

Standardization of Comprehensively Comparable Key Performance Indicators for the Group Logistics of a Car Manufacturer

Masterarbeit

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1 The Importance of Comprehensively Comparable Key Performance Indicators

„Daten sind das Öl unserer Zeit“

- Martin Winterkorn, CEO Volkswagen Group

“Data is the oil of our time”. With these words *GroupNews*¹, the internal manager magazine for *Volkswagen*, quotes Prof. Dr. Martin Winterkorn, chief executive officer (CEO) of the *Volkswagen Group*, in its November 2014 issue. This quote shows that the top management has perceived the importance of data to the success of the company.

Data can be described as “symbols that represent properties of objects, events and their environment”² or, more simply, the product of observations which is not usable or relevant on its own. Similarly to oil, data on its own is only of low value (see Figure 1). In order to add value to data, it is analyzed and transformed into information, e.g. through statistical or arithmetical processing. Hence, *information* is data in a useable and relevant form. Information are, for example, used to answer questions starting with words such as who, what, where, when, and how many.³

Organizations can learn from the information and acquire knowledge. *Knowledge* is, for example, to know how a system works. It enables the controlling of a system which in turn means to make it work efficiently; that is “doing things right”.⁴ For organizations, to increase efficiency means “either to increase the probability of producing a desired outcome with fixed resources or to decrease the amount of resources required to produce it with a specific probability”.⁵ For an organization to reach its goals, it must be effective (i.e., “doing the right things”)⁶ in selecting the right actions for improvement. The ability to increase effectiveness is *wisdom*, which is the highest value added to data.⁷

In order to add value and get from the data collected in *Databases* to wisdom, *Indicators* are used to understand relations and patterns. The comparison of indicators in the form of *Benchmarking* helps to undertake the right actions that lead to improvement and business success (both Indicators and Benchmarking will be introduced in greater detail in Chapter 2).⁸ This value generation chain from data to wisdom through drawing connections and increase understanding is illustrated in Figure 1.

¹ Martin Winterkorn, *VOLL VERNETZT DIE DIGITALE REVOLUTION HAT BEGONNEN*, interview by *GroupNews* Das Managermagazin des Volkswagen Konzerns, November 2014

² R. L. Ackoff, “FROM DATA TO WISDOM: PRESIDENTIAL ADDRESS TO ISGSR,” *Journal of Applied Systems Analysis* 16 (1989): 3, accessed February 18th, 2015.

³ Ibid.

⁴ Ioannis E. Tsolas, “Modelling profitability and effectiveness of Greek-listed construction firms: an integrated DEA and ratio analysis,” *Construction Management and Economics* 29, no. 8 (2011): 797.

⁵ R. L. Ackoff, “FROM DATA TO WISDOM: PRESIDENTIAL ADDRESS TO ISGSR,” *Journal of Applied Systems Analysis* 16 (1989): 4, accessed February 18th, 2015.

⁶ Ioannis E. Tsolas, “Modelling profitability and effectiveness of Greek-listed construction firms: an integrated DEA and ratio analysis,” *Construction Management and Economics* 29, no. 8 (2011): 797.

⁷ R. L. Ackoff, “FROM DATA TO WISDOM: PRESIDENTIAL ADDRESS TO ISGSR,” *Journal of Applied Systems Analysis* 16 (1989): 5, accessed February 18th, 2015.

⁸ Chris Statham and David Pike, “Property Benchmarking,” Government Property Unit, <http://www.civilservice.gov.uk/networks/gpp/property-asset-management-in-government/property-benchmarking>, accessed March 6th, 2015.

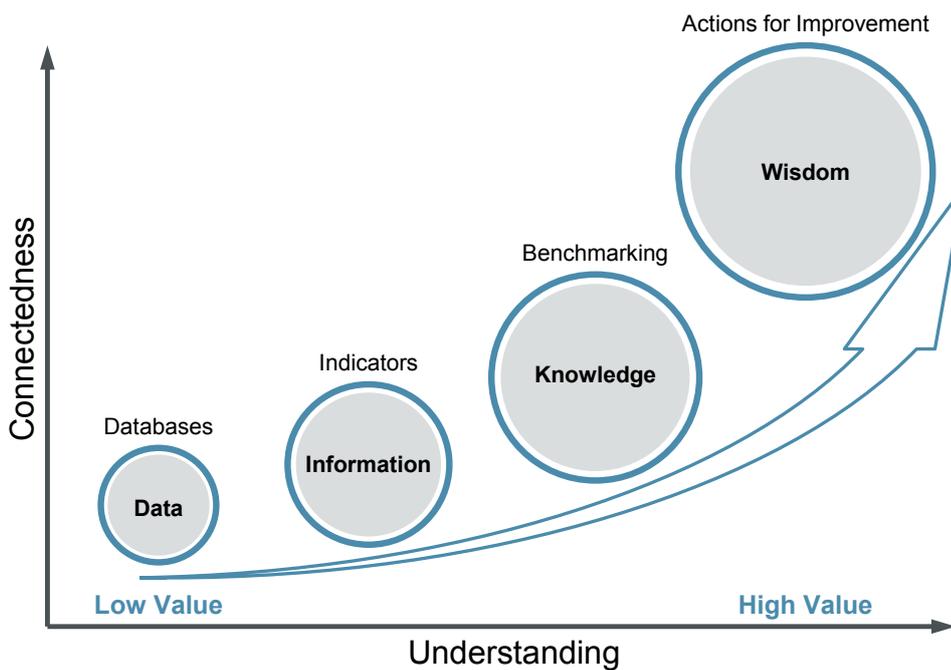


Figure 1 Creating greater Value from Data
 Source Own Illustration based on Ackoff⁹ as well as Statham and Pike¹⁰

The statement that data is the new oil is currently truer than ever. This becomes evident when looking at the most successful organizations. Until 2011 the oil company *Exxon Mobile* has been the largest companies by market capitalization.¹¹ Market capitalization is commonly used in the literature as an indicator for the size and success of an organization.¹² Now, in 2015 the technology company Apple and Google with its core competence in analytics have claimed the top.¹³ Table 1 lists the companies with the largest market capitalization as of March 2015.

Table 1 The World's largest Companies by Market Capitalization on March 5th, 2015
 Source Own Contribution based on Dogs of the Dow¹⁴

Rank	Company	Market Capitalization (in billions of dollars)
1	Apple	736.3
2	Google	395.7
3	Exxon Mobil	363.8

⁹ R. L. Ackoff, "FROM DATA TO WISDOM: PRESIDENTIAL ADDRESS TO ISGSR," *Journal of Applied Systems Analysis* 16 (1989), accessed February 18th, 2015.

¹⁰ Chris Statham and David Pike, "Property Benchmarking," Government Property Unit, <http://www.civilservice.gov.uk/networks/gpp/property-asset-management-in-government/property-benchmarking>, accessed March 6th, 2015.

¹¹ PricewaterhouseCoopers LLP, "Global Top 100 Companies by market capitalisation,"

¹² Protiti Dastidar, "International corporate diversification and performance: Does firm self-selection matter?," *Journal of International Business Studies* 40, no. 1 (2008).

¹³ Dogs of the Dow, "Largest Companies by Market Cap," Dogs of the Dow, 2015, <http://www.dogsofthedow.com/largest-companies-by-market-cap.htm>, accessed March 6th, 2015.

¹⁴ Ibid.

In general, today's most successful organizations are those that have developed data collection and analytics to their competitive advantages. Davenport¹⁵ defines "an organization that uses analytics extensively and systematically to outthink and outexecute the competition" as *analytical competitors*. In 2007 he lists *Wal-Mart, Netflix, Google, Amazon.com*, and the *New England Patriots* as examples for *analytical competitors*.

The success of these companies until now is remarkable. The retailer *Wal-Mart* has its distinctive capability in supply chain analytics and is the top consumer service company 2014 followed by the electronic commerce company *Amazon.com*.¹⁶ *Netflix*, a provider of on-demand internet streaming media, has its primary focus for analytics on predicting customer movie preferences and leads in peak period traffic in North America where it accounts for 34.2 percent of downstream traffic.¹⁷ And, last but not least, the National Football League (NFL) team *New England Patriots* has just won the 2015 *Super Bowl*.¹⁸

Evidence that this superiority of analytics also holds in other organizations has been found in the statistically significant relationship between analytical capabilities and performance in a study of 310 companies from different industries from the USA, Europe, Canada, Brazil and China.¹⁹

Indicators are part of the value creation from data and at the heart of analytics. They are the best way to measure improvements.²⁰ Even better than indicators are standardized indicators which are comprehensively comparable. These standard indicators enable comparisons in multiple dimensions and the identification of a global maximum in the presence of several local maximums. They are the best way to learn and improve performances in order to reach the global maximum.²¹

1.1 Problem Statement and Research Gap

The purpose of this thesis is to develop a concept that supports organizations in the establishment of indicators that contribute best to continuous improvement to ensure long-term business success. As stated in the previous section, standardized indicators that enable comprehensive comparisons are identified as best suited for this task. Thus, the research question that this thesis answers is:

"How can comprehensively comparable indicators be established in organizations?"

The implication of this research question is that the status quo is characterized by the existence of indicators that are not comprehensively comparable. In order to account for this underlying assumption the

¹⁵ Thomas H. Davenport and Jeanne G. Harris, *Competing on analytics: The new science of winning* (Boston, Mass.: Harvard Business School Press, 2007), p. 23.

¹⁶ PricewaterhouseCoopers LLP, "Global Top 100 Companies by market capitalisation," 28.

¹⁷ Sandvine Incorporated ULC, "Sandvine Global Internet Phenomena Report - 1H 2014,"

¹⁸ Frankfurter Allgemeine Zeitung GmbH, "Super Bowl 2015: New England Patriots schlagen Seattle Seahawks," 2015, <http://www.faz.net/aktuell/sport/super-bowl-2015-new-england-patriots-schlagen-seattle-seahawks-13404265.html>, accessed March 6th, 2015.

¹⁹ Peter Trkman et al., "The impact of business analytics on supply chain performance," *Decision Support Systems* 49, no. 3 (2010).

²⁰ Elisabeth M. Hamin, Linda Silka, and Priscilla Geigis, *Preserving and enhancing communities: A guide for citizens, planners, and policymakers / edited by Elisabeth M. Hamin, Priscilla Geigis, and Linda Silka* (Amherst: University of Massachusetts Press, 2007).

²¹ Ioannis E. Tsolas, "Modelling profitability and effectiveness of Greek-listed construction firms: an integrated DEA and ratio analysis," *Construction Management and Economics* 29, no. 8 (2011).

thesis firstly investigates the characteristics of existing indicators. This is done in a status quo analysis which identifies five categories of root causes as threats to the standardization of indicators. Secondly, a target concept is developed that answers the research question and provides a framework establishing comprehensively comparable indicators that are capable to ensure continuous improvement and long-term business success. Thereby, the concept acknowledges that improvement requires measurement. Due to the fact that a review of the existing literature on indicators could not provide measures to assess the standardization, a maturity model is developed which enables organizations to measure the standardization of indicators on the basis of five maturity levels.

The importance of this thesis stems from the large opportunities for improvement that arise from standardized indicators. Even though the literature implies that organizations have recognized the benefits from comparisons, e.g. through benchmarking, this thesis finds that in practice organizations underestimated the potentials of comprehensively comparable indicators. The absence of evaluation models for the standardization of indicators shows that there is also a research gap in this area.

1.2 Research Methods

The research for this thesis was conducted in cooperation with the *Volkswagen Logistics GmbH & Co. OHG* (*Volkswagen Logistics* in the following). In order to identify influencing factors that cause a poor standardization of indicators, several research methods were applied. The primarily used research methods are *Semi-Structured Interviews*. This qualitative method was chosen to profit from the personal experience of employees and managers in a short without in terms of indicators. According to Bernard²² semi-structured interviews are applied best when there might be only one chance to interview someone. This was the case since disturbances of the employees had to be kept to a minimum.

As an additional qualitative method, a World Café was run as a workshop type of business meetings or organizational workshop. A World Café or knowledge café is a method to share ideas and insights, and gain a deeper understanding of the subject and the issues involved. Drawing on seven integrated design principles, the World Café methodology is a simple, effective, and flexible format for hosting a large group dialogue. It can be modified to meet a wide variety of needs. Specifics of context, numbers, purpose, location, and other circumstances are factored into each event's unique invitation, design, and question choice.²³

In addition to these two qualitative methods, a quantitative method has been applied as well. Quantitative methods are used in a variety of fields such as economics, sociology and political science. More specifically, a survey was handed out to 30 people actively using or developing indicators at Volkswagen. A survey is a frequent market research tool and gives an overview over a predetermined, specific phenomenon. The advantage of this quantitative method is that it enables to collect data from a large number of

²² H. R. Bernard, *Research methods in anthropology: Qualitative and quantitative approaches*, 5th ed. (Lanham, MD: AltaMira, 2011).

²³ Patricia O'Brien and Angela N. Amado, "Our Time World Café – What does Choice mean to you?," The University of Sydney, 2015, <http://www.cds.med.usyd.edu.au/news-a-information-66/latest-news/193-our-time-world-cafe>, accessed February 15th, 2015.

respondents.²⁴ Here, respondents were asked to rate their experience with indicators and their importance. That way, an overview over the status quo at the company was gained. More importantly, this allowed to contrast actual business practice (experience) and personal values (importance) and to detect incongruities. The findings of the status quo analysis are structured in a Cause-and-Effect diagram (Ishikawa diagram), a tool that is recommended in the literature for a root cause analysis.

Based on the findings from the above explained analyses, a concept for the standardization of indicators is proposed. In order to give a critically reflect its strengths and weaknesses as well as opportunities and threats, a *SWOT analysis* is carried out. Whereas strengths and weaknesses identify the factors that give an advantage/disadvantage over competitors, opportunities and threats identify factors that are critical for the future success. Hence, the SWOT analysis provides an overview over the current and future success factors. By doing so, it is an extremely valuable tool for the management in what regards the practical value of this thesis.

1.3 Structure of the Thesis

The thesis follows the structure depicted in Figure 2. The different shades of blue indicate the change between a theoretical (light blue) and practical (dark blue) focus of the chapters.

²⁴ Susan E. Sim, Clarke, Charles L. A., and Richard C. Holt, eds., *Archetypal Source Code Searches: A Survey of Software Developers and Maintainers* (1988).

8 Conclusion

Comprehensively comparable indicators promise the best possibilities for improvement. This is because such indicators enable the most opportunities for performance comparisons and learning from others. However, this thesis finds prevalence of unstandardized indicators in a conducted status quo analysis. In this status quo analysis, influencing factors from the categories *People*, *Process*, *System*, *Environment*, and *Cost/Benefit* were identified as causal for the prevalence of unstandardized indicators. The key findings from this analysis are that standardized indicators are neither wanted from employees, nor sufficiently backed-up by the management. Reasons for this are that people perceive the increased transparency from standardize indicators as negative and prefer not to be transparent and thus comparable to others.

Based on these findings, a target concept for the standardization of indicators is proposed that addresses all five categories with concrete recommendations for actions to overcome the barriers to standardization. It is thereby focused on a holistic approach that jointly addresses *Employees*, *Managers*, and the *Company Culture*. The recommended measures to improve the standardization of indicators reach from suggestions at the operational level, such as the commitment to one standard indicator information sheet, to measures at the strategic level, such as investments in the establishing a knowledge sharing company culture. Furthermore, the target concept acknowledges the requirement of measurement for improvement by introducing an indicator maturity model which enables the measurement of standardization and makes the current status of indicators transparent.

Performing a SWOT analysis of the target concept revealed that an important challenge stems from the top-down approach that is employed for implementing a centralized indicator development ensured by management leadership. This approach can be counterproductive for the willingness to use standardized indicators. In particular, unwanted performance comparisons threaten the introduction despite the huge chances for improvement offered by maximum transparency.

Even though the target concept represents a holistic approach to align management and employees to their common goal of long-term business success (greater good of the organization), the absence of solid estimates about the benefit of standardized versus unstandardized indicators is identified as a key problem especially in the light of the high initial costs the development of such a system requires. Due to the scope of this thesis, this aspect is left for future research.