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Performance Measurement Systems in Germany

– A Descriptive Evaluation Report –

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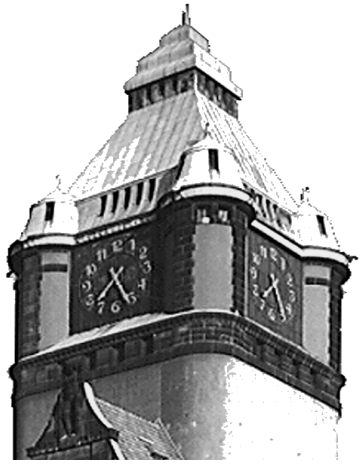

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1 Introduction

With the changing structure of competition over the last few years, new factors of success became more important in management accounting that had previously only been considered to a lesser extent, if at all.[1] Simultaneously their interrelated dependencies increased rapidly (e.g. between quality and time and costs, respectively). This is why intensified endeavours have been undertaken in the 1990s to establish and control new success factors (e.g. quality, time or customer orientation). These multidimensional approaches are called performance measurement systems.[2] The literature shows that with respect to a particular implementation of performance measurement systems there may be considerable difficulties.[3]

2 Objectives and design of the study

The extent to which German companies are using performance measurement systems was evaluated in an empirical examination at the Chair of Management Accounting at Dresden University of Technology in Summer 2000. We investigated the structure of these systems and their further development and practical use in order to find approaches for the design of an optimal performance measurement system. The following topics are the **main issues** considered in this study:

- **Popularity**
  How widely are performance measurement systems used? What kind of basic model is used (e.g. Balanced Scorecard, value based approaches)?
- **Type of measures and content of measurement**
  What types of performance measures (e.g. financial/non-financial, subjective/objective) are used in what areas? Do these performance measures reflect the strategy of the company?
- **Adjustment to new challenges**
  What elements of the performance measurement system have to be modified and how often?
- **Implementation in the company**
  To what extent is a performance measurement system linked to performance-related payment in an incentive scheme? Which hierarchical levels are covered by a performance measurement system and to what extent are employees integrated?
- **Satisfaction and Problems**
  How do companies rank their own performance measurement system, and where do they think problems and difficulties concerning performance measurement arise?

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1 See JOHNSON, H. T./KAPLAN, R. S. (1987), pp. 1ff.
2 See GLEICH, R. (1997), pp. 114ff.
3 See e.g. HORVÁTH & PARTNER (ed.) (2000), p. VI.

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The **Objective** of the project is to describe the extent of performance measurement systems in German companies and to verify several models that may be used to explain the structure of performance measurement systems.

Based on the "Total Design Method"[4], a provisional questionnaire was developed that has been refined in a **pre-test** conducted in cooperation with several companies. Interviews in leading German companies, a consultancy and in scientific institutions were held to optimise the questionnaire.

To obtain representative, non-sector specific results, 862 companies with a high turnover were selected from the Hoppenstedt company database.[5] This sample was extended by 80 companies, which already took part in an empirical study focusing on brand evaluation and brand management performed at the Chair of Management Accounting last year.[6] For that sample consisting of 942 companies, contact persons in the field of management accounting or finance were retrieved from several databases.

Companies that were already contacted in the pre-test of the questionnaire are not included in the final sample to avoid bias.

To test the level of significance of results (elimination of random variations), statistical tests (t-tests etc.) and correlation analyses are used. In the application of these methods a level of significance $\alpha = 5\ \%$ is assumed.

3 Results of the empirical investigation

The questionnaires were sent out at the end of July 2000. In September a reminder to all companies which had not yet reacted followed.

Three-hundred and thirty-four of the 942 companies answered in some way (response rate 35.5%), of which 181 were utilisable (return rate 19.9%). Eleven companies prefered not to sent the questionaire back, beause they felt the topic was not relevant for them. Two companies refused to respond because they believed internal matters of their company would have been exposed too much. Six enterprises did not react due to the multiplicity of enquiries received to support empirical studies, and four companies do not answer questionnaires at all any more. Four companies are currently planning to implement a performance measurement system and therefore felt they were not able to contribute. Thirty-three companies did not cooperate because of a shortage of time. The remaining companies gave no reason for their rejection.

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4 For this method of developing a questionnaire see DILLMAN, D. A. (1978).

5 See HOPPENSTEDT (ed.) (2000). This is considered to be the largest German database in this field.

3.1 The sample

This study is cross-sectoral covering a wide range of branches (Fig.1). The frequency of manufacturing and trade companies is relatively high.

sector	frequency	relative frequency	responses	response rate within segment
Agriculture and forestry	1	0.1 %	0	0.0 %
Mining and related companies	8	0.8 %	6	75.0 %
Manufacturing	439	46.6 %	162	36.9 %
Power and water supply	46	4.9 %	25	54.3 %
Building	13	1.4 %	6	46.2 %
Trade	227	24.1 %	57	25.1 %
Hotels and restaurants	3	0.3 %	2	66.7 %
Transport and communication	55	5.8 %	22	40.0 %
Finance and insurance	1	0.1 %	0	0.0 %
Real estate and residential lettings; leasing of movable goods; business-to-business services	134	14.2 %	44	32.8 %
Health care, veterinary and social services	2	0.2 %	1	50.0 %
Other public and private services	13	1.4 %	7	53.8 %
	942	100.0 %	332[7]	35.2 %

Fig.1: The sector structure of the sample[8]

Since our selection from the Hoppenstedt database only includes companies with a turnover in excess of DM 800 million a year, our sample is not representative for all 3 million German companies. The turnover distribution of the sample can be seen in Fig. 2.

turnover [million DM]	frequency	relative frequency	responses	response rate
up to 900	218	23.1 %	69	31.7 %
901 to 1.000	75	8.0 %	32	42.7 %
1.001 to 1.500	196	20.8 %	67	34.2 %
1.501 to 2.000	122	13.0 %	37	30.3 %
2.001 to 5.000	222	23.6 %	80	36.0 %
5.001 to 10.000	57	6.1 %	20	35.1 %
more than 10.000	52	5.5 %	27	51.9 %
	942	100.0 %	332[9]	35.2 %

Fig. 2: The turnover distribution of the sample

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6 See GÜNTHER, T./KRIEGBAUM, C. (1999).
7 Two companies could not be assigned.
8 Structure according to HOPPENSTEDT (ed.) (2000).
9 Two companies could not be assigned.

3.2 Popularity of performance measurement systems

In 1997 an empirical study showed that 36 % of all German companies did not use performance measurement systems at all.[10] Three years later this proportion is not much lower in this study (32%, see Fig. 3). About half the companies (32 % + 15 % = 47 %) did never deal with performance measurement or are just examining systems to determine whether they could be useful for the company. On the other hand, about half the companies (37 % + 16 % = 53 %) have already some experience with the implementation of performance measurement systems, and most of these are actually using them (37 percentage points out of 53 percentage points). One out of six companies is currently implementing a performance measurement system.

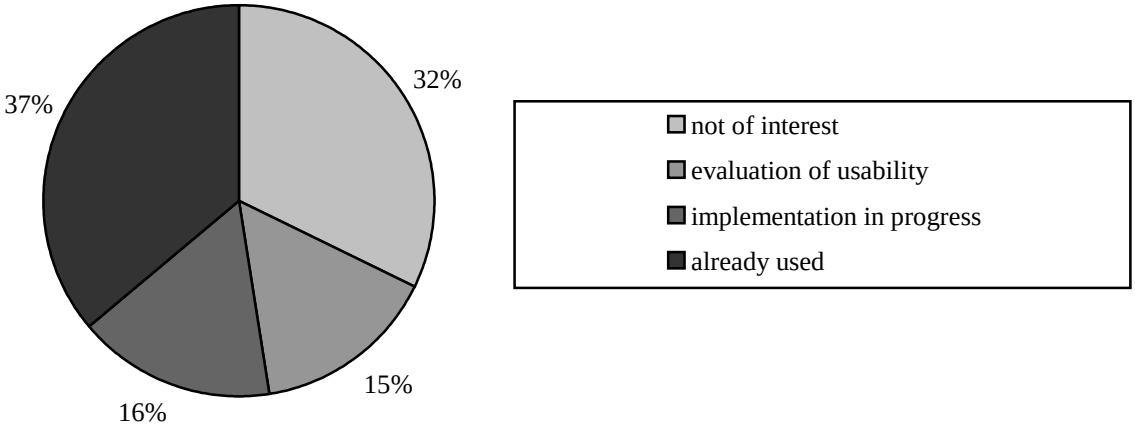

Fig. 3: Usage of performance measurement systems
(subsample of 179 companies)

The reasons why companies did not apply performance measurement systems are diverse (Fig. 4). One third believes that the existing management accounting instruments are sufficient and, therefore, introducing performance measurement systems is unnecessary. The same proportion of companies is afraid of high costs for performance measurement systems, whereas the number of companies hesitating because of implementation costs and running expenditures are balanced. Remarkable, six companies were not able to find a suitable basic approach for performance measurement at all. The remaining companies gave various reasons, mostly higher priority of other projects.

This evaluation report only considers the popularity of performance measurement systems in participating companies. The popularity among *all* German companies may be different. Some of the companies using no performance measurement system likely choose not to take part in our study because they did not see any benefit in it. Unfortunately, the size of this proportion can neither be measured nor estimated. Therefore, the use of performance measurement systems in all German companies may even be lower than that found in our study. Of course, this also

[10] See HORVÁTH, P. u. a. (1999), p. 308.

applies to the results of other authors studying the popularity of performance measurement systems.

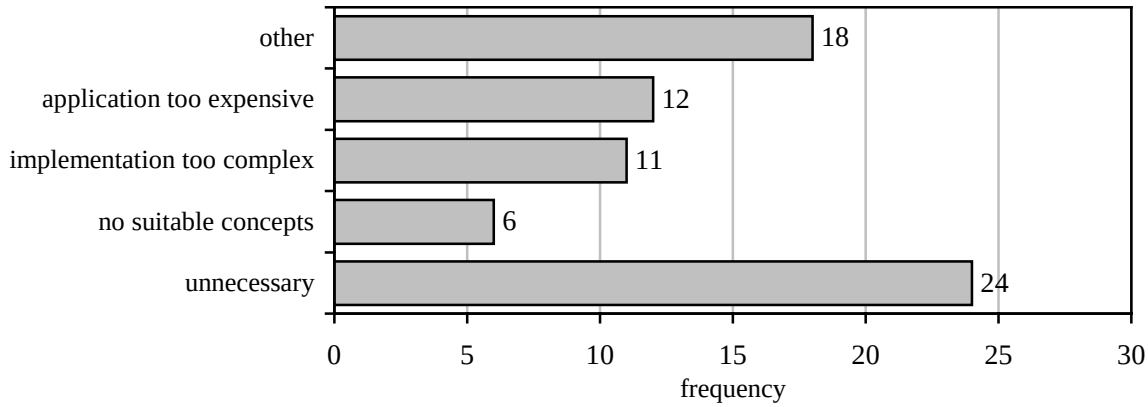

Fig. 4: Reasons for rejection of performance measurement (subsample of 58 companies)

Results of a 1997 empirical study focussing on Germany showed that the Balanced Scorecard[11] was only used by a minority (8.9 %), but 20 % of all companies planned its future implementation.[12] One year later already 22 % of all companies in the US used the Balanced scorecard,[13] whereas the percentage in Germany was 17.4 %.[14]

The Balanced Scorecard is the best known and most frequently implemented approach among the companies responding to our questionnaire (see Fig. 5). Additionally, an even greater use of the Balanced Scorecard may be expected in the future, because more companies than are already using this tool are currently in the implementation stage or at least evaluating it for application. Other approaches discussed in the literature such as the Performance Pyramid[15] or Quantum Performance,[16] are of no practical relevance and less well known.[17] On the other hand, one third of the companies use classical systems such as the Return on Investment (RoI) scheme or ZVEI-scheme.[18] However, the importance of these classical approaches is not expected to increase in the future as almost no implementation or evaluation in progress was found to occur. Value-based approaches will be used more frequently since the 19 % of the companies which are already using such systems will double due to those companies which are currently at the evaluation, development or implementation stage of value-based approaches. In previous years most companies used proprietary (self-developed) approaches of performance measurement.[19] Today proprietary concepts are applied in practice nearly as often as the Balanced Scorecard. It

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11 See KAPLAN, R. S./NORTON, D. P. (1997).
12 See HORVÁTH, P. u. a. (1999), p. 308.
13 See FRIGO, M. L./KRUMWIEDE, K. R. (1999), p. 1.
14 See FLEISCHHAUER, D. (1998), p. 10.
15 See LYNCH, R. L./CROSS, K. F. (1995).
16 See HRONEC, S. M. (1996).
17 See equivalent FLEISCHHAUER, D. (1998), p. 10.
18 See REICHMANN, T. (1995), p. 30
19 See HORVÁTH, P. u. a. (1999), p. 308.

is to be expected that proprietary approaches will be less prefered in the future as in addition to the 38 companies already applying Balanced Scorecards there are 1.5 times that number of potential users. For proprietary concepts this factor is just 0.3 based on 37 users.

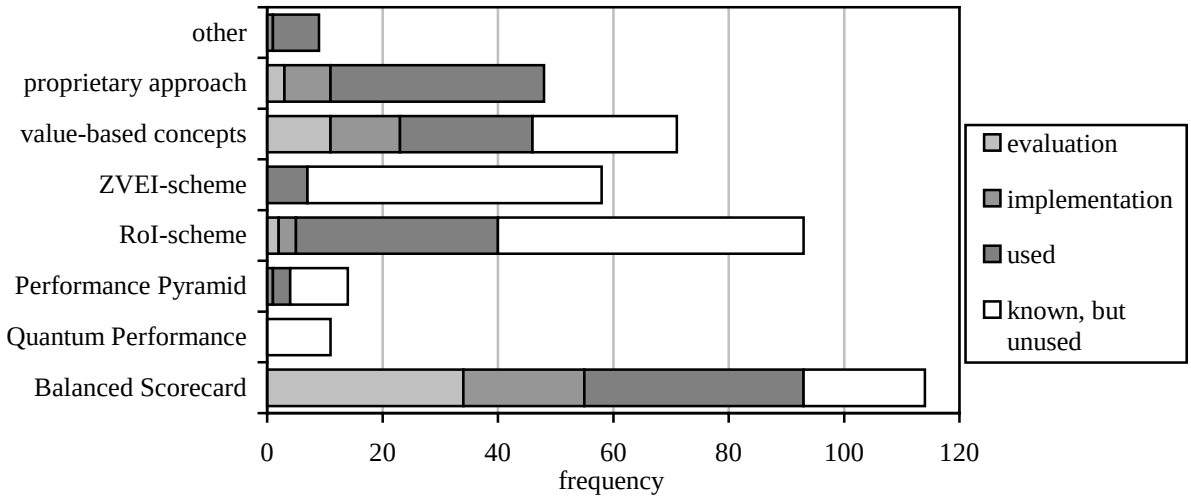

Fig. 5: Popularity and status of introduction/use of performance measurement systems (subsample of 123 companies)

Performance measurement systems are not ready-to-use products,[20] but have to be adjusted to the specific requirements of the companies. There are even several companies in the consultancy and service sector that offer support for the implementation of a performance measurement system. Nevertheless, most of the responding companies create their performance measurement system themselves (see Fig. 6). Almost one fourth of the companies buy a standard product to customise it according to company needs. Non-adaptable standard products play a minor role. In nearly 6 % of the companies we found another development process mainly influenced by guidelines of the parent company and group-wide specifications.

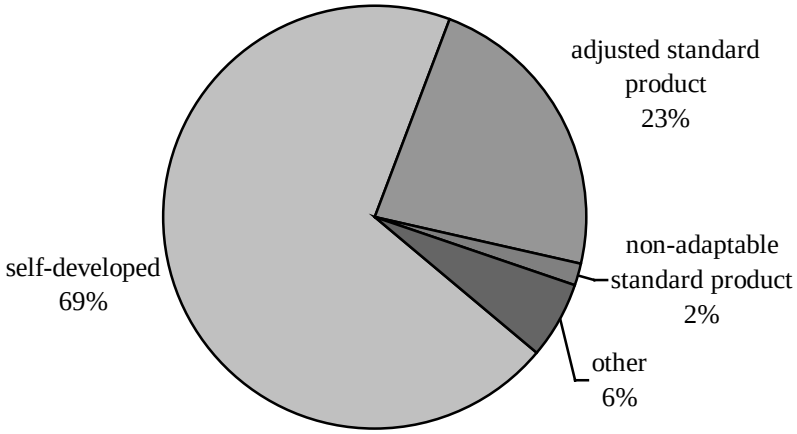

Fig. 6: Development of performance measurement systems (subsample of 113 companies)

[20] See FRIEDAG, H. R./SCHMIDT, W. (1999), pp. 222ff.

In summary, the majority of companies uses self-developed systems based on the Balanced Scorecard. The importance of the Balanced Scorecard will probably increase further in the future.

3.3 Content of the measurement

Objects of reality usually cannot be measured directly. Therefore, indicators (= measures, ratios) have to be used as substitutes to obtain information about these objects (e.g. percentage of rework as an indicator of process quality). The individual weight of a particular measurement object within a performance measurement system varies depending on the type of the object.

For the purpose of systematisation five types of measurement objects will be considered. Each of them comprises an area that is important for a companies success and its control:

- *Tangible resources* (e.g. machines, buildings, inventories)
- *Financial resources* (e.g. cash, deposits, shares, accounts receivables, liabilities)

} "classical" measurement objects

- *Intangible resources* (e.g. patents, brands, reputation, employee know-how)
- *Processes* (e.g. production and logistic processes)
- *Business environment* (e.g. competitors, customers, general public)

} "modern" measurement objects

Tangible and financial resources have traditionally been included in accounting figures. On the other hand, up to now companies have a limited experience of measuring intangible resources, processes and the business environment. Accordingly, the first two are called "classical" measurement objects, whereas intangible resources, processes and the business environment are called "modern".

There is a general assumption that those measurement objects that are relevant for the long-term successful development of the company should be integrated in the performance measurement system. The relevance of the five types of measurement objects is shown in Fig. 7. The spectrum reaches from "not relevant" (1) to "very relevant" (5). [21] The average relevance of all measurement objects except business environment is high. Therefore, business environment seems to be of less importance for the companies of our sample.

[21] The distance between the numerical values is proportional to the difference of respective intensities. Therefore, the scales are called equidistant or interval scales. All scales used in this study that contain numerous attributes are interval scales. The attributes were selected such that intervals between two attributes are perceived equally (by German speaking people. Here an English translation of attributes is used.) For an empirical test of equal intervals of German wordings see ROHRMANN, B. (1978), pp. 222ff.

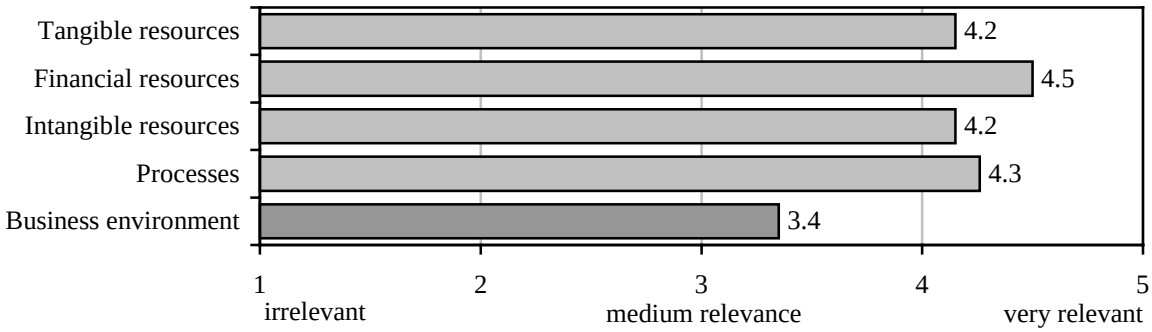

Fig. 7: Average relevance of measurement objects
(subsample of 109 to 122 companies)

Today we know three **strategic directions**: competition on price and cost, competition on quality and competition on time.[22] There are great differences in relevance of these directions in our sample. As shown in Fig. 8 the relevance of price and cost competition that companies counter with cost leader strategies, is higher compared to quality as well as time and flexibility competition, mostly countered with diversification and specialisation strategies.

The average relevance of price and cost competition is significantly higher[23] than the average relevance of quality competition ($T = 8.914$, $dF = 113$, $\alpha = 0.00 < 0.05$) and time and flexibility competition ($T = 8.328$, $dF = 112$, $\alpha = 0.00 < 0.05$).

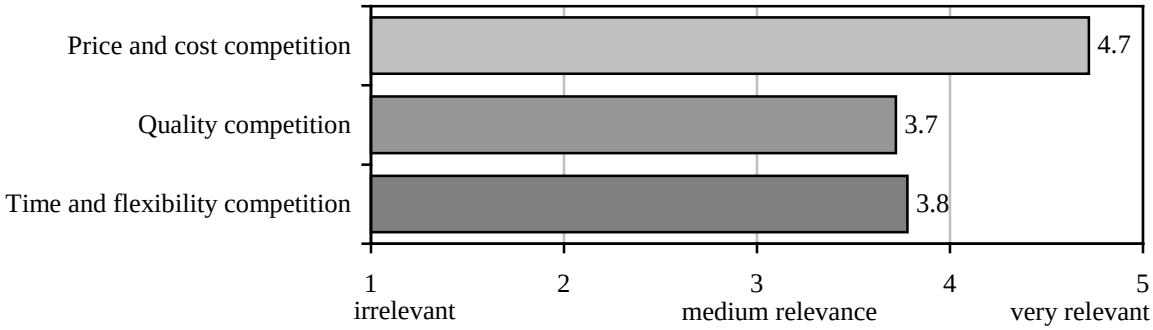

Fig. 8: Average relevance of strategic directions
(subsample of 113 to 115 companies)

In contrast to the relevance just examined, Fig. 9 shows the intensity with which measurement objects are considered in performance measurement systems of the sample. On average, the „classical“ measurement objects (tangible and financial resources) are considered significantly more intensively in performance measurement systems than „modern“ measurement objects:

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[22] See for an overview e.g. BAUM, H.-G./COENENBERG, A. G./GÜNTHER, T. (1999), pp. 77ff.

[23] The proposition „A is significantly larger than B“ means, that A is larger than B *in the sample* and that the probability that A is larger than B in the parent population (not completely covered by the sample) is at least 95 % at the same time. To examine the significance of differences between mean values t-tests can be applied, of which the T-value (T), the degrees of freedom (dF) and the level of significance (α) are given here.

Test values: paired comparison of intensity of consideration	Intangible resources	Processes	Business environment
Tangible resources	T = 8.856, dF = 110, $\alpha = 0.00 < 0.05$	T = 2.132, dF = 112, $\alpha = 0.04 < 0.05$	T = 6.688, dF = 102, $\alpha = 0.00 < 0.05$
Financial resources	T = 12.684, dF = 111, $\alpha = 0.00 < 0.05$	T = 3.851, dF = 112, $\alpha = 0.00 < 0.05$	T = 9.522, dF = 104, $\alpha = 0.00 < 0.05$

There is obviously still a strong influence of managerial and financial accounting on performance measurement.[24]

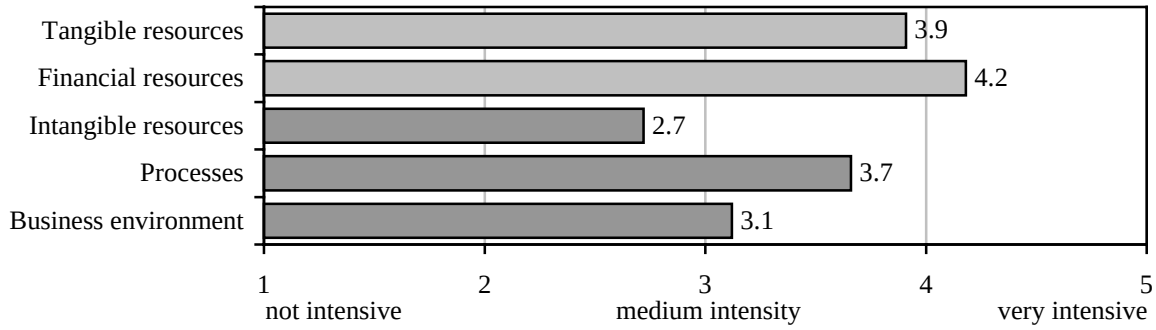

Fig. 9: Average intensity of consideration of measurement objects (subsample of 105 to 116 companies)

Comparing Fig. 7 and Fig. 9, substantial discrepancies between relevance and intensity of consideration of measurement objects (especially intangible resources and processes) are revealed. All differences between relevance and intensity of consideration are significant:

Tangible resources	Financial resoures	Intangible resources	Processes	Business environment
T = 2.324, dF = 113, $\alpha = 0.02 < 0.05$	T = 3.528, dF = 114, $\alpha = 0.00 < 0.05$	T = 14.936, dF = 108, $\alpha = 0.00 < 0.05$	T = 6.104, dF = 112, $\alpha = 0.00 < 0.05$	T = 2.387, dF = 94, $\alpha = 0.02 < 0.05$

Similar differences can be found regarding strategic measures (see Fig. 10). Costs, revenues and profits that are important for cost leader strategies dominate in performance measurement systems. Information on time and flexibility as well as on internal and external quality that are of interest for diversification and specialisation strategies are considered significantly less intensively:

[24] On the other hand, it might be uncertain to postulate a "Fixation on Financial Results" (ANTHONY, R. N./GOVINDARAJAN, V. (1998), p. 469).

Test values: paired comparison of intensity of consideration	Time and flexibility measures	Internal quality measures	External quality measures
Cost measures	T = 5.843, dF = 116, α = 0.00 < 0.05	T = 5.592, dF = 116, α = 0.00 < 0.05	T = 7.269, dF = 117, α = 0.00 < 0.05
Revenue and profit measures	T = 9.397, dF = 116, α = 0.00 < 0.05	T = 8.675, dF = 115, α = 0.00 < 0.05	T = 10.520, dF = 116, α = 0.00 < 0.05

The comparison between the relevance of competition areas (Fig. 8) and the intensity with which strategic measures are considered in a performance measurement system (Fig. 10) reveals that they correspond well. No significant differences exist except for price and cost competition:

Price and cost competition	Quality competition	Time and flexibility competition
T = 2.173, dF = 111, α = 0.03 < 0.05	T = 1.033, dF = 110, α = 0.30 > 0.05	T = 0.676, dF = 109, α = 0.50 > 0.05

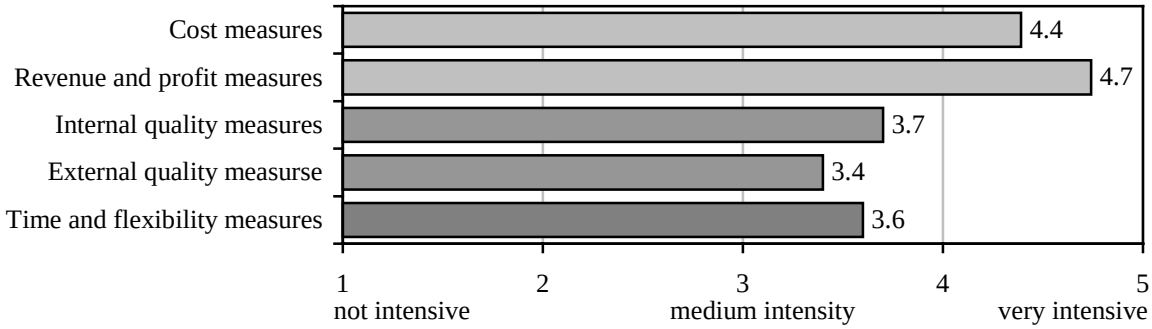

Fig. 10: Average intensity of consideration of strategic measures (subsample of 117 to 119 companies)

In summary, we found that the strategic compatibility of performance measurement systems is strong, as important strategic objects play a key role in the performance measurement system, while the less relevant ones are considered less intensively. We found a different situation for measurement objects. For example, although intangible resources are rated as relevant they are not intensively considered (comparison of Fig. 7 and Fig. 9). The differences between relevance and consideration can be explained by analysing *how* objects are measured. This analysis follows in the next section.

3.4 Type of measures

Some measurement objects might be neglected just because no indicators that may be measured economically are available for these measurement objects. Large differences concerning measurability between “classical” and “modern” measurement objects were revealed in our sample (see Fig. 11). **Measurability** is rated significantly higher for “classical” measurement objects than for “modern” ones.

Test values: paired comparison of measurability	Intangible resources	Processes	Business environment
Tangible resources	T = 13.978, dF = 114, $\alpha = 0.00 < 0.05$	T = 5.961, dF = 115, $\alpha = 0.00 < 0.05$	T = 10.064, dF = 100, $\alpha = 0.00 < 0.05$
Financial resources	T = 19.953, dF = 113, $\alpha = 0.00 < 0.05$	T = 10.917, dF = 114, $\alpha = 0.00 < 0.05$	T = 16.878, dF = 99, $\alpha = 0.00 < 0.05$

These results suggest an provisional explanation of the variation of the intensity with which measurement objects are considered in performance measurement systems.

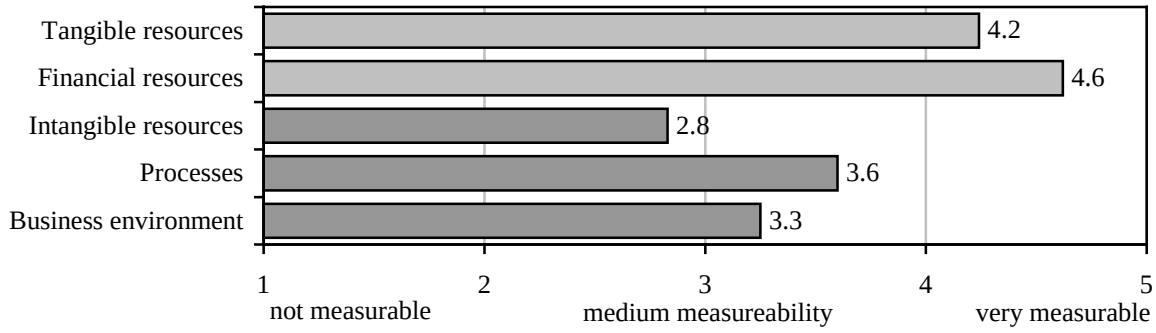

Fig. 11: Average measurability of measurement objects (subsample of 101 to 119 companies)

An additional explanation may be derived from the **quality of measures used**. In general, each measurement process comes with a measurement error. The quality of the measurement process is determined by the validity and reliability of the measures used. The **validity** of a measure describes whether the measurement process measures what it should, i.e. if the measure is an indicator of the desired measurement object. Validity is a measure of the systematic measurement error. **Reliability** refers to the random measurement error caused by the scattering of measurement results. The quality of measures determined by validity and reliability in the sample is shown in Fig. 12. Both validity and reliability are rated significantly higher for "classical" measurement objects than for "modern" ones:

	Test values: paired comparison of validity resp. raliability	Intangible resources	Processes	Business environment
validity	Tangible resources	T = 11.103, dF = 115, $\alpha = 0.00 < 0.05$	T = 6.789, dF = 112, $\alpha = 0.00 < 0.05$	T = 10.808, dF = 112, $\alpha = 0.00 < 0.05$
	Financial resources	T = 14.062, dF = 117, $\alpha = 0.00 < 0.05$	T = 10.470, dF = 113, $\alpha = 0.00 < 0.05$	T = 14.540, dF = 114, $\alpha = 0.00 < 0.05$
reliability	Tangible resources	T = 13.234, dF = 114, $\alpha = 0.00 < 0.05$	T = 7.708, dF = 113, $\alpha = 0.00 < 0.05$	T = 12.592, dF = 111, $\alpha = 0.00 < 0.05$
	Financial resources	T = 15.435, dF = 117, $\alpha = 0.00 < 0.05$	T = 10.389, dF = 114, $\alpha = 0.00 < 0.05$	T = 15.359, dF = 114, $\alpha = 0.00 < 0.05$

There is significant correlation between validity and reliability of measures.[25] Therefore, they are a good indicator of the quality of measures used.

Tangible resources	Financial resources	Intangible resoures	Processes	Business environment
r = 0.702, N = 117, α = 0.00 < 0.05	r = 0.794, N = 119, α = 0.00 < 0.05	r = 0.803, N = 118, α = 0.00 < 0.05	r = 0.816, N = 115, α = 0.00 < 0.05	r = 0.848, N = 114, α = 0.00 < 0.05

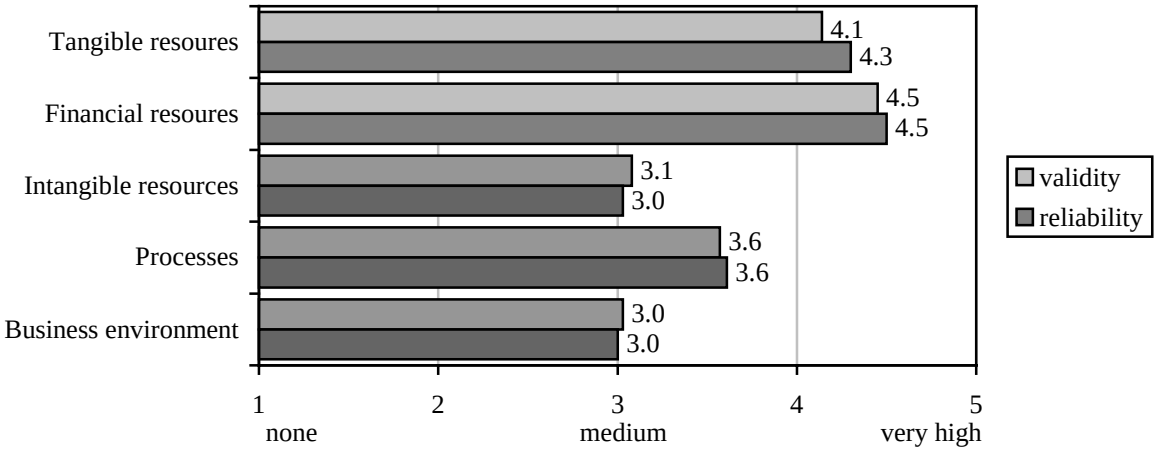

Fig. 12: Average validity and realiability of measures
(subsample of 115 to 119 companies)

Both **financial** (based on $ or €) as well as **non-financial** measures can be used to measure measurement objects.[26] To measure "classical" measurement objects, financial measures predominate in our sample. In contrast, non-financial measures are used for the majority of intangible resources, processes and the business environment (see Fig. 13).

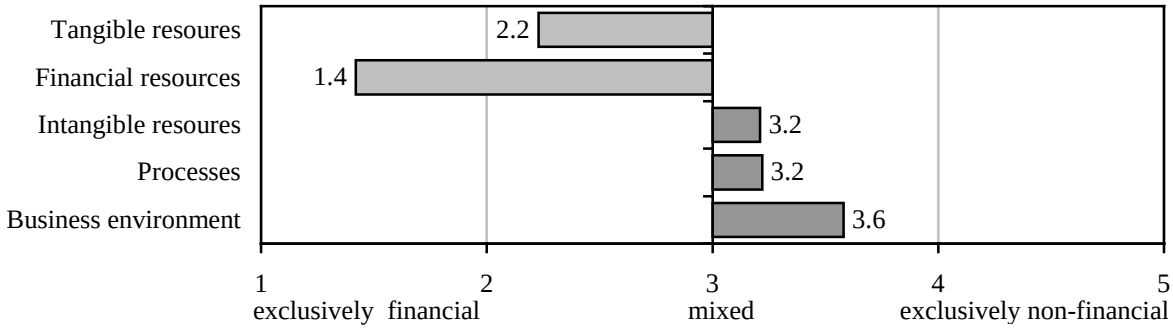

Fig. 13: Average financial focus of measures
(subsample of 113 to 119 companies)

The degree of objectivity or subjectivity of measures is another criterion to describe the type of measures. In general, most companies prefer objective measures to subjective ones. The

[25] For correlation analysis the Bravais-Pearson-correlation coefficient is used. Appropriate results (correlation coefficient r, sample size N, level of significance α) are given.

[26] See KLINGEBIEL, N. (1999), pp. 22ff.

measures of "classical" measurement objects are rated as more objective than those of "modern" measurement objects (see Fig. 14). Possibly there is a trend to more objective measures as those are not yet available for those measurement objects that companies have less experience with (relating to "soft facts").

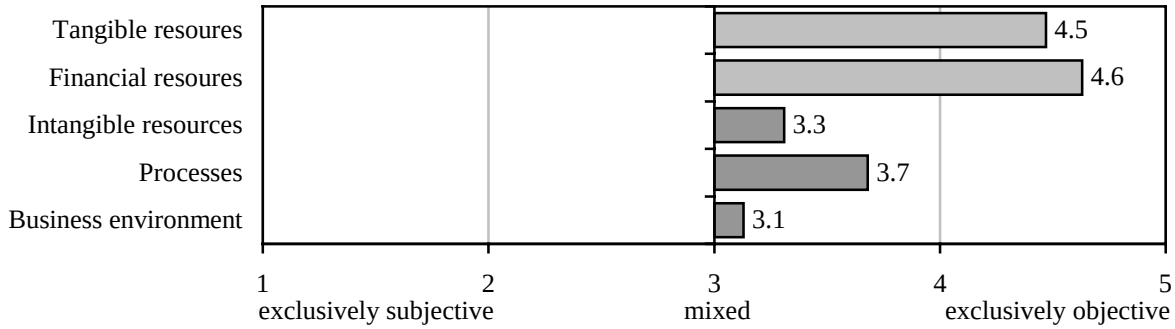

Fig. 14: Average degree of objectivity and subjectivity of measures (subsample of 112 to 119 companies)

Timeliness is very important as information about the development of measurement objects should be available as soon as possible. However, it is difficult to anticipate the future as forecasts are accompanied by uncertainty.[27] On average, measures of tangible and financial resources ("classical" measurement objects) had a slight lead in time in our sample. On the other hand, the statistical tests show that there is no significant difference from "up-to-date", so for the parent population measures might not have a lead in time:

Tangible resources	Financial resoures	Intangible resources	Processes	Business environment
T = 0.765, dF = 112, $\alpha = 0.45 > 0.05$	T = 1.387, dF = 114, $\alpha = 0.17 > 0.05$	T = 3.059, dF = 107, $\alpha = 0.00 < 0.05$	T = 2.401, dF = 105, $\alpha = 0.02 < 0.05$	T = 5.110, dF = 103, $\alpha = 0.00 < 0.05$

Measures of "modern" measurement objects are significantly lagging behind. Therefore, information about intangible resources, processes and the business environment may already be outdated when they become available (see Fig. 15).[28]

[27] For forecasts and environmental scanning see KREILKAMP, E. (1987), pp. 245ff.

[28] Most measures of "modern" measurement objects are lagging behind. However, some "modern" measurement objects drive the financial performance of a company. These facts do not exclude each other. The first one refers to the result of the result of the measurement process, the second fact to the interaction of measurement objects.

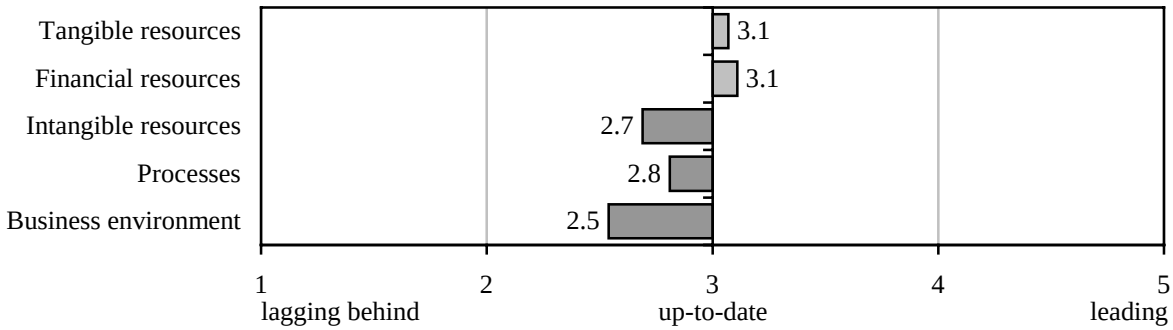

Fig. 15: Average time lag of measures
(subsample of 104 to 115 companies)

In summary, "classical" measurement objects of tangible and financial resources differ from "modern" measurement objects of intangible resources, processes and the business environment in the way they are measured. Measures of "classical" measurement objects are more easy to use, more up-to-date, more objective, more financial and have a better quality than those for "modern" objects.

3.5 Adjustment to new challenges

It is a truism that the market demands that a company faces change as time goes on. Performance measurement systems that are based on success factors are also under that pressure to change.

In our sample most companies do not use a fixed **timebox** for adjustments, but try to make changes when necessary. If a fixed schedule is used, most companies prefer it to correspond to the annual planning cycle. Companies described as "other" do not have any experience with modification or have to observe group standards (see Fig. 16).

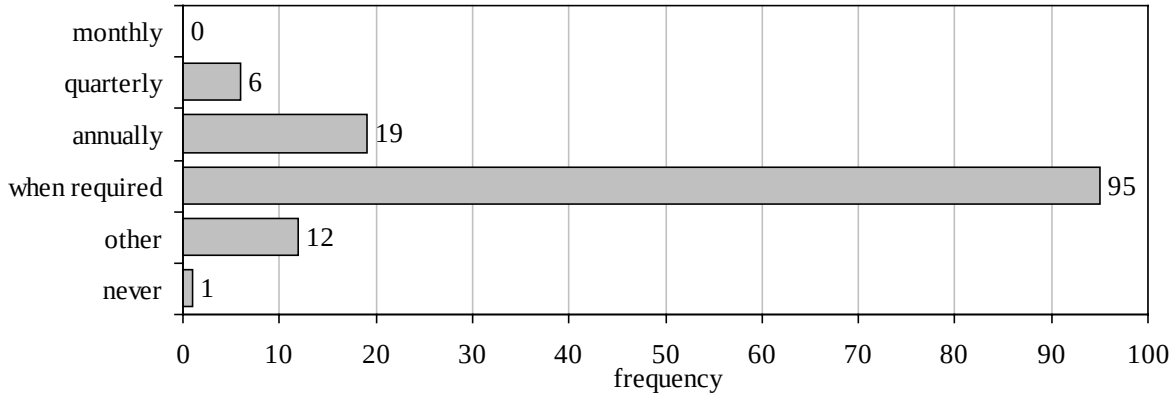

Fig. 16: Interval of adjustment of performance measurement systems
(subsample of 119 companies)

The **adjustments** of a performance measurement system relate to any of the important **elements of a performance measurement system** (see Fig. 17). The average intensity of adjustment does not differ significantly between elements.

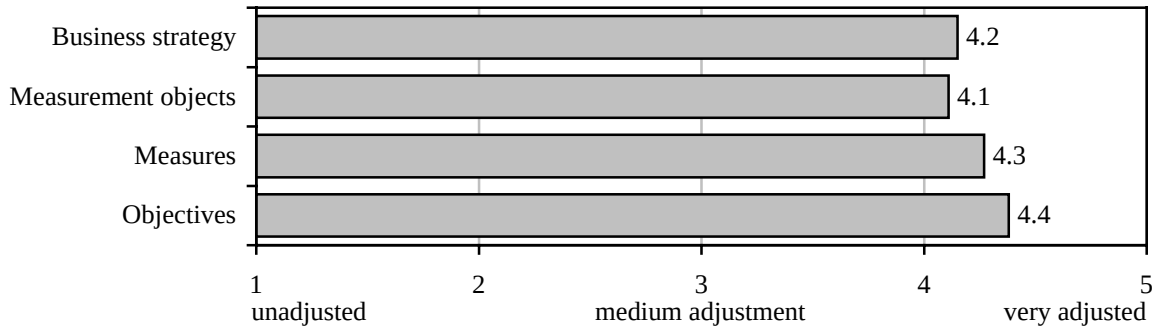

Fig. 17: Average intensity of adjustment of elements of a performance measurement system
(subsample of 111 to 114 companies)

In summary, companies adjust almost all important elements of a performance measurement system to new requirements when necessary.

3.6 Implementation

For a successful implementation of a performance measurement system it is important to encourage **staff** interest and co-operation. Therefore, suggestions, ideas, and interests have to be considered or, if that is not possible, staff should at least get comprehensive information about the performance measurement system. In our sample we found the situation shown in Fig. 18. While the **participation of staff** in the development process of a performance measurement system is not very excessive (average between "medium" and "considerable"), **information exchange** between top and shop floor is developed stronger (average between "considerable" and "very").

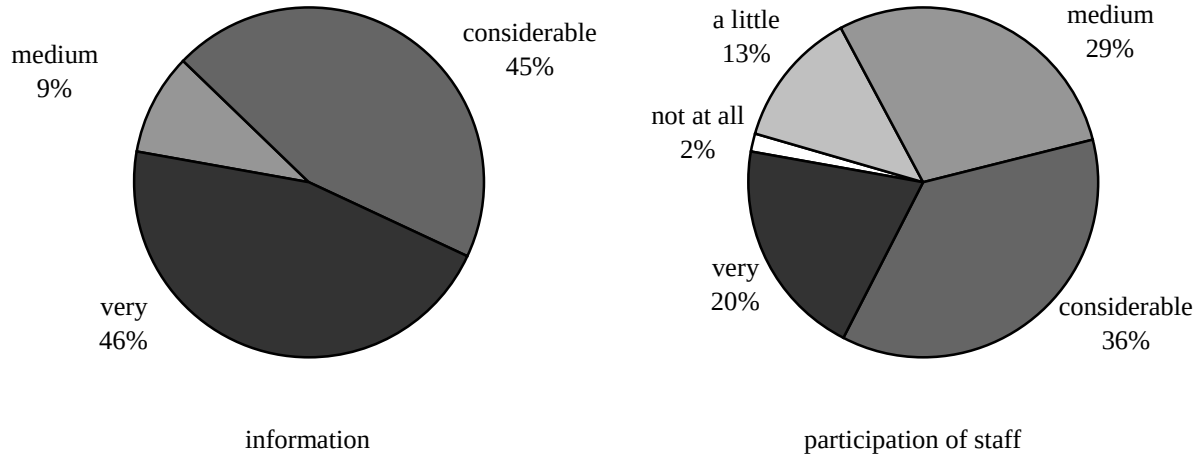

Fig. 18: Information exchange and participation of staff
(subsample of 118 companies)

Due to the ever increasing importance of computers in business at the transition to the information age, powerful **software support** for performance measurement systems became a key success factor of their implementation. Today companies use information technology for their performance measurement system to some extend, but serious manual work is still necessary (see Fig. 19).

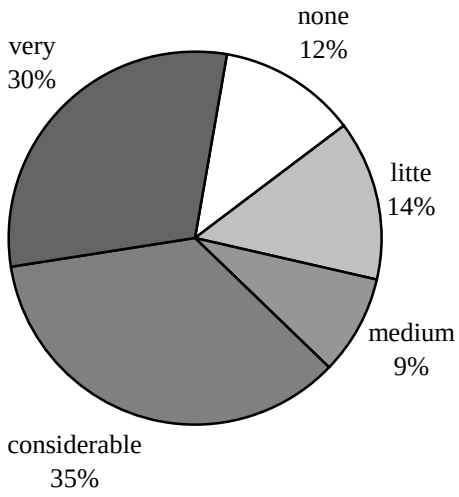

Fig. 19: Software support for performance measurement systems (subsample of 116 companies)

The average software support is between “medium” and “considerable”. Most companies use self-developed software products (36 companies), often based on Microsoft standard software. Software related to SAP-systems (mostly R/3) is very popular and used by 34 companies. Sometimes SAP reports are analysed with MS Excel. Those 27 companies that use Microsoft software for their performance measurement system use Excel followed by Access. 6 companies use Hyperion software, another 18 prefer “other” products (Gentia, ALEA, Oracle, Lotus etc.). Altogether 93 companies offered information about software used.

For a durable and successful implementation of a performance measurement system it is necessary to convince the top management of the company of its potential benefit. **Communication of information** to the top management about where the company stands and how business is runing is very helpful for that. There are considerable differences concerning the reporting frequency in our sample (see Fig. 20). Information about “classical” measurement objects (tangible and financial resources) are reported more often and ad-hoc reporting is less often used than for “modern” measurement objects (intangible resources, processes, business environment).

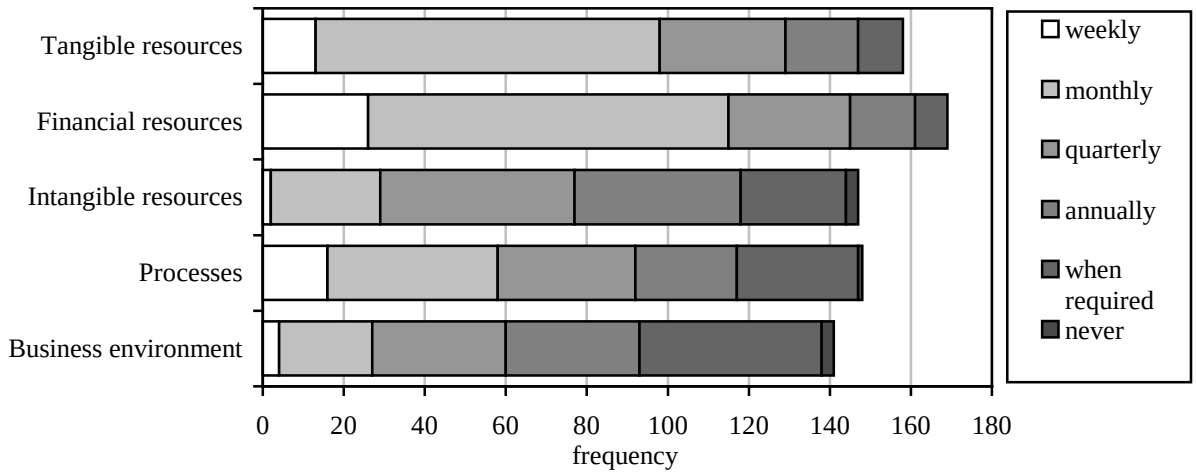

Fig. 20: Reporting frequency to the top management
(subsample of 111 to 120 companies)

These differences are also reflected in the average **reporting frequency** as shown in Fig. 21. Reporting frequency for "classical" measurement objects is significantly higher than for "modern" objects:

Test values: paired comparison of reporting frequency	Intangible resources	Processes	Business environment
Tangible resources	T = 10.450, dF = 113, $\alpha = 0.00 < 0.05$	T = 6.025, dF = 110, $\alpha = 0.00 < 0.05$	T = 11.621, dF = 108, $\alpha = 0.00 < 0.05$
Financial resources	T = 12.204, dF = 115, $\alpha = 0.00 < 0.05$	T = 7.543, dF = 111, $\alpha = 0.00 < 0.05$	T = 14.652, dF = 110, $\alpha = 0.00 < 0.05$

There are two possible explanations for this difference. On the one hand, the higher reporting frequency of "classical" measurement objects might be caused by cost accounting and interim reporting that have a long tradition in companies. On the other hand, "modern" measurement objects might be reported less frequently as those objects change less often (e.g. customer and employee satisfaction or know-how) and, therefore, a more frequent reporting is unnecessary.

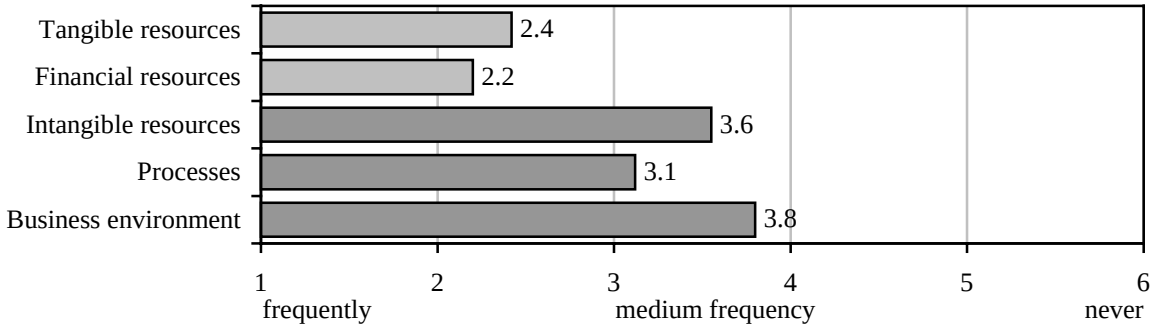

Fig. 21: Average reporting frequency to the top management
(subsample of 111 to 120 companies)

To increase management effectiveness it might be useful to link compensation (broadly defined, including, for instance, status symbols and career options) to goal achievement using an

incentive system.[29] "Classical" measurement objects that are measured with more objective, more up-to-date, more valid, and more reliable measures (see section 3.4) are on average significantly more often used to determine compensation than "modern" objects:

Test values: paired comparison of intensity of copmensation base	Intangible resources	Processes	Business environment
Tangible resources	T = 6.528, dF = 109, α = 0.00 < 0.05	T = 2.795, dF = 108, α = 0.01 < 0.05	T = 8.651, dF = 106, α = 0.00 < 0.05
Financial resources	T = 10.726, dF = 110, α = 0.00 < 0.05	T = 7.365, dF = 108, α = 0.00 < 0.05	T = 13.114, dF = 107, α = 0.00 < 0.05

Financial resources are the most important measurement objects with regard to compensation. Elements of the business environment (e.g. supplier relations and ecological results) that are difficult to manage and influenced by many other factors employees cannot control are less important for compensation (see Fig. 22).

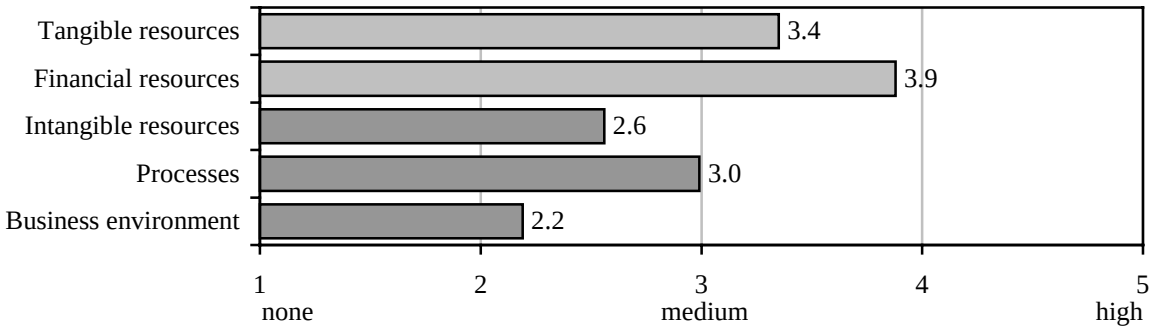

Fig. 22: Average influence on compensation
(subsample of 108 to 114 companies)

Today three **levels of performance** interacting with a performance measurement system are known. These levels are the organisational level, the process level, and the job/performer level.[30] The first one refers to the entire company, the process level is limited to a part of the company i.e. a department, and the third is an individual/operating level. The summary in Fig. 23 is based on the figure used in the questionnaire. The numbers included describe the borders between the three levels of performance and will be used in further analysis. The investigation of hierarchical levels participating in the performance measurement system shows that top management is almost always involved (average upper boarder is 1.0), while the operating level is often omitted (average lower boarder is 3.2). Companies may not include the operating level as operationalising success factors tend to be difficult.

[29] See PRENDERGAST, C. (1999), pp. 16ff.
[30] See RUMMLER, G. A./BRACHE, A. P. (1995), pp. 15ff.; SWANSON, R. A. (1994), pp. 48ff.

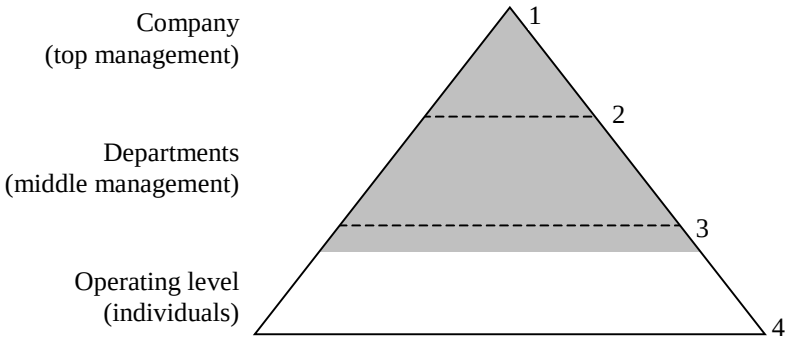

Fig. 23: Average levels of performance participating in performance measurement systems
(subsample of 119 companies)

In summary, the average company implements a performance measurement system with software support (but not extensively), including top and middle management (but not the operating level). Employees hardly participate in the development process, but are well informed of the systems' rules. The reporting frequency of "classical" measurement objects exceeds that of "modern" objects where information is often only presented when required. The influence of goal accomplishment on personal compensation is medium, whereas "classical" measurement objects are more important than "modern" ones.

3.7 Achievements and problems

In general, the companies of our sample are satisfied with their performance measurement system (see Fig. 24). There are significant differences in **satisfaction** between the extent to which internal measurement objects are used and the timeliness of information on the one hand and the extent to which external measurement objects are used and the extent of comprehensive information on future development on the other hand:

Test values: paired comparison satisfaction	External measurement objects	Comprehensive information on future development
Internal measurement objects	T = 5.017, dF = 116, α = 0.00 < 0.05	T = 5.321, dF = 115, α = 0.00 < 0.05
Timeliness of information	T = 5.380, dF = 116, α = 0.00 < 0.05	T = 6.244, dF = 115, α = 0.00 < 0.05

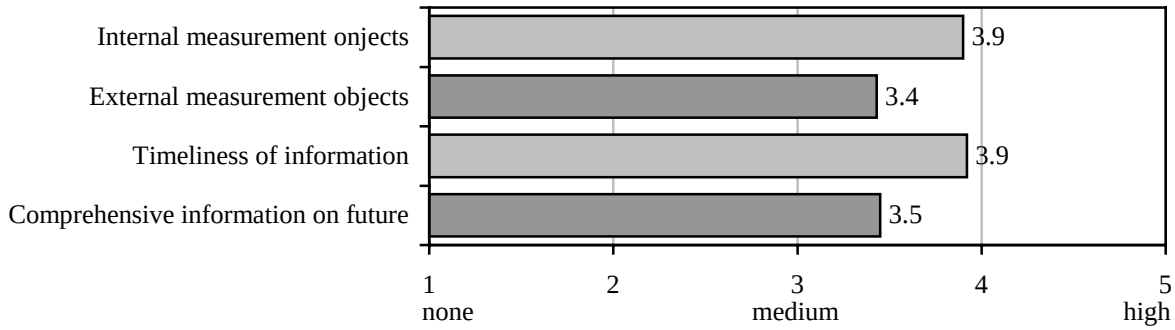

Fig. 24: Average satisfaction with the performance measurement system
(subsample of 116 to 118 companies)

An open question in our survey asked for **conditions** to be met for the introduction of performance measurement systems that are **critical for its success** (see Fig. 25). The following analysis is based on 108 companies that responded to this question. **Communication with employees** and their **participation in the development** of the performance measurement system are most important for success (77 companies). The **type and quality of the measurement construction** rank second (64 companies), where the quality of measures (esp. validity) and their timeliness are expected to be very important. For the introduction of a company-wide performance measurement system **support of the top management** is very important. In our sample 50 companies said that this is critical to success. Well behind these "top 3" are **software support** of the performance measurement system and the **link to an incentive system** to reward employees for individual goal achievement. Fifteen companies believe that to adjust a performance measurement system to new developments i.e. its **flexibility** is critical for success. Specific characteristics of the introduction process were stated by 12 companies, but there is no agreement on whether to prefer a top-down or a bottom-up introduction. Availability of resources for the introduction and an economical handling of the performance measurement system are also important to some extent. Vision, mission, and culture of the company are of secondary importance (4 companies).

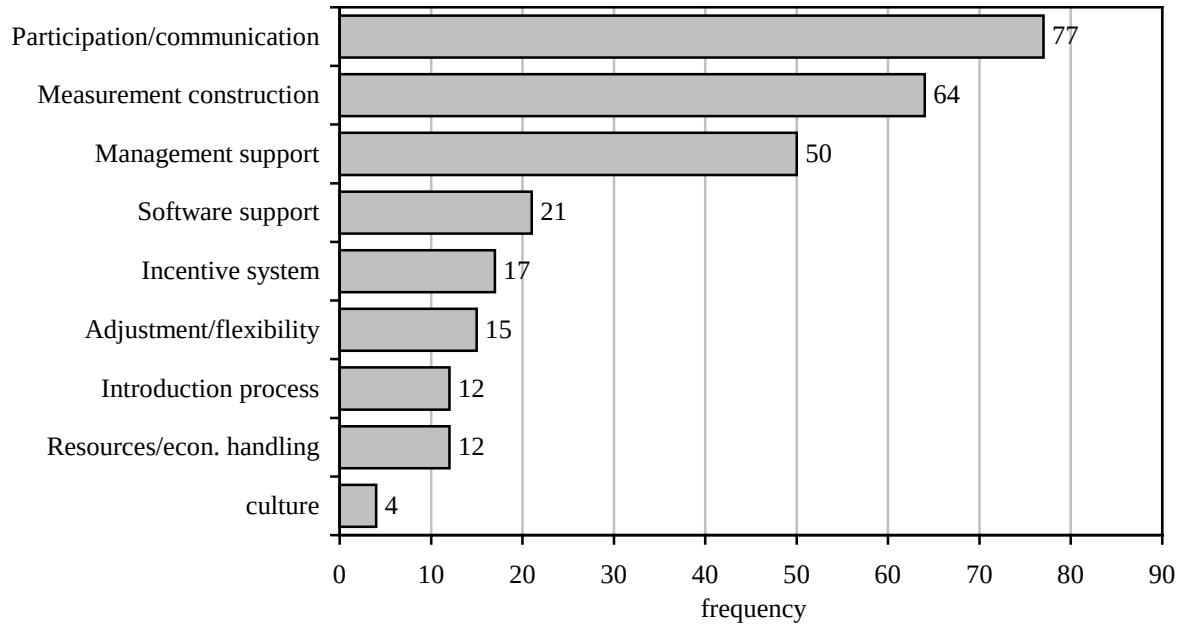

Fig. 25: Conditions to be met for successful introduction of a performance measurement system
(subsample of 108 companies)

On average, companies are content with their performance measurement system. The success of the introduction process of a performance measurement system depends on the involvement of employees, the type of measurement construction, and management support, with the latter being said to be of importance in all kinds of projects.

3.8 Outlook to a non-descriptive analysis

Extensive research was carried out to enhance the results mentioned in this report. The following section offers an overview.

There is a significant correlation between the following **properties of measures**: measurability, objectivity, and quality (validity and reliability). Measures regarded as more valid are more measurable, more reliable, and are perceived as being more objective. Therefore, these items load high on a single factor, i.e. they describe a common characteristic of measures.

In addition, there is much evidence to suggest that the properties mentioned above are independent of whether a measure is of **financial nature** or not. Occasionally it is hypothesized that financial measures are more objective[31] or more subjective[32] or have a better quality than non-financial measures. None of these hypotheses could be verified in our sample.

At the end of section 3.3 it was hypothesized that an insufficient consideration of relevant measurement objects in a performance measurement system is due to characteristics of measures available for these measurement objects. Causal modelling, which will not be explained in detail here, showed that the **intensity to which measurement objects are considered** in a performance measurement system is determined by the relevance of these measurement objects for long-term company success, as well as by the measurability and quality of measures mentioned above. Therefore, causal modelling offers an explanation of which measurement objects are considered to what intensity in a performance measurement system.

When using **measures in an incentive system** some authors assume that there is a preference of objective measures to subjective measures in determination of compensation.[33] This hypothesis could not be verified in our study. The hypothesis that more timely measures are prefered to link the performance measurement system with the reward system could not be verified either. On the other hand, there is some evidence that a higher quality of measures (validity and reliability) supports the use of these measures in an incentive system.

There is evidence of a relation between the intensity to which measurement objects are used in a reward system and the **reporting frequency** to top management. For “modern” measurement objects measures of a higher quality are communicated to top management, whereas for “classical” measurement objects such a correlation could not be found. Generally measures regarded as more objective are communicated more often.

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[31] See KAPLAN, R. S./NORTON, D. P. (1996), p. 53; ANDREWS, K. Z. (1996), p. 8.

[32] SINGLETON-GREEN feels that non-financial measures are less subject to manipulation and, therefore, financial measures are more subjective. See SINGLETON-GREEN, B. (1993), p. 52.

[33] See COENENBERG, A. G. (1999), p. 579 and LAUX, H./LIERMANN, F. (1993), p. 522.

4 Summary

Performance measurement systems have achieved a strong position at the interface of strategic management and management accounting. Their popularity depends on the challenges a company faces. Therefore, a considerable number of companies do not use performance measurement systems due to lack of necessity at present. Recent development is mainly based on in-house developments of the companies or the Balanced Scorecard approach by KAPLAN and NORTON.

Currently there are considerable differences between “classical” measurement objects, i.e. tangible and financial resources that relate to cost and financial accounting on the one hand and intangible resources, processes, and the business environment that became more important within the last decades on the other hand.

On the fundamental level “classical” measurement objects are considered significantly more intensively in performance measurement systems than “modern” objects. On the application level significant differences between “classical” and “modern” measurement objects were found with respect to quality of measures, measurability, objectivity, financial focus, reporting frequency, and usage in a compensation system.

In general, performance measurement systems insufficiently include the operating level. Therefore, a real translation of corporate strategy into operational measures could not be achieved yet. Other weaknesses of the implementation process relate to less co-operative development of performance measurement systems and to the extent of software support that is open to improvement.

The popularity of performance measurement systems in German companies will probably increase in the near future. Two questions are very important for further development of holistic approaches: “What should be measured within the performance measurement system?” and “How to convince employees to actively use performance measurement systems?”

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39/00	Günther, Edeltraud; Schuh, Heiko	Definitionen, Konzepte, Kriterien und Indikatoren einer nachhaltigen Entwicklung
40/00	Günther, Edeltraud; Krebs, M.	Aufgaben- und Organisationsstruktur der Umweltpolitik in der Bundesrepublik Deutschland
41/00	Günther, Edeltraud	Valuluation of eco-related consequences
42/00	Bogaschewsky, Ronald; Buscher, Udo; Lindner, G.	Optimizing Multi-Stage Production with Constant Lot Size and Varying Number of Unequal Sized Batches – Proof of Convexity of Total Cost Function
43/00	Buscher, Udo	Optimale Koordination in unternehmensübergreifenden Logistiksystemen
44/00	Günther, Thomas; Grüning, Michael	Performance Measurement-Systeme im praktischen Einsatz – deskriptiver Auswertungsbericht –