. Ensuring mutual interconnection so that improving (or worsening) the result of one indicator will not be evaluated in isolation but as a cause or consequence of follow-up indicators' results is a precondition of their usefulness. Thanks to causal links the interconnection should prevent the situation in which one small business unit would reach improvement of its results but at the expense of other small business units, which in the final consequence could reflect in insufficient results of indicators in the whole company.

The choice of key indicators and ensuring their mutual links will depend not only on the field of business of the given company but also in which phase of its development it occurs.

In the previous part mentioned small family firm operating in wood-working industry determined 'cash flow' and 'liquidity' as the basic top indicators of the success. The reason of the choice was the fact that it is a family firm in which the owner is at the same time its manager, the firm is at the beginning of its enterprise activities and it is relatively indebted. Part of the key indicators of the mentioned firm has been chosen for the following figure (Fig. 1) to demonstrate causal links. The firm has a vision 'to build up a family business with a good reputation'.

A cash flow and liquidity were identified as top KPI (key performance indicators). Development of liquidity is influenced by indebtedness and profitability. These are influenced by the share of profitable loyal customers (sales volume). Sales volume is in the first place influenced by selling price (price policy) and the volume of production (stable loyal employee with a high productivity of labor) that is influenced by employee's productivity of labor with the utilization of production capacity.

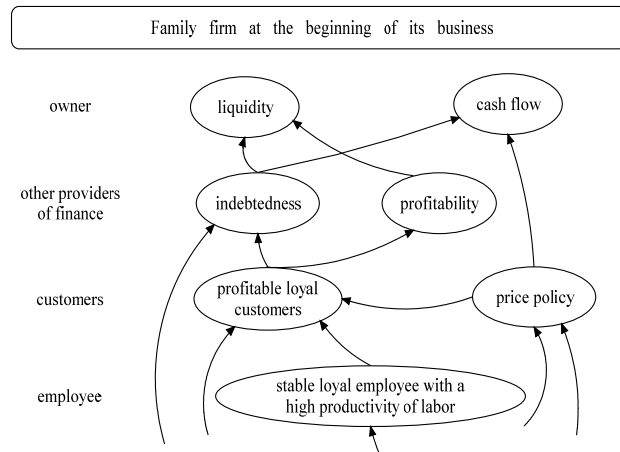


Fig. 1 Example of causal links among key indicators of the success

The presented example is simple, understandable and it has avoided a trap of looking for unnecessary links.

In looking for the way of maintaining the position on the market (an actual goal in the current economic situation) the manager (the owner) decided on cutting the selling prices in average by 10%. The result was gratifying - the sales increased almost by 20%. By the increased sales the indebtedness was decreased (by 24%) and profitability (return on assets-ROA) was increased. Thanks to the decrease in indebtedness and the increase in ROA an available liquidity was enhanced (by 14%). Decrease in indebtedness influenced not only the increase in liquidity but also the increase in a cash flow even by 26% (Fig. 2).

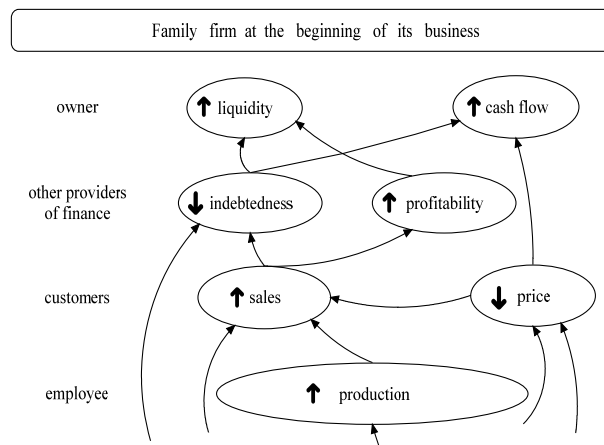


Fig. 2 A sample of causal links among key indicators of the success - cut in selling prices

For comparison a case of increase in sales price by 10 % in average was simulated. It was intended that the increase in a sales price would result in sales drop by 10 % in average. Results of 'telling story' were interested. Sales price increased

by 10 % led to further indebtedness (by 7.4%). Increase in indebtedness together with the arisen loss as a result of economy decreased a prompt liquidity. The drop was very small (by 3.3 %) so the liquidity still remained at a very good level as well as a higher volume of monetary flow for the owner (by 3.7) thanks to the increased prices. Yet it would be desirable to carry out a detailed analysis to find out whether a liquidity crisis is not starting, which might together with the alarming state in the area of profitability seriously threaten the existence of the enterprise.

It is obvious that on the basis of economically significant KPI and building up a network of causal links the firm has obtained an instrument for the support of decision-making. Attention was especially paid to the processes and elements that contribute to the growth of the value based on the certain subject of enterprise. In the choice and implementation of key indicators and their interconnection into casual linkages the internal and external information are taken into consideration in such way as to reflect requirements of shareholders as well as of other stakeholders.

When causal links are determined, a number of them it is not possible to quantify in advance. It is not a problem to express dependency for hard and monetary indicators in a clear mathematical way. It is different with soft indicators in a non-monetary area - chains of causes and consequences usually represent management's hypothesis. For example, determination of dependency between employees' satisfaction and their performances can be examined only by correlations ex post.

In principle, however, it holds true that the network of relations among appropriately chosen KPI can be built up also on the basis of simplifying preconditions.

## VII. IMPLEMENTATION OF KEY PERFORMANCE INDICATORS IN THE PROCESS

In the previous part casual links among KPI at the top level of the whole wood-working firm were presented. Implementation of KPI and observing the performance, however, will proceed especially in processes at lower levels. As there has not been established any central accounting and any principles of process management have not been implemented in the firm, it was not possible to brake down costs assigned to particular small business units (SBU) of the firm or to processes. To demonstrate the approach to KPI implementation and observing the performance at a lower level than at all-company one, a process of 'wood working' was chosen (Fig. 3). Process of 'wood working' takes place within a SBU 'saw'. This is a primary process. By means of structured process analysis (SPA), processes at a lower level were identified: edging, cutting and drying. Within those processes concrete activities take place. Storage of raw material, semi-finished products and finished products is an auxiliary process.

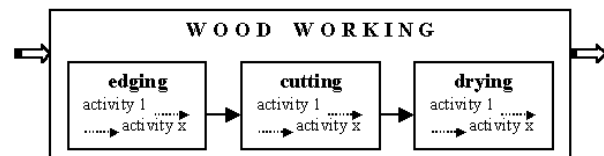


Fig. 3 Identified processes of the first and the second level (only chosen processes)

Characteristics and continuity of the 'wood working' process to the previous processes and to the following ones are depicted in the Fig. 4.

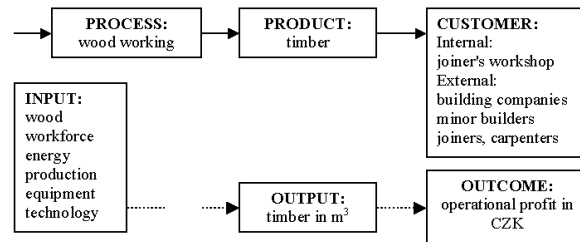


Fig. 4 Four characteristics of the 'wood working' process

As the beginning of the process was determined the moment at which raw material (wood) is taken from the storing space to be edged. With regards to already mentioned impossibility to assign costs and returns (profit) to particular processes or SBU, as the end of the process is considered the moment at which the product (timber) is handed over to the external or internal customer after finishing the process of drying (a process of the second stage) and possible storing.

In looking for indicators for this concrete process a relative simplicity of the process as well as demands for the product appeared to be an advantage. By applying brainstorming, the following areas of implementing the indicators for recording of desired and undesired results of the process and properties of the process and of product from the position of the owner of the wood working process and from the position of the internal and external customer of the wood working process were identified (Fig. 5).

The result of brainstorming aimed at the identified areas made the determination of indicators such as operational profit, the utilization of production capacity and productivity of labor possible.

For a key indicator of this process is considered operational profit. The rate of profit is influenced by the volume of product sales depending on customers and their willingness to buy, which is influenced by customers' satisfaction (ensuring desired outcomes, desired properties, and elimination of undesired outcomes as it is depicted in Fig. 5). Selling price as a result of negotiation between a product provider and a person interested in the product is included among factors influencing customer's satisfaction. It is also the rate of operational profit influenced by the rate of variable and fixed costs.



owner of wood working process	customer of wood working process
desired outcomes	
a growing profit volume of timber sales	timber in the required quality, quantity and time
undesired outcomes	
loss of customers	non-compliance the terms of supply (quality, time, quantity, price)
properties of product - outcome	
low purchase price of wood	required quality
properties of process	
high total productivity utilization of production equipment	ensuring the delivery in time

Fig. 5 Potential areas of implementing of 'wood working' process indicators

Indicators cover the basic criteria: costs, price and quantity. By control of casual links at all-company level (Appendix III), connections between indicators of the chosen process and indicators at the all-company level are obvious: within the process the evaluation of performance at all-company level is aimed at the utilization of production capacity and productivity of labor increasing, which is in the mentioned enclosure further linked to the strategy, in which among others, profit is measured.

### VIII. CONCLUSION

There are a number of reasons why to measure. A majority of decision-makers will agree with the statement that performance measurement is an inevitable part of integrating and managing their company. According to Horvathova [3] focussing on the company performance is even one of the most important activities of any top management.

The system of performance measurement is a means of attaining the goal, not the goal itself. An actual contribution of the system will appear after the whole cycle of management is closed - by ensuring that the indicators will stimulate to necessary improvements in company's performance.

There exist quite a high number of approaches, models, constructions or frameworks of the system of measurement. Some of them are very similar, others considerably different. Each of them, however, brings some value. It can be said that together with changes in enterprise environment also the systems of performance measurement will be constantly developed. Indicators undoubtedly influence behavior. Indicators give people signals about what is important and how they should behave. When indicators are in harmony with the strategy of organization they arouse behavior that it also in harmony with it. The right indicators then offer not

only means of informing on the strategy but also means of supporting its implementation.

If we assess the quality of performance indicators generally, two basic questions arise:

Are the right things measured?

Are they measured in the right way?

A problem common for many organizations is that they often choose to measurement what is easy to measure instead of measuring what is right to measure [23]. If the sufficient attention is not paid to the draft of indicators to be used by the company then there are systems of measurement leading to the ways of behavior that are quite inappropriate even if not intentionally.

Sufficiently detailed, clear and understandable definition of every indicator making impossible the ambiguity of interpretation is an essential prerequisite for the indicator to be sensibly implemented. Then the indicator is useful, the cost of its obtaining is relevant and it is intended to facilitate obtaining information needed for the process of decision-making.

The indicator called the same may have different contents in various companies. Different definition in various companies has its justification in specificities of the given company and its environment. That is why e.g. when it concerns the external benchmarking also data on definition of the appropriate indicator should be available. The above-mentioned authors, and others, e.g. [18], [20], [21] emphasize a prerequisite of indicator's usefulness, which is indicator's uniformity within the company for all involved internal units. Various interpretation or a possibility of various interpretation is confusing, the indicator does not fulfill its purpose and it may become, on the contrary, even harmful.

Construction of the indicator that has successfully passed all tests and could be included into the system of measurement is the first step. Development of a quality indicator is a prerequisite for the use of the system of measurement for management but as such it is insufficient. Information technologies, technological support and infrastructure background may fail because of people. Overcoming the fear of measurement, anxiety from something new and overcoming resistance to a change at all levels of management often becomes a key problem of the whole process [12], [8-9], [22].

The engagement of all who are in relation to the certain indicator either directly or indirectly is usually necessary. They have to get an opportunity to join the construction of the indicator, to know the process of its handing over, evaluation and above all subsequent actions. It should persuade them that the indicator is not an enemy. It should be obvious that when they themselves stand up for the improvement of indicator's dimension (or on the contrary for its worsening) it will reflect in their rewards.

The author comes to the conclusion that the construction of a quality indicator is a necessary prerequisite but insufficient for the combination of measurement and management. Only when the support of all the involved people is ensured and barriers of the development of performance measurement

system are overcome then prerequisites for the successful interconnection of measurement and management are completed.

#### APPENDIX I: INDICATOR CARD

##### Indicator

How should be the indicator called?  
Does the name reflect which indicator is in question?  
Will everybody understand the name?  
Is it clear why the indicator is so important?

##### Description of the indicator

Is a verbal description sufficiently understandable and clear to everybody, who will deal with the indicator?  
Is it completed?  
Is it not ambiguous?  
Is it not too long/brief?

##### Purpose

Why is the indicator implemented?  
What is the aim (intention) of the indicator?  
What behavior should the indicator initiate?

##### It relates to...

What other indicators does it relate to?  
What kind is this relation of?  
What specific strategies or initiatives does the indicator promote?

##### Formula/verbal description

How is it possible to measure this dimension of performance?  
Is it possible to express the formula mathematically?  
Is the formula/verbal description understandable?  
Does the formula/verbal description express exactly what data are required?  
What behavior should the formula/verbal description initiate?  
Is there a dysfunctional behavior that could be initiated?  
Is it the used scale appropriate?  
How accurate will be the obtained data?  
How many data will be redundant if the average is used?  
Is a verbal description of the soft indicator fitting?  
Cannot it be confused?

##### Level of a set goal (goals)

What level of the performance is desired?  
How long will it take to reach this level of performance?  
Are preliminary milestones of the goal required?  
What are these goal levels of performance in comparison with competition?  
How good is the current competition?  
How quickly is the competition improving?

##### Tolerated deviation

Are the limits/scopes clearly and understandably determined?  
Is the tolerance justifiable?  
What will happen if the deviation is exceeded?

##### Sources of data

Where will the data necessary for finding out the indicator's value come from?  
Isn't it possible to mix them up?  
Are they constant?

##### Frequency

How often should be the indicator created?  
How often should be the measurement reported?  
Is the frequency of measurement sufficient to ensure conclusiveness of values?  
Is the frequency sufficient to find out the effect of actions the role of which is to lead to the improvement?

##### Who performs the measurement

Who - the name, position or some external agency - is in fact responsible for data collecting, their classification and analyzing?  
Has the person acquired appropriate knowledge and skills?  
What are their competences and responsibilities?

##### Method of measurement

Is it sufficiently detailed, clear and unambiguous?  
Is ensured its invariability?  
Does exist any replaceable way to ensure the same quality of data?  
Are the costs of the method relevant?

##### The way of measurement

Is it sufficiently detailed, clear and understandable?  
Are the required measuring aids and instruments available?  
Has been the worker trained to use them?  
Has the worker acquired appropriate skills?

##### Periodicity of measurement

Is the periodicity sufficient?  
Aren't the data collected unnecessarily often?  
What are the reasons for periodicity increase/decrease?

##### Schedule of measurement

Has been every interested party got acquainted with it?  
Is the time continuity of all actions ensured?  
Is factual continuity ensured?

##### The way of reporting the results of measurement

Are means of reporting the results ensured?  
Is the way suitable for all involved people?  
Are the costs relevant?

##### Who verifies the results of measurement?

Who - name, position or some external agency - is actually responsible for data verification?  
Do they have appropriate knowledge and skills?  
What are their competences and responsibilities if some discrepancies are found out?

##### Who will react to the data?

Who - name or position - is responsible for initiating the actions to ensure improving the performance?  
From what reason just that person or position has been appointed?  
What is their relation to the indicator for which they have been chosen as its owner?

##### What do they do?

How exactly will the owner of the indicator use the obtained data?  
What will do they do to improve the performance?  
What are their competences and responsibility for ensuring the increase of performance?  
Do they have appropriate knowledge and skills?

#### APPENDIX II: INDICATOR CARD 'CASH FLOW' IN THE CASE OF A SMALL FAMILY FIRM

The firm operating in the wood-working industry pays back the credit granted to purchase a real property, and leasing to buy processing equipment.

##### Indicator

Cash Flow

##### Description of the indicator

Indicator for weekly manual processing:  
Financial means (cash-desk, bank account, money on the way) - input  
Financial means (cash-desk, bank account, money on the way) - output  
Indicator for month processing:

It is part of accounting software.

Weekly as well as monthly processing: the result for the given period will be established and the result accumulated since the beginning of the year.

#### **Purpose**

To control firm's solvency it is necessary to know a cash flow coming through the firm. Importance of cash flow monitoring results from the fact that firm's costs and returns do not have to be and mostly they are not identical with the move of money.

Calculation of the cash flow will point out to the important differentiation between available means and profitability. Even though the firm can have profitable business its incomes need not to exceed in short term its expenses as a consequence of the delay in receiving payments from customers. This delay is usually a primary source of cash flow short supply in a number of firms. Therefore a cash flow is very important in analyses confirming firm's financial sound. Shareholders should carefully inquiry into the causes of every more extensive loss of cash flow.

Law of accounting has determined the structure of a cash flow statement capturing a historical cash flow. Designing of cash flow into the future should predict the accessibility of cash flow for the future activities and facilitates the estimation whether there are available funds to satisfy the future investment projects.

The estimation of projected prompt financial means makes it possible to plan the future funds including negotiation about credits and loans well in advance, which may cut financial costs. Knowledge of cash flow serves to timing of capital inputs, planning of expansion (purchase of new fixed assets, technologies) or to the management of invested

#### **It relates to...**

Processes: financial management of the firm – operative level

Stakeholders: shareholders

Strategy: all levels

#### **Formula/verbal description**

Unit: CZK

Cash flow is created (financial means flowing in, a positive cash flow) or it is used up (the outflow of financial means, a negative cash flow) at any firm's activity.

Cash flow from operating activity is based on the profit from a current activity that has been adjusted by non-monetary operation (depreciations, correction items) and furthermore by changes in operating capital (change in inventory levels, short-term claims and obligation from operating activity).

Cash flow from investment activity is connected with the move of fixed assets (purchase and sale e.g. processing equipment) and property participations.

Cash flows from financial activity follow changes in long-term obligations (drawing of new credit, loan installments), in basic capital and paid shares of profit.

Increase in cash - money accepted by the firm. It includes items: cash resulting from operating activities, extraordinary activities, remuneration received from investment activities (accepted interests) and disposal of assets, acceptance of new means as loans, credits and the like.

Loss in cash - money paid out by the firm. Cash withdrawals include the items: ensuring firm's working (wages, purchase of material and raw materials, services - electricity, water, gas, fuels), credit duties, taxes and deliveries to institutions, investment (fixed property), and payment of loans.

Cash flow is often analyzed before and after a significant action (e.g. loan paid-off, purchase of fixed assets). When the analysis is making it is important to recognize free cash flow that is available to be used in the firm to satisfy the needs of others.

Analysis of free cash flow has to take into consideration planned cash flow as well as actual cash flow because the planned cash flow makes it possible to ensure availability of cash in the future.

Data to find out the rate of cash flow are at disposal in financial statements. Cash flow is usually part of every business plan.

#### **Level of a set goal (goals)**

To ensure payment of all obligations in time and in the full amount.

#### **Tolerated deviation**

Short-term standpoint: liquidity means for the payment of obligations not later than within 15 days after the due date.

If cash flow is insufficient then payments of obligations to the most important suppliers will be preferred (the State Forests, the Czech Energy Works), furthermore to the state institutions (revenue authority, district authorities of social security, health insurance companies).

If there is a danger of higher loss in cash it is necessary in time to start talks with the involved people about the extension of invoices due dates, installments and the like.

Long-term standpoint:

To introduce a system of claims management - advance money, invoices' due time, demanding the money of penalty, and claims recovering.

#### **Sources of data**

Cash book, bank statements.

#### **Frequency**

Once a week – by hand.

Once a month - part of a monthly balance of accounts.

#### **Who performs the measurement**

Accountant - who at the same time acts as a cashier, the accountant has a right of on-line approach to bank statements. They have material responsibility for entrusted financial means. The accountant (cashier) has got a computer with accounts software, controlling software, on-line connection with a bank and a hand safe. The required level of education: secondary economic education, five-year experience in bookkeeping. At least once a year taking part in training about what is new in the field.

Knowledge: work with PC, software, and on-line communication with a bank.

#### **Method of measurement**

Measurement once a week: On Friday afternoon the accountant will find out the statement of accounts in the cash book which she will compare with a real statement of accounts in the hand cash and will pass one week's on line abstract of account. She will make an analysis in which she will point out to unplanned, unexpected or lump sum expenditure or income. On Friday before 5.00 p.m. she will hand the analysis over to the manager

Measurement once a month: Cash flow statement is part of accounts software. She will make the same analysis as in the previous case. By 12.00 a.m. of the fifth day of the following month she will hand it over to the manager.

#### **The way of measurement**

A cash book is kept by hand. Entries into it are made immediately at every transaction. Cash documents are passed to once a week.

Cash is paid on the basis of submitted tax documents. Employees entrusted by purchase are obliged to submit them not later than on the following day after the purchase.

#### **Periodicity of measurement**

To ensure liquidity in connection with relatively high indebtedness it is appropriate to submit the results once a week.

#### **Schedule of measurement**

Measurement is taken once a week, on Friday afternoon. By 5.00 p.m. of the same day the manager will get the results including commentaries.

Measurement once a month: manager will get the results of the analysis by 12.00 a.m. on the fifth day of the following month.

#### **The way of reporting the results of measurement**

The results will be submitted in a printed shape. Instruments for reporting the results of measurement are available - a computer, software, a safe, connection with a bank, telephone. Costs of finding out the results are appropriate.

#### **Who verifies the results of measurement?**

Manager (the owner) randomly checks the state of cash in the cash-desk.

Statements of account he checks at least once a month in connection with the balance of accounts.

#### Who will react to the data?

Manager (at the same time the owner) of the firm.

#### What do they do?

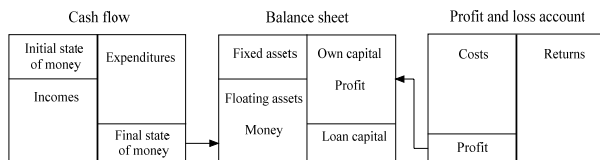
Observing the trend of cash state development. Checking whether the cash is ensured for repaying real estate installments and leasing installments. In case of loss of cash he will immediately start talks with the most important creditors to make them sure about his efforts to meet his obligations. He will ensure the way of obtaining substitute cash money.

He will enter into cooperation with a tax consultant, with an expert in financial management and marketing - immediately.

By minor, financially reasonable activities he will make the surrounding environment aware of himself and in this way he will create the image of a trustworthy firm.

#### Note

A total cash flow is the result of all positive and negative flows during the observed period. This result is recognizable from a balance sheet. Cash flow statement explains the way of how the result has been created.



From the current value of the future cash flows the value of assets can be derived, which is the substance of discounted cash flow models. The basis is the current value of the future returns for the period for which the **investor** will own the firm. It is supposed that the investor behaves rationally and considers so-called opportunity costs. These costs depend on the due date, liquidity and the rate of risk.

As far as the **owner** is concerned a **net current value** is the basic criterion of firm's performance. It combines the interests of owners and managers. If managers are motivated to the maximization of the net current value, then they will act in owners' best interest.

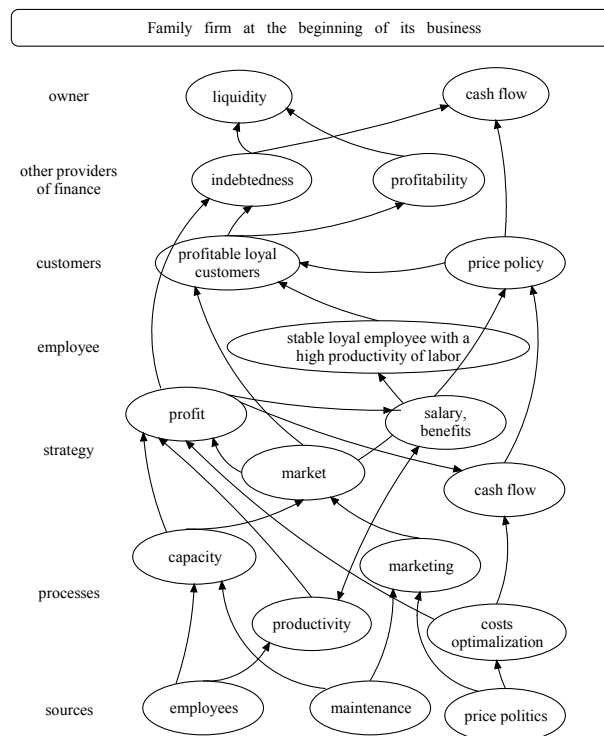
To the modeling of discounted cash flow (DCF) it is possible to approach from various points of view.

From the view of a **cash flow** that is for whom the cash flow is intended: whether it is a free cash flow for the owners and creditors (FCFF - free cash flow to the firm), free cash flow for the owners (FCFE - free cash to the equity), dividend and EVA indicator (economic added value). Free cash flow for the owners and creditors (FCFF) represents all operating cash flows. It takes into consideration ensuring further working and development of the firm (change in working capital and investment). From that cash flow the claims of the owners and creditors will be met.

In case the firm is financed by its own capital only, the FCFE calculation is identical with the FCFF calculation. The firm, however, is mostly financed in addition to its own capital also by loan capital. In that case a cash flow is lowered by the sum intended for creditors because their position in meeting interests is prior to the owners. Free cash flow for the owners takes into consideration on the contrary to FCFF capital structure and that is why a discount rate is determined on the basis of own capital costs.

From the view of the used **discount rate**: weighted average costs of capital (WACC) are relevant to the EVA indicator and a cash flow for the owners and creditors. They represent an average price the firm will pay for the created financial mix that is in what ratio the firm uses its own and loan capital for financing its needs.

### APPENDIX III: CASUAL LINKS AT ALL-COMPANY LEVEL



### ACKNOWLEDGMENT

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