

ENABLING DATA VALUE CREATION WITH DATA GOVERNANCE: A SUCCESS MEASUREMENT MODEL

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ABSTRACT

This paper deals with measuring the success of Data Governance as an information system in corporate environments. Evaluating the success of information systems is an important but controversial topic for corporate management. It is not easy to measure the success or effectiveness of information systems in order to justify past and future investments. Many models have been developed by researchers to support the fulfilment of both tasks. The main objective of our work as ongoing research is to examine and review the most important models of information systems success. We have compared these models and discussed their relevance to the field of Data Governance. Key findings are the adapted and supplemented success factors for Data Governance and a preliminary model for measuring Data Governance based on DeLone and McLean's Information Systems Success Measurement Model.

KEYWORDS

Data Governance, Information System Success, Information System Success Measurement

1. INTRODUCTION

As a result of a fast-moving and highly competitive economic environment (globalization) and the advancing digitalization of operational organizations (digital transformation), data is playing an increasingly important role, i.e. the importance of data as a resource for innovation and value creation is steadily increasing in organizations. In order to generate added value from data, companies need to adapt their strategies and develop methods to integrate data into their value creation processes on the one hand and to gain a deeper understanding of data origin and use on the other. In this context, Data Governance is a promising approach to successfully maximize the value of this data and thus contribute to the company's success (Figure 1).

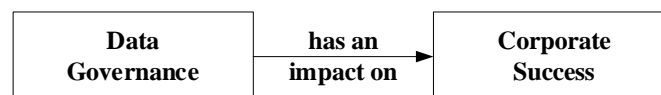


Figure 1. Data Governance Causal Model (Initial Model)
(Source(s): Contribution of the authors)

This also takes place against the background of a discussion about a new discipline of controlling, called data controlling. It is therefore essential to demonstrate the influence of Data Governance on the company, whereby the effects of Data Governance on the company can be

complex and usually only an indirect effect can be determined. A comprehensive system for measuring the success of Data Governance is therefore required. The aim of this article is therefore to create an instrument that makes it possible to measure the success of Data Governance in the context of organizational application. To this end, a model for measuring success is developed in which all aspects of the various success dimensions of Data Governance are taken into account.

The paper is structured as follows. The second section presents the theoretical foundations. Section 3 presents a preliminary model for measuring the success of Data Governance based on the "D&M IS Success Model" developed by DeLone and McLean [1], [2] and the Data Governance success factors evaluated in the literature. Finally, chapter 4 summarizes the results and provides an important outlook.

2. THEORETICAL BACKGROUND

This section provides the theoretical basis for this article by clarifying the terms relevant to this study.

An *Information System (IS)* describes a system based on the concept of the human-task-technology system [3], which supports all participants in carrying out defined (information) tasks [4]. The tasks include business process control and decision support. The type of task owner, i.e. the resources with which the defined tasks are performed, depends on the degree of automation of these tasks: if a task can be automated, this task is performed by computers and computer systems; if the task cannot be automated, this task is performed by people.

The concept of *Data Governance* is fragmented and ambiguous in scientific and practice-oriented literature. In addition to management-oriented researchers, e.g. [5], there are also technically-oriented researchers, e.g. [6], and representatives of both perspectives, e.g. [7]. Overall, however, researchers agree that Data Governance is a company-wide, cross-functional IS in the above sense (Figure 2), which formally orchestrates processes, people and technology [8] in the sense of a human-task-technology system in order to enable organizations to formalize and successfully use data as an asset [9]. The basis is formed by strategies [10], which in turn define guidelines, standards and processes that have an optimizing effect on the specific functions, including data management, data protection and security, data quality [11].

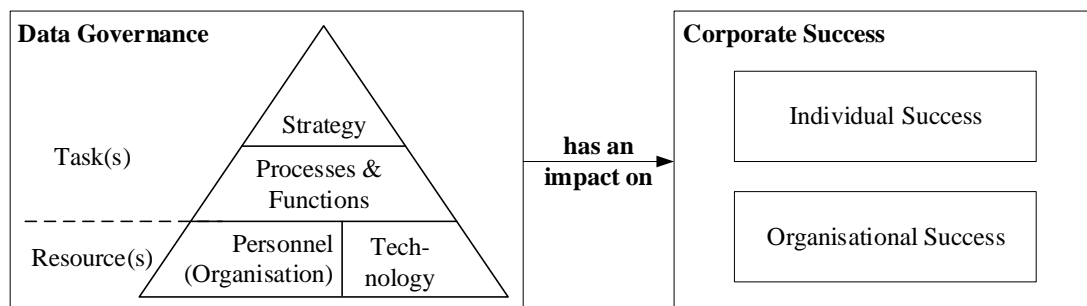


Figure 2. Data Governance Causal Model (decomposition)
(Source(s): Contribution of the authors, adapted and extended from [12])

While the *value proposition* explains why the service provided creates value for the recipient [13], *value creation* refers to the profitable performance of an action or system as a measure of its productivity in terms of maximizing the value of a good [14] and the value proposition to be fulfilled. The focus is on the question of whether and to what extent Data Governance as a IS is

suitable for maximizing the value of data itself as well as the added value from the data assets for the recipients. Value refers to the use value and exchange value of data as a commodity, a distinction that goes back to Aristotle's concepts [13]. While the use value is a question of the subjective assessment of a good in terms of its (use) properties, exchange value refers to the value of a good expressed in terms of a price. The use and exchange value of data is determined by data quality, data management and data responsibility, among other things. These are some of the success categories in the context of Data Governance that are important for measuring business management success.

Business management success is understood as the positive effect or consequence of decisions or actions [15], which is measured in monetary terms by comparing expenses and income [16]. Success eludes direct observation, i.e. it is often not possible to say ad hoc which goal individual measures and instruments are contributing to. For this reason, operationalization is required [17]: (a) define clear (i.e. measurable) objectives, (b) identify indicators ("key factors" or "success categories" or "strategic" or "critical success factors") that are important for achieving the objectives and (c) find metrics and key performance indicator (KPI) based on these indicators (b) that can be used to measure the objectives well. This requires two things: (1) it must be possible to capture the multidimensionality of success using suitable indicators and (2) a suitable measurement methodology is required for the selected success factors. To measure success, maturity models, e.g. [18], or special models for measuring success can be used as measurement methods. The latter are the subject of the following explanations.

Various *models for measuring the success of IS* can be found in the literature [19], [20], [21] with the "D&L IS Success Model" by DeLone and McLean dominating the scientific community, e.g. [22], [23], [24]. This model describes the effectiveness of information systems based on their system characteristics and user perceptions. In its original form [1], it contained six interdependent success categories to indirectly measure IS success: (a) "*system quality*" measures technical success as the accuracy and efficiency of an information system, (b) "*information quality*" measures semantic (domain) success in conveying the intended meaning of information, and the factors (c) "*system usage*", (d) "*user satisfaction*", (e) "*impact on individuals*", and (f) "*impact on the organization*" measure effectiveness and efficiency success on recipients. The six success factors were linked together in the sense of a temporal process and causal model. Numerous studies (evidence in [2]) confirmed positive interactions between these six categories. Nevertheless, DeLone and McLean adapted their model in response to research findings, criticism and the recommendations of the research community. Based on the research of [25], they expanded the dimension area to include the category "*service quality*" in order to include the supportive side. In addition, the independent variables "*impact on individuals*" and "*impact on the organization*" were replaced by the construct "*net benefit*" in order to ensure that all influences at individual and organizational level are taken into account, as well as the fact that the results of measuring the success of IS are not exclusively positive or negative, and to establish the link to "added value". Furthermore, the model contains arrows to show the associations, but not concrete causalities, between the categories. The latter is part of the model construction in specific studies. The model can be seen in its current form in Figure 3.

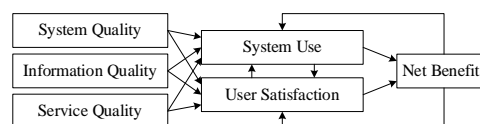


Figure 3. D&M IS Success Modell in the current state
(Source(s): [2])

The above-mentioned success dimensions have the following function (Table 1):

Table 1. Dimensions of D&L Success Model and their meaning
(Source(s): [1], [2], [26], [27], [28], [29])

Dimension	Aim/Purpose	Goal(s)/Objective(s)	Example Metrics
System Quality	This dimension measures the desired properties (characteristics, features) of an IS.	Determining the technical success of an IS	User-friendliness; availability; reliability, adaptability; response time; integration; flexibility; freedom from errors.
Information Quality	This dimension refers to the content aspects of the IS, i.e. the desired characteristics and features of the product's information	Determining the semantic (technical) success of an IS	Accuracy; relevance; comprehensibility; completeness; timeliness; dynamism; personalization; diversity; reliability; security; importance; trustworthiness.
Service Quality	This dimension addresses the quality of support provided to the end user when using the IS. Poor support reduces participation in the IS as well as the use of the IS and ultimately leads to a loss of trust.	Part of the determination of the effectiveness and efficiency success on the recipient	Trust in service; responsiveness of services.
System Use	This dimension measures the nature, scope, quality and appropriateness in terms of the informed and effective use of the IS. Essentially, it is about the fulfilment of the desired / intended use of the IS.	Part of the determination of the effectiveness and efficiency success on the recipient	Costs of system use; quantity (duration) of use; access frequency.
User Satisfaction	This dimension summarizes the users' attitude towards IS, i.e. the users' reactions to the use of IS.	Part of the determination of the effectiveness and efficiency success on the recipient	Information satisfaction; difference between information needed and information received;
Benefit(s)	This dimension combines almost all (individual or organizational) "impact" measures and their positive and negative effects into a single impact or benefit category.	Part of the determination of the effectiveness and efficiency success on the recipient	Decision effectiveness/efficiency; Business process effectiveness/efficiency; Improved productivity; Increased product quality; Reduction of costs; Minimization of risks; Reputation building; Increased employee creativity; Increased willingness to share knowledge within the Group

This model serves as the basis for the development of the model for measuring the success of Data Governance.

3. METHODOLOGY

The success categories of the "D&L IS Success Model" must be individually filled with attributes depending on the type of IS and the stakeholders, as pointed out by DeLone and McLean as well as several other authors [30]. For the concrete application of their model, DeLone and McLean also recommend determining exactly what is defined as a net benefit in a specific case, for whom this definition is valid, at which level of analysis the discussion should take place and who benefits from it. The definition of "success factor" and "value proposition" in case of Data Governance is therefore of crucial importance.

At this stage of the research, the *qualitative* method of *literature analysis* [31], [32] is used to reconstruct the current knowledge. Based on the results of the literature analysis, the preliminary success model for data governance was then developed using the *design science approach* [33].

4. MODEL APPLICATION

The concept of critical success factors (CSF) goes back to Rockart [34]. CSF encompass critical aspects of a company in which "things have to go right" in order to ensure successful, competitive performance (internal impact). In contrast, the value proposition comprises those factors on the basis of which recipients decide whether a system represents added value for them (external impact). If CSF are implemented correctly, they create added value for the addressees and can therefore be regarded as value propositions themselves. They therefore also have a major influence on the design, development and implementation of IS [35] and we use CSF as qualitative metrics to measure the success of Data Governance. In the literature, there is some academic research on CSF in the context of Data Governance [36]-[47], whereby the number of CSF in the studies varies, but they show a high degree of overlap in terms of content. However, they do not explicitly address the role of CSF in measuring the success of IS Data Governance. In order to make the CSF operable, i.e. manageable and clear, they are summarized into functional groups based on common characteristics and the defined architecture. The following (preliminary) model (Figure 4) is based on these functional groups.

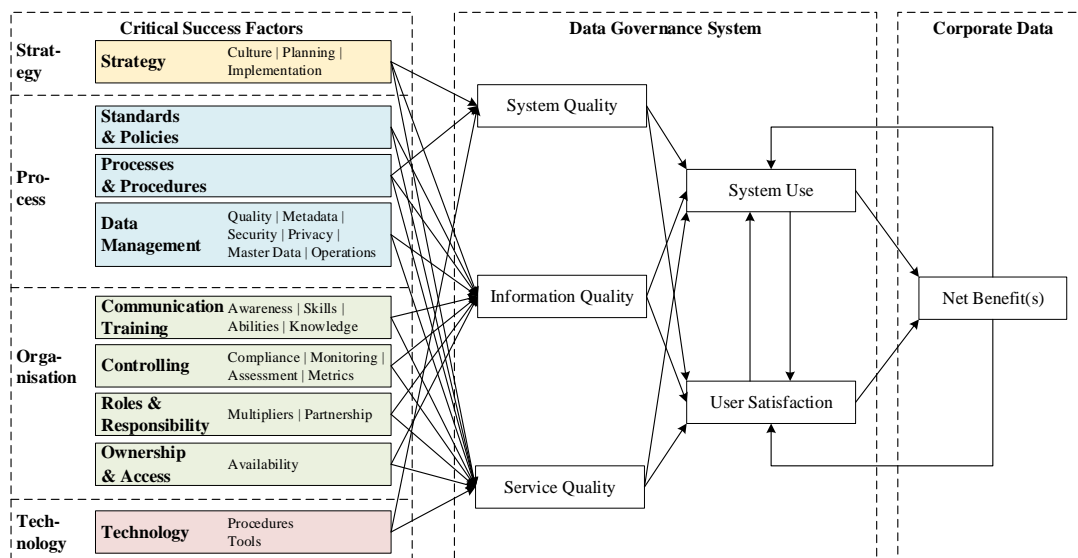


Figure 4. Model for Measuring Success of Data Governance (preliminary)
(Source(s): Contribution of the authors)

In order to fully answer the questions regarding the measurement of "IS-Success", the identified success factors are categorized according to their influence and assigned to the determinants of "IS-Success" identified as valid in the expert discussion. The question is whether the advantages for the customer relate to the overall design of the information system, its framework of use or the consequences of use (net benefits).

5. CONCLUSIONS

This article presents a study in which DeLone & McLean's model for measuring the success of IS is applied to Data Governance. In order to provide an overview of the success drivers of Data Governance we conducted a literature review to identify the KEFs. The KEFs identified were then categorized using the Data Governance causal model in order to place them in the context of DeLone & McLean's model for measuring the success of IS. The KEFs found are scientifically valid and can certainly serve as criteria for evaluating the success of data governance IS. It becomes clear that the success of a Data Governance IS generally depends on the design of the (system, information, service) quality.

Finally, it should be noted that the results of this study are currently preliminary, that research is ongoing. To further verify the model, it is intended to conduct expert interviews with researchers and practitioners in the context of measuring the success of Data Governance and, if necessary, to adapt the model on the basis of the results obtained (in-depth analysis). Subsequently, a broad survey will be conducted to determine whether and, if so, what concrete influence the identified KEFs have in data governance practice. Hypotheses will be formulated in due course and verified on the basis of the survey results.

This work contributes to making operational organizations aware of the need, when Data Governance measures are or have been taken, to adequately measure the success of these measures in order to maximize the value of their data. Data Governance can and should be evaluated at both the individual and organizational level.

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