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## Article

# Performance measurement of management system standards using the balanced scorecard

Amfiteatru Economic Journal

## Provided in Cooperation with:

The Bucharest University of Economic Studies

*Suggested Citation:* Kopia, Jan; Kompalla, Andreas; Buchmüller, Melanie; Heinemann, Bastian (2017) : Performance measurement of management system standards using the balanced scorecard, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 19, Iss. Special Issue No. 11, pp. 981-1002

This Version is available at:

<https://hdl.handle.net/10419/196405>

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## PERFORMANCE MEASUREMENT OF MANAGEMENT SYSTEM STANDARDS USING THE BALANCED SCORECARD

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**Please cite this article as:**

Kopia, J., Kompalla, A., Buchmüller, M. and Heinemann, B., 2017. Performance Measurement of Management System Standards Using the Balanced Scorecard. *Amfiteatru Economic*, 19(Special no. 11), pp. 981-1002.

**Article History**

Received: 14 July 2017

Revised: 10 September 2017

Accepted: 5 October 2017

### Abstract

Management system standards (MSS), such as ISO standards, TQM, etc. are widely-used standards adopted by millions of organizations worldwide. It is still an unclear question whether these standards are beneficial for an organization, besides the fact that they might be required or expected by law or customers. The question, whether MSS increase the efficiency, the output, or the performance of an organization is still discussed in scientific research. One reason might be that performance measurement itself is not fully understood or in constant development ranging from pure financial evaluations over intellectual capital rating to calculating of levels of environmental, social or economic expectations known as the Triple Bottom Line. The Balanced Scorecard is one possible solution for performance measurement on a strategic and operational level and therefore useful for the measurement of the influence of MSS within organizations.

This study summarized current research in the field of performance measurement in the context of MSS and IMS and the use of BSC and quantitatively and qualitatively tests the usefulness of BSC in measuring the effect of MSSs using the Execution Premium. It was found that BSC is often used, that an average number of companies integrate their measurement initiatives of their MSSs into the BSC-process, and that a high integration of MSS into the BSC improves the organizational performance.

This research is useful for researchers and practitioners in order to understand the benefits of the usage of the BSC in the context of MSS or Integrated Management Systems.

**Keywords:** performance management, balanced scorecard, strategy maps, management system standards, integrated management systems, executive premium

**JEL Classification:** M10, L10, L15, L25

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## **Introduction**

Management system standards (MSS), such as those offered by the International Organization for Standardization (ISO), offer organizations worldwide the possibility to reach certain goals based on a standardized way. Historically ISO started to developing standards in the 1950s (ISOa, 2017). In 1987 the ISO 9000 standards (quality management) were developed and became a starting point for organizations worldwide to focus on quality improvement. But ISO was not the only standard to that time. Total Quality Management (TQM) played a major role earlier already (originating in Japan and taught by Deming in the 1950s and by other quality experts such as Ishikawa, Crosby etc. in the 1960s (Stupak, 2001)). Since that time the question whether and how such a MSS changes the output of an organization is still not clearly answered by scientists. One reason is that the general question of how performance is measuring is not clearly defined. Performance measurement is a intensively discussed topic which went through a recent change from strictly financial oriented models and indicators toward the measurement of other important aspects, such as capabilities and knowledge within organizations, environmental, social, and cultural aspects, and other intangible assets. Besides different existing methods the Balanced Scorecard (BSC) introduced by Kaplan and Norton (1992 and later extended 1996a, 1996b) is a widely-adopted measurement system which aligns the strategic goals of an organization with its operational parts. It therefore is a useful system to measure the output of operational processes (e.g. MSS-processes) and link them to a strategic level via the BSC (even if the chosen scope of the MSS is narrow).

This research summarizes current trends in scientific literature and develops a theory based on the literature analysis. It then tests the theory quantitatively and qualitatively.

## **1. Literature review**

### **1.1 Management system standards and integration**

No clear link between the ISO 9000 standards and TQM was identified in scientific literature yet but indifferent research results regarding the questions whether to adapt both standards at the same time, what influences have these approaches to each other, and which improves performance of company more or less (Bradley, M., 1994; Sun, H., 2000; Magd et al., 2003; Sampaio, 2009; Martinez-Costa, 2009; Tyler, 2017). Despite the scientific debate, ISO certifications grew tremendously within the last 20 years. The most adapted standard is ISO 9001 with the most recent revision of ISO 9001:2016 (followed by ISO 14001-environmental management) is being used by over 1.4 million companies worldwide (ISO, 2015). Several other MSS become more important too: ISO 50001 (Energy management), ISO 27001 (information security management), ISO 20000 (IT service management), ISO 22000 (food safety management system), ISO 31000 (Risk management) etc. – ISO lists over 50 MSS on its webpage.

Despite the above mentioned scientific debate, it seems reasonable for organizations to follow such standards either because it is required by laws or regulations or because certain customers require it. But are there other reasons as well? ISO itself states, that MSS „enable organizations to implement a structured approach to their activities in order to achieve their objectives” (ISO, 2017b). ISO further states that MSS „help organizations improve their performance [...]”. This is done by implementing repeatable steps toward a goal and

objectives and by creating an organizational culture which is open to change and improvement. This cultural setting is reached by leadership commitment and trained employees. ISO further states that the benefits of a MSS is the improvement of financial performance through efficient use of resources and „increased capability to deliver consistent and improved services and products, thereby increasing value to customers and all other stakeholders”.

Scientific research over the last decade covered many different aspects in the context of MSS and other meta-standards (Heras-Saizarbitorra, 2013). Besides motivational effects of the implementation of a MSS which can either be internal or external driven (Prado-Roman et al., 2014), there is evidence of certain success factors for an efficient and effective implementation and that ISO 9001 is a preliminary step toward TQM (Lee et al., 1999; Sampaio et al., 2009). The „promise” of ISO that a MSS improves financial performance was not clearly confirmed in scientific literature. „Whatever its version is, ISO standard is not a guarantee of quality or better performance” (Sampaio et al., 2009). Many studies also focus only on the dichotomic variable whether the organizations are certified or not ignoring the degree of commitment, implementation of the ISO standards (Tari et al., 2012). In fact, it is still a field of academic debate whether and how MSS (most research is based on the ISO 9001- and ISO 14001 standard) influence the performance of an organization (Karim, 2015; Khan, 2014; Tari et al., 2012; Ming-Hsien Li et al., 2012; Daily, 2011; Sampaio et al., 2009; Martínez-Costa, 2009; Heras, 2002; Gavin, 2000). The same is true for TQM (Errikson et al., 2003; Chong et al., 2004; Hoque, 2003; Sholihin et al., 2009; Kaynak 2003).

### **1.2 Integrated Management System Standards**

The last chapter made clear that there are still many open questions regarding the effect of MSS within an organization. These questions become even more interesting when multiple MSS are implemented within one company. Either all MSS are implemented and operated separately or are congested into an integrated management system (IMS) (Rebelo, 2015). Most ISO MSS recently introduced a high-level structure (HLS) which improves the integration efforts of multiple MSS (Kopia, 2016). Despite some controversy there is scientific evidence that the integration of MSS into one IMS is beneficial to an organization (Bernardo et al., 2009, Zutshi et al., 2005, Ahsen et al., 2001, Griffith, 2000). Researches of Kopia (2016), Katniak (2012) and other scientists confirm these finding. But as in the research field of MSS, there is still a research gap in the field of clear outcomes of IMS for in organization (Griffith et al., 2008; Brobrek and Sokovic 2006) due to a missing standardized performance measurement system (Dowell et al., 2000; Litten, 2005). Several authors (Braun, 2005, Delmas, 2001 etc.) argued that ISO standards do not aim for a specific organizational goal or result and therefore are not easily measured with a standardized performance measurement system. ISO standards assist organizations in systemize, document and improve corporate processes within the given limits of the organization. And so do IMS.

### **1.3 Performance measurement**

Several scientific authors stated above investigated the question of how to measure organizational performance of a MSS (either a separate system or an IMS). The problem is that performance is not clearly defined in that context. The above stated ISO promises of an increased performance summarize that problem. Performance measurement of an organization is a challenging and widely discussed topic. It is closely related to the question

of how success is defined for a company. Since this definition depends on the company's vision and strategy it seems clear that success and performance mean different things to organizations.

Most organization however have some common basic goals. Certain strategic aspects, such a how to survive in the competitive landscape, must be answered by almost all organizations. The competitive advantage depends on resources and capabilities (Kompalla et al., 2016; Prahalad et al., 1990). Teece et al. (1997) developed the concept of dynamic capabilities as "[...] firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." What knowledge companies can develop, keep and use to produce its goods and services became a dominant phenomenon at the end of the 19th century. Important assets are not only tangible but intangible. And with it the question of how to measure it. "The concept of dynamic capabilities, especially in terms of organizational knowledge processes, has become the predominant paradigm for the explanation of competitive advantages. However, major unsolved—or at least insufficiently solved—problems are first their measurement and second their management..." (Cordes-Berszinn et al., 2013).

Many performance measurement systems are still focusing the financial side of the organizational performance. Key performance indicators such as Market share, different kinds of turnover rates, cash flow, net and gross profit, Debt to Equity Ratio, Revenue growth rate, Earnings before tax (EBT), Return on Investment (ROI), Return on Equity (ROE) are still the dominant numbers in a financially driven world.

It seems logical that ISO highlights that the financial performance is increased when companies use MSSs in order to market their standardization efforts. But as stated above, no clear evidence is found that a MSS improves the financial performance of a company. The influence of MSS on the strategic level of a company is unclear. „What is the real ISO 9001 impact over business performance in a long-term perspective?" (Sampaio, 2009). The same is true for other standards, such as TQM.

Performance therefore is often analyzed by scientists using financial values. Only a few authors analyzed ISO standards within organizations with a multi-dimensional approach. Typical indicators for performance in scientific research in the context of MSS (mainly ISO 9001) are types of „operational performance" (Martin, 2016), such as unit product costs, organizational commitment, efficiency, design quality and customer's satisfaction, climate of change (Terziovski et al., 1997; Naveh and Marcus, 2005), continuous improvement or customer orientation, fast delivery, flexibility, cycle time, manufacturing quality, employee satisfaction and involvement, market share. These indicators might also be used by organizations themselves to measure the performance of the MSS (it is required to regularly measure and improve a MSS based on KPIs in order to successfully pass the re-certification). Some authors (e.g. Naveh and Marcus, 2004) used multi-dimensional approaches and came to the conclusion that the grade of assimilation and the degree to which the organization goes beyond the minimal practice requirements influence the effect of a MSS.

#### **1.4 Performance definition**

Operational performance and organizational performance are different. Organizational performance can be measured based on companies output in the financial perspective (with numbers stated above), in the perspective of the market (number of sales, market share, etc.), and in the context of shareholder return (total shareholder return, economic value added, etc.)

(Richard et al., 2009). Considering the capability-aspects of a knowledge-driven world there are more suggestions from scientists of measurement methods of performance: Economists identified very important aspects in knowledge management in the form of valuable assets measured by Intellectual Capital (IC) (Stewart, 1997; Pulic, 2008) of a firm (Bontis et al, 2001). Public (2008) suggested Value Added Intellectual Coefficient (VAIC), Stewards (1997) Calculated Intangible Value (CIV), Gu et al. (2003) Intangible Driven Earning (IDE), Skandias “Skandia Navigator”, Activity Based Costing, Zero Based Budgeting, Business Process Reengineering (Johnsen, 2001), and IC Rating which included aspects of the Intangible Asset Monitor (Sveiby, 1997). More measurement methods are being discussed: According to Sveiby (2014) all of these measurement methods can be divided into the four groups: Direct Intellectual Capital Methods (DICM), Market Capitalization Methods (MCM), Return on Assets Methods (ROA), Scorecard Methods (SC) (Kompalla, 2016b).

Performance today has various dimensions which includes not only financial values but also different aspects of stakeholder expectations with an internal or an external perspective. Looking at environmental management, health and safety regulations, corporate social responsibility (CSR), sustainable development etc. it seems clear the performance can also mean improving environmental aspects, following health and safety regulations, or acting responsible in the social environment by initiating social projects. Reports, such as The Global Reporting Initiative (GRI) were established to standardize measurement efforts internationally. The GRI has become a very important reporting performance framework in the context of CSR and sustainability based on the Triple Bottom Line (economy, environment and social responsibility) also expecting values other than financial ones.

Depending on the perspective performance must be measured differently. Figure 1 demonstrates some different levels of performance measurement possibilities depending on the area of focus within an organization. It does not show that the strategic perspective influences the operational perspective (and vice versa), but it separates the level at which performance is measured depending on the chosen perspective. MSS are part of the operational business of an organization and can therefore be measured on that perspective. But in ISO MSS (and especially also in TQM) certain goals (such as quality) is a strategic topic of a company deeply connected with the strategy, the vision, and the way, the organization performs its business. It makes sense that MSSs also have some interconnections to the strategic level (as it can be seen in figure no. 1). There are other overlapping topics as well, such as Enterprise Risk Management (ERM), and aspects of sustainability which also have elements of both sides and should therefore be measured with an individual operational (Yin and Schmeidler, 2009) perspective (e.g. individual KPI) and a generic strategic perspective (e.g. typical expected KPI used in financial reporting or GRI etc.) in mind.

It is important for an organization to know the sense of the measured value and how to interpret it to reach the related goal. This is true for all perspectives and confirmed by scientists (Schylander et al., 2007; Quazi, 2001 etc.) who analyzed environmental management systems (EMS) based on ISO 14001 and suggested that the EMS should be transform into a sustainability management system by closer connecting the EMS with the organizational strategy and its strategic planning processes.

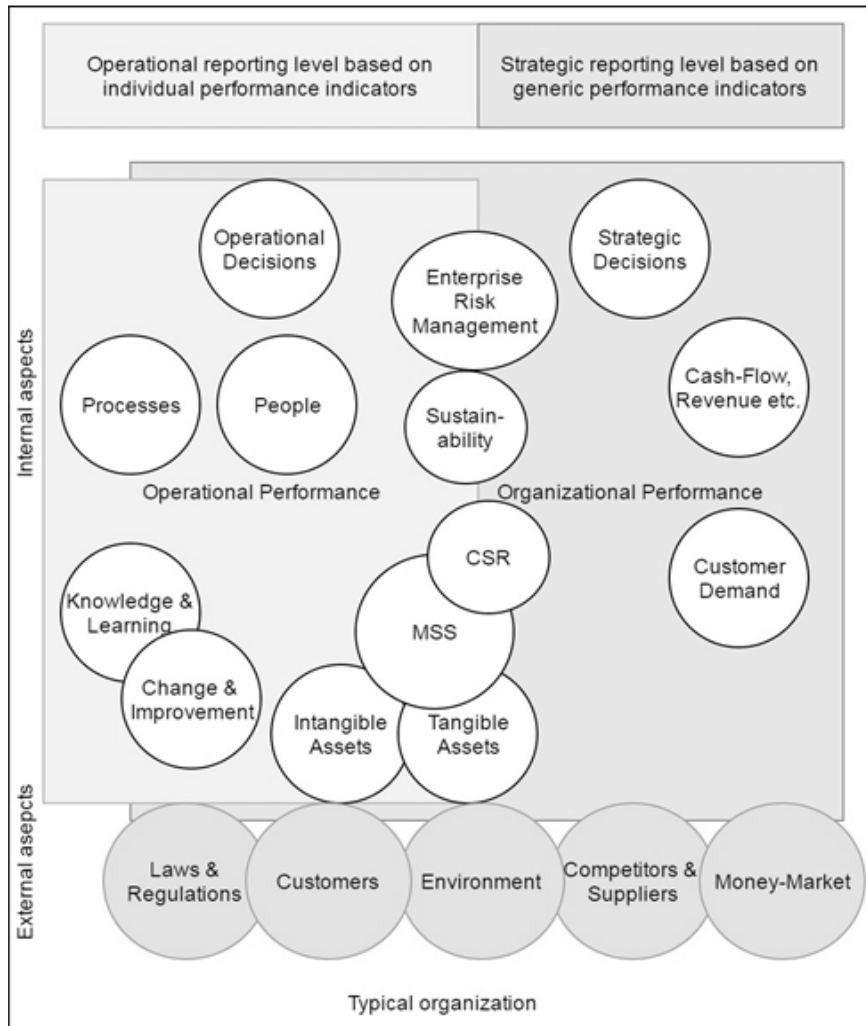


Figure no. 1: Operational and strategic areas of performance measurement

1.5 ERM

Enterprise Risk Management is an integrated and joined up approach to control the risks associated with the business activities by providing a pragmatic and consistent framework of methods and processes to monitor and respond to events or circumstances that could affect the achievement of business objectives on company level as much as in an organizational unit (Institute of Risk Management, 2006). As seen in figure 1 risks can be calculated on all levels of the organization. Companies using ERM mostly aggregate all kinds of risk identified at operational level upward to a centralized risk management board. Identified risks therefore come from different departments on the operational level as well as from strategic level (changing competition, changing money market etc.) and impact the company on a strategic level if a certain risk-level is reached. Measuring risks on various levels therefore is

similar to measure performance on various levels (as shown in figure 1) since risk similarly to performance factors are mostly identified using a calculated value (e.g. a percentage, a defect rate, etc.). Kopia et al. (2017) suggested a framework to measure ERM in its different perspectives which include financial and not financial values. The measurement of MSS should be more integrated into that holistic measurement and reporting framework which is also connected to strategic decision making. This measurement method involves using the BSC because the BSC offers a measurement system which addresses operational and strategical elements of an organization which similar to risks in ERM. This can be used to assess the measurement problem in MSS as well.

### **1.6 Performance measurement of MSS with Balanced Scorecard**

There are studies of MSS which propose the analysis of indicators on the operational level as well as the strategic level (Tarí, 2012) which include people-related indicators, operational aspects, as well as customer and financial benefits. These can then further be divided into an internal and external perspective.

A measuring system which includes different aspects and different levels of an organization is the BSC. The BSC was introduced by Kaplan and Norton (1992) (derived from Druckers Management by Objectives (MBO) (1954)) and was further developed over the years. The core idea of the BSC is that the BSC compares performance within a company in 4 dimensions (Kaplan et al., 1992):

- The financial perspective – “How do we look to shareholders?”
- The internal business perspective – “What must we excel at?”
- The innovation and learning perspective – “Can we continue to improve and create value?” and
- The customer perspective – “How do customers see us?”

The reason for suggesting that model was the earlier stated problem to measure intangible assets (Kaplan et al., 2004) with financial measures. Financial measures alone do not adequately predict market value or other external, financial outcomes (Caldarola, 2016). While it has been proposed that intangible assets can create value for organizations, it may not be inferred that they have a distinct market value (Kaplan and Norton, 2001).

The method of adding cause and effect changed the BSC from a performance measurement system to a strategic management system by defining causes and effects within the BSC (also known as Strategic Map). The financial perspective was defined as the result this process (the outcome and external measures) and the other as drivers (internal measures) of the BSC (Ittner et al., 2003; Frigo, 2002). With this additional step the BSC links the strategy of a company with its performance measurement system. This way the BSC can be used to control the organization from the management. With strategic maps organizations are able to describe its strategy and with BSC it is possible to link the strategy to the organizational management system (Kaplan et al., 2006). The goal of that idea was to create synergies within the organization by aligning all relevant areas of the organization, e.g. the top management, all shareholders (including customers, suppliers, partners), and the business and support units.

There are still some difficulties with this method, e.g. the difficulties of identifying the right metric for the right performance aspect and the question how to deal with conflicting objectives. These were solved with the Multi-Attribute Utility Theory (MAUT) suggested by



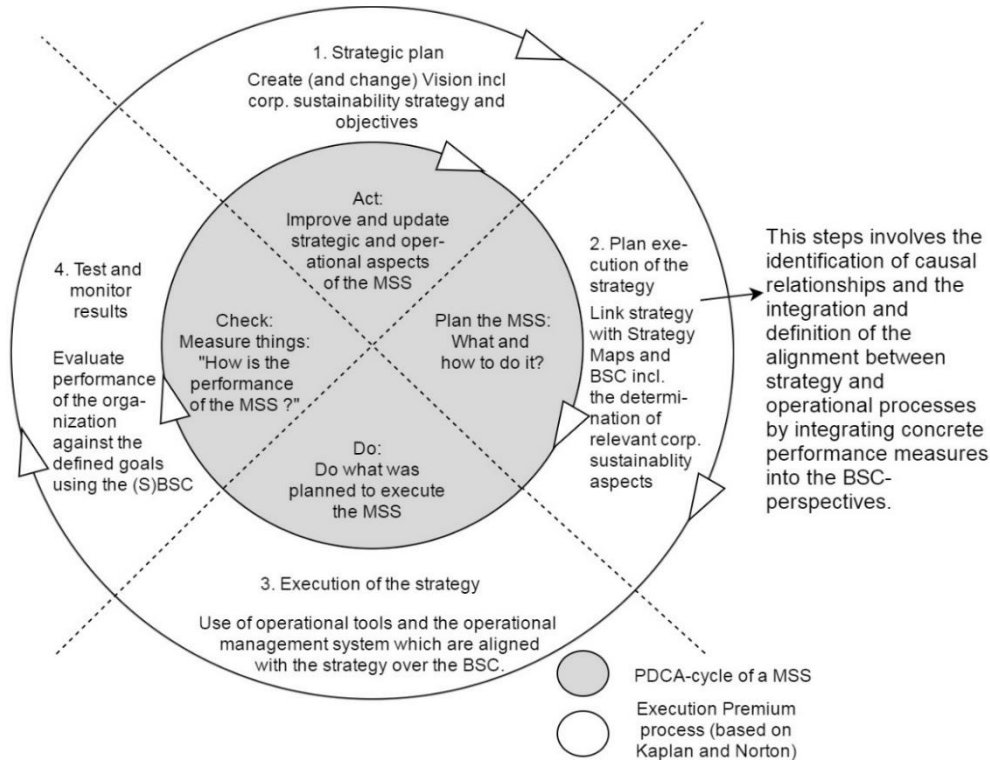
Youngblood et al. (2003). Many authors analyzed the BSC. Over the last decade, the BSC was the focus of different scientific researches which identified some drawbacks but mostly positive influence of BSC for organizations (Habidin et al., 2012; Assiri et al., 2006; Escobar, 2002; Greatbanks et al., 2007; Madsen, 2014; Chi et al, 2011; Atkinson et al., 1997; Hoque et al., 2000; Braam, 2012; Speckbacher et al., 2003; Brudan, 2005; Madsen et al., 2015; Sim et al., 2001) which also highlighted many open topics in research (Hoque, 2011) and several different versions and interpretations of the BSC.

Capelo et al. (2009) concluded that BSC (including Strategy Maps) is helpful to create „mental business models that resemble reality, enabling them to make good decisions”. De Geuser et al. (2009) also confirmed the positive influence of BSC on organizations since it provides makes strategy to a continuous process which aligns processes, services, competences and business units.

Another change in the BSC was done by Kaplan and Norton (2008) by proposing the Execution Premium. They suggested a cyclic approach which integrates the strategy of the company with its operations. The circle has six stages:

- Develop the strategy on the basis of three inputs: internal context, external context, existing strategy.
- Plan the strategy. Develop the BSC and the Strategic Maps.
- Align the organization with the strategy.
- Plan operations by including the budget perspective.
- Monitor the results and continuously learn.
- Test the results and change the operations in the case the operations are not aligned with the strategy or when the strategy changed. This steps means going back to step 4 or even 1 which is defined as the continuous improvement element of that process.

Bringing MSS into the BSC-process would mean to integrate MSS-steps (mostly ordered in the form of the PDCA-cycle – Plan, Do, Check, Act) into the Execution Premium steps of the BSC-process (see figure 2). The Plan-step of a MSS takes several requirements coming from different areas including the specific requirements of the MS-standard and related stakeholders and transform them into measures. This usually involves a risk-based approach which identifies organizational risks and opportunities. The result is a list of measures which need to be realized. ISO standards require to consider the requirements of all “interested parties within the scope” and the involvement of the top management. The Plan-phase of an MSS therefore should include different strategic aspects even though certain MSS are only concerned about very specific areas. Nevertheless, a quality strategy (ISO 9001, the EFQM - Excellence Model, TQM etc.) is a strategic decision, and so is Energy management and consumption (ISO 50001) or the way the company is dealing with information security (ISO 27001). Certain goals should be a central element of the strategy of an organization and therefore included in step 1 or 2 of the Execution Premium-process (see figure no. 2). The Do-phase of a MSS can be compared to the execution phase of the BSC-process. Checking is done in the monitoring-phase, and the act-phase is the last phase in the PDCA-cycle which is comparable with step 6 in the Execution Premium. All MSS require a continuous improvement process which is also a central element of the stated BSC-process (Steps 5 and 6).



**Figure no. 2: Matching the Balanced Scorecard Process with standardized steps of Management System Standards**

**1.7 ERM, TQM, and the SBSC as example for integration**

Using BSC as an instrument for ERM or MSS is a relatively new topic in academic research. Acharyya (2008) suggested a framework for measuring performance of insurers’ ERM by apply the BSC to measure economic and organizational variables. The framework integrated financial risks and operational and strategic risks and linked them with the BSC. A similar approach was suggested by Chen et al. (2006), Woods (2007), Nagumo et al. (2009), and Kopia (2017).

By analyzing the effective of TQM on the performance of organizations, Hoque (2003) suggested that there is an interaction between TQM and BSC which affects firm performance. In this context, Anderson et al (2004) also confirmed that the successful application of TQM can be strengthened with the help of a strategic performance management framework, such as the Balanced Scorecard. The scientists emphasize that TQM can only be successful if there is a performance measurement system which is linked to the strategic level as it is with BSC. Two models were suggested – the intervening/mediating model and the moderating model which differ in that way that the role of the BSC has either a mediating or moderating effect on performance. Sholihin et al. (2009) and Kaynak (2003) preferred the intervening model based on their research. Hendrick et al. (2001) and Chong et al. (2004) confirmed the moderating model in their studies. Schmutte (2007) developed a model for integrating Six Sigma, EFQM, and BSC into an organization. The BSC in this case is used for the continuous

and focused controlling of the organization. The input collected by the BSCs is used in the EFQM-based process, and improvement is done within Six Sigma-projects and other measures. This confirms the idea of the alignment of the strategy of the organization with the operations using the BSC as linked element.

Another approach to adapt the BSC is the alteration of the BSC toward corporate sustainability. The integration of sustainable development (environmental and social aspects (Schaltegger et al., 2006; Zingales, 2002)) into the BSC was the origin of the so-called sustainability balanced scorecard (SBSC) (Figge et al. 2002; Wagner 2007), an extension of the BSC emphasizing the multi-dimensional character of performance management. According to research there are three ways of integration of sustainability:

- Integrate sustainability indicators into the four dimensions of the BSC (Epstein et al., 2001; Monteiro et al. 2003), or

- Developing a separate, but linked, sustainability scorecard, or

- Adding non-market elements to the scorecard (Figge et al., 2002; Hubbard et al, 2009; Lämsiluoto et al. 2010) and keeping the traditional BSC-perspectives which offers the advantage to be able to “simply” add elements to an existing performance measurement process without recreating the entire BSC and the Strategic Map.

Nevertheless, the linkage between the dimensions must be adapted since more elements have to be considered. The linkage between the four (or more) dimensions is a very important element when designing a (S)BSC otherwise the cause and effect-relationship between the operational level and the strategic level suffers. Different models in this regard were suggested (van Marrewijk, 2004) which are oriented on the organization’s value systems:

- The strong hierarchical model of the SBSC is closest to the original BSC which focusses on profit. The development of this kind of SBSC means to express the strategy of a company on all BSC-perspectives. With cause-and-effect relationships the linkage between different strategic elements are defined which exist between lagging and leading indicators. All indicators have to be linked (directly or indirectly) toward a financial perspective; ignoring the financial perspective might result in improvements which have no financial effect (Ferreira et al., 2016; Kaplan et al., 2001; Jensen 2001). On the other side, it is important to find the right balance between short-time and long-time financial success which also includes the other defined goals in the context of corporate sustainability (e.g. environmental goals (Rowland-Jones et al., 2005)).

- In the semi-hierarchical SBSC the financial performance dimension is not the result but a competing dimension within the Scorecard (Raisch et al., 2009; Brignall, 2002). Organizations using this type of BSC are able to manage incremental (short-term) and radical (long-term) change processes simultaneously.

- In the systemic-driven SBSC the BSC-hierarchy is replaced with a network structure where all perspectives can be linked to each other (Hansen et al., 2012).

Hubbard et al. (2009) suggested a combination of the SBSC and a sustainable performance index (OSPI) in order to integrate the sustainability elements economic, social, and environmental into the BSC and in order to find a comprise between an often-demanded complex performance reporting and a simpler approach which is more useful for making managerial decisions. Depending on the chosen model of SBSC it is a challenging act to find

an adequate trade-off between rival performance indicators and weighting factors for managers to clearly derive their goals for their area of operation. Hubbard et al. (2009) suggested that:

- Managers need to make a decision about the general relation between profit-making and sustainability (the value system) by generating a generic understanding of multiple objectives.
- Then they must define their corporate sustainability strategy (CSC).
- The CSC and the value system lead to the generic SBSC architecture presented above.
- After the SBSC architecture is chosen, the BSC-process starts with the Strategy Mapping-Step.
- The last step is the definition of the performance indicators as suggested by Kaplan and Norton.

On the basis of the presented research the authors of this study suggest that the integration of MSS / IMS into the BSC-process should follow these 5 steps and the presented process from figure 2.

## **2. Hypotheses**

On the basis of the literature research the authors suggest the following hypotheses:

- Most organizations which operate two or more MSS integrate their MSS into an IMS.
- Organizations integrate measurement elements of a MSS / IMS into a BSC and therefore measure MSS also on a strategic level (As shown in figure 2).
- The longer the MSS / IMS system is in operative the better is the “output” of it measured with certain performance indicators.
- Most organizations use the BSC as strategic system and not only as performance measurement tool.

## **3. Methodology**

The authors conducted semi-structured interview within 28 medium and large-sized organizations in the energy-, production-, and service-industry in Germany within the year 2015 and 2017. The questions were based on the hypotheses and included closed and open questions partially with ratings (see appendix 1). The focus on the research were organizations which use any form of a BSC as performance measurement system.

## **4. Results**

### **4.1 BSC usage and MSS specifics**

For the identification of organizations which use BSC as performance measurement system, the following results were found (the questionnaire can be found in appendix a):

- 28 of 60 organizations use the BSC as performance management system (47%).

- No specific trend of the BSC-usage could be found regarding the branch of the organization with that small sample size. Of the 28 organizations, 10 are in the energy industry, 11 in the service industry and 7 in the production industry.
- Except one organizations all adapted at least one ISO-based MSS. The one organization from the production industry uses a TQM-based approach for quality management but did not certify this approach based on any standard.
- 21 out of 27 organizations use two or more MSS. 20 of them are certified based on ISO 9001, 15 based on OHSAS 18001, 9 based on ISO 14001, 3 based on ISO 50001, 3 based on ISO 27001.
- 15 have fully integrated their MSS (Kopia et al, 2016) into an IMS (= 56%). 6 operate them separately or partially integrate certain aspects.

As confirmed by academic research the BSC is a widely-adopted performance measurement system. Considering the small sample size of the market research (60), almost 50% use BSC. The same is true for ISO-based MSS. Almost all organizations within the sample size use one or more MSS. Over 50% of the them integrate their MSS into an IMS which also is confirmed by other studies stated before. This confirms Hypothesis 1.

**4.2 Answers to closed and open questions (table no. 1)**

**Table no. 1: Result of the interviews**

	YES	NO	SUMMARY OF INTERVIEW RESULTS
<b>Q1</b>			Specific KPIs or separated BSC are used at department level.
<b>Q2</b>			Financial focused performance measurement with different weighted factors of other dimensions (especially quality oriented measures and elements of the Tribble Bottom Line).
<b>Q3</b>	23	5	Most organizations perform a regular linking-process between the organizational processes and the strategic level. The intervals are ranging from half-yearly (4) to every 5 years (8). 10 organizations use department-level BSCs and develop an aggregated version of it regularly per year.
<b>Q4</b>	19	9	Corporate sustainability is important for 2/3 of the organizations. 12 of 19 organizations created an SBSC (63%). The other companies use different solutions to integrate this topic into their measurement and reporting system – mostly separate from the BSC-strategy process. All of them use a BSC-process which is comparable to the hierarchical BSC stated before with financial values as primary output. Corporate Sustainability aspects are weighted individually in the BSC based on the importance of the specific topic.
<b>Q5</b>			Most companies use more than 10 but less than 20 indicators on the corporate level. Individual BSCs on a department level use up to 20 indicators partially generated with the help of automated systems / IT.

	YES	NO	SUMMARY OF INTERVIEW RESULTS
Q6			13 organizations integrate their MSSs into the BSC by including the goals of the MSSs into the organizational strategy (which includes goals of the Triple Bottom Line).
Q7	12	16	12 of the 28 organizations integrate their MSSs (9 of them use an IMS) into the strategy development process including the Strategy Map (11 of 12) to identify connections between strategic goals and operative procedures. One organization does not use a Strategy Map in the context of MSS but see MSSs and sustainability as strategic topic evaluated separately.
Q8	17	11	65% of the participants identified a positive relation between the BSC and organizational performance. There was no indication of a relation between BSC and operational performance except an increased transparency about the operational status.
Q9			21 organizations use more than one MSS, 7 have on MSS based on either ISO or TQM. 12 participants neglected a measurable impact on organizational performance. 16 identified a positive correlation between the use of MSSs and the organizational performance (75%). Most stated ways of measurement were specific KPIs of the MSSs and other “soft” effects such as increased market position through an ISO-certificate or the reduced energy consumption and therefore cost savings. 8 organizations emphasize the BSC as primary reason why the MSSs improves performance because the MSSs are “visible” on the top management level.

The answers to these questions confirm Hypothesis 2, 3, and 4.

Most organizations use Strategy Maps to align strategy with the operational level and therefore use the BSC on the organizational level and as strategic instrument (Hypothesis 4). 10 organizations use several BSCs on department levels and aggregate them into an organizational-wide BSC. In this case the BSC is also used also as performance measurement tool.

Organizations use performance indicators of MSSs on their BSCs. The interpretation can prove the hypothesis that MSSs can be measured by using a BSC approach. Going one step further, through the link of the operational level of an MSS to the strategy over the BSC, measurable results of the MSSs create an impact on a strategic level. This would confirm the developed model of the authors (figure 2).

75% of the organization see a positive correlation between a MSS and the organizational performance. In the interview 8 participants see a primary success factors of the MSSs in the fact that top management is constantly involved in the status and development through the transparency created by the BSC (despite the fact that handling many different performance measures and indicators often lead to difficulties).

For most of the companies’ organizational performance is still measured mainly in financial values rather than other dimensions of the BSC. Sustainability aspects are integrated in the BSC at some companies.

In order to identify the influence of aspects of the subject matter in relation to performance an empirical calculation based on additional question were performed.

**4.3 Answers to questions with answers based on a rating (table no. 2)**

**Table no. 2: Correlations of variables compared to MPD (performance indicator), mean, standard deviation, and p-value based on a significance value of 0.05.**

Dimensions	Correlation R / R <sup>2</sup>	Mean	Standard deviation	Variance	P -value
<b>R2 BU</b>	0.612 / 0.374	7.214	1.499	2.248	0.0005
<b>R3 IMS</b>	0.180 / 0.032	5.929	2.371	5.624	0.360
<b>R4 IBSC</b>	0.624 / 0.388	7.214	1.423	2.026	0.0003
<b>R5 YIMS</b>	0.577 / 0.332	6.464	1.551	2.406	0.001
<b>R6 YBSC</b>	0.270 / 0.073	6.392	1.594	2.543	0.164
<b>R7 FM</b>	0.331 / 0.110	6.786	1.257	1.582	0.085
<b>R1 MPD</b>	1,000	7.679	1.248	1.556	

**4.4 Interpretation**

The aim was to identify correlation between several aspects of MSS and BSC usage and measurable performance changes.

The highest correlation was found with the IBSC and BU variables closely followed by YIMS variable. The p-values are significant at  $p < 0.05$  for these three variables. Analyzing IBSC, which is the level of integration of the MSS / IMS into the BSC, the results might indicate that a high integration leads to better organizational performance. Considering the results of Q6 and Q7 in which the integration level is below 50% the calculated correlation seems slightly too high. Nevertheless, the authors would argue that this is a confirmation of the hypothesis that the integration level of a MSS / IMS into the BSC is an influence factors for the measurement of MSS / IMS on the strategic level which would explain why it was possible for the interviewees to title the positive correlation.

Using a BSC as strategic planning system (in contrast to performance measurement only) is positively related to performance development of an organization. A significant correlation was also found between the year of the introduction of a MSS and the performance development of a company. The longer the MSS(s) or IMS were in use the better the performance of an organization. This finding seems logical since the level of experience increases over time. In addition to that, the financial investment into the MSS will most likely decreases over time.

**Conclusion and limitations**

This study summarized current research in the field of performance measurement in the context of MSS and IMS and the use of BSC and quantitatively and qualitatively tested hypotheses which the authors developed on the basis of the literature research.

The findings can be summarized as follows: Whether or not organizational performance is influenced by the operation of MSSs is not answered in scientific literature mainly due to a

lag of a common definition of what and how to measure. Despite criticized in several ways the BSC offers the advantage of a widely-accepted system to first measure different dimensions of an organization and second link strategic goal setting with the operational level. In agreement with other scientists who developed an integration model of TQM, EFQM, Six Sigma etc. on the one side and corporate sustainability issues and ERM on the other into the BSC-system, the authors developed a model to integrate the MSS-process into the BSC-process based on the Execution Premium developed by Kaplan and Norton. This way the influence of the MSS is linked from the operational level to the strategic level and can be measured on all perspectives. This theory was positively tested in organizations in the German market which use BSC for strategic purpose.

Most organizations appraise the BSC positively in the sense of performance development of the organization. Even though the selected organizations measure performance mainly on financial value, the other dimensions on the BSC are included in the strategic goal setting. More than 45% of the organizations integrate performance indicators of the MSS(s) into the BSC. This also included aspects of sustainability using a hierarchical BSC-development process. A high integration level of the MSS / IMS into the BSC was strong correlated with organizational performance. The effect of performance improvement of an organization was better the longer the MSS was established. It was also found that the use of the BSC as strategic instrument has a positive effect on companies' performance compared to the BSC as only a measurement instrument. In accordance with other findings in scientific literature most companies implement an IMS when they operate more than one MSS.

There are several limitations in this study. The first limitation is the small sample size which is not representative. Second, no specific differences between the selected companies were made regarding size and industry. Third, the intensity of the use of the MSSs or the BSC was not clearly evaluated. It was assumed that every organization use the MSSs and the BSC with the same intensity creating comparable results.

Future research is necessary in order to get a better understanding of how the BSC is exactly used when MSSs are integrated into the measurement system (e.g. using a longitudinal-study which analyses the way the MSS is integrated into the performance measurement system). It is also necessary to research how and what should be measured on an operational level and on an organizational level in order to develop a generic and clear performance measurement system for MSSs which is useful on all levels of the organization.

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**Appendix A**

List of questions for the interviews:

- Q1. How do you measure performance in your department?
- Q2. How do you measure performance at corporate level?
- Q3. Does the use of the BSC help the organization to align the operational processes with the strategic level?
- Q4. Is corporate sustainability an issue in your organization? Is this reflected by the use of an SBSC?
- Q5. How many performance indicators are you using for your BSC?
- Q6. How is the MSS / IMS linked with the BSC or with the organizational strategy?
- Q7. Is the MSS / IMS part of the BSC-Process?
- Q8. Does the BSC increase performance (on the operational or organizational level)?
- Q9. How many MSS do you use? Does the MSS / IMS increase performance (how is this measured)?
  
- R1. MPD = Rate the performance development of the organisation over the last 5 years (1=negative, 2=neutral, 5=strongly positive)
- R2. BU = Rate the level of your BSC use between the BSC as performance measurement tool only and the BSC as strategic planning system (1=performance management system only, 5=strategic planning system)?
- R3. IMS = At what scale is the MSS(s) integrated into an IMS? (1=not integrated, 5=fully integrated into an IMS)
- R4. IBSC = How would you rate the integration of the MSS / IMS into the BSC (1=not integrated, 5=strongly integrated)?
- R5. YIMS = When did you implemented your first MSS? (1=10 years before and more, 5=1 year before)
- R6. YBSC = When did you integrated the MSS / IMS into the BSC? (1=10 years before and more, 5=1 year before)
- R7. FM = How often are performance indicators in the BSC evaluated? (1=every 3 years or rarer, 5=4 times and more per year)