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QUALITY OF DATA GOVERNANCE AND ITS IMPACTS ON CORPORATE PERFORMANCE MANAGEMENT

Master thesis

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Declaration:

I hereby declare that I am the sole author of the thesis entitled "Quality of data governance and its impacts on corporate performance management ". I duly marked out all quotations. The used literature and sources are stated in the attached list of references.

In Prague on <u>10th of May 2018</u>   <u>Signature</u>

Orkhan Mammadov

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Abstract

Nowadays, data plays vital role in life of modern organizations. However, data management and especially, data quality are unsatisfied in most of them. Recently, new methodology, known as Data Governance was developed. This methodology defines roles, responsibilities, standards and policies for Data Management. Literature shows that, complete conceptualization of factors affecting Data Governance quality is missing. There is also a limited research regarding the effects of Data Governance quality on the corporate performance management. This study is prepared to analyze and fill this gap. Through conceptualization of Data Governance based on literature, we have developed conceptual framework or model. Five variables, which affect Data Governance quality were identified in this framework: (1) Data Stewardship and Ownership, (2) Data Integration, (3) Data Modeling, (4) Data Quality and (5) Compliance with policies. This model defines above mentioned factors of Data Governance quality and how Data Governance impacts corporate performance management. The practical part of this study is based on interview, considering this framework. This research also approves, that the poor Data Governance has negative influence on corporate performance. So, organization needs to increase quality of its Data Governance to improve business performance and to realize full business value.

Keywords

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1. Introduction

Nowadays, influence of data is so big that we started to roll in it. Therefore, the companies understand the value of data, and they started to use their programs and hardware to analyze data. By this way, they can get competitive advantage of knowledge more, than their competitors.

"Big data" refers to collecting, using and analyzing of huge data volumes created by our digital lives. A few years ago, the companies either had no access, or didn't know what to do with it. However now the companies use it for identification of new ideas for business processes, for authentication of client demand or moods, for forecasting and response to changes.

However, access to data isn't enough. Data itself is useless. That is, what are you doing with it that gives value to it (Chen W. J., 2013). To investigate the value of data, we need to study data at first. The data should be considered as corporate asset and it needs to be governed properly for effective corporate performance management.

Researchers and experts in the field of the Information Systems (IS) consider data governance as perspective approach for the companies on improvement and maintenance of corporate data quality, that is considered critical to correspond with strategic business requirements, such as integrated customer management. Both parties agree that data governance generally is a matter of the organization. However, still there haven't been received any scientific results regarding, what must be organized by data governance and how data governance should look like (Cheong & Chang, 2007). The aim of this study - to define influence of data governance quality on corporate performance of the organization based on the comprehensive analysis of a state both in science, and in practice.

As for quality of their data, the companies are seen, that they face several strategic business requirements, such as observance of legal and standard statuses or need of the business models focused on the client. In this context, data governance is considered as perspective approach for the companies on improvement and maintenance of quality of the data and development of corporate performance of an organization. Early definitions of the term have been made both by researchers and practitioners. Both parties agree that data governance refers to completeness of decisions and responsibility for data management (Fukuyama, 2013).

Assignment of the rights of decision-making in the companies is a typical organizational task. As for the data governance of organization, both researchers, and practical experts have developed the number of recommendations and specifications, such as functional charts connecting the rights of decision-making with the corresponding roles, the specification of such roles as data stewards or data committees, the specification of the rights of

decision-making or the recommendation for creation of data governance in organizational structures of the companies (Plotkin, 2014). All these approaches are concentrated on separate aspects of data governance that, leads only to the isolated decisions. Still neglected the fact that the companies must consider several aspects in attempt to organize data governance (Russom, 2006). This gap both in scientific, and in the practical level of topic was motive for this thesis.

1.1. Motivation

The volume of data is increasing dramatically in this sphere. Due to fast grow of volume, there are several data management challenges that currently cover IT sphere too (Chaffey & Wood, 2005):

1. Information access is needed to be organized correctly.
2. Information systems needs to be set correctly, so they can analyze, manage and organize data.
3. There is rising need for technological opportunities, which allows cooperation anywhere and anytime.

Nowadays, companies are faced with a growing pressure due to increasing volume of data. As data is a valuable corporate asset of an organization, so, management should handle this data effectively and correctly. Therefore, Data Governance must be accurately defined, created and monitored, so it can allow to estimate and soften risks. The literature shows that, quality of data in an organization makes it to perform better (Cheong & Chang, 2007) (Berson & Dubov, 2007) (Otto, 2011). It means, better Data Governance gives advantage to companies, to compete with their opponents. It gives them opportunity, to be one step ahead of their competitors, so they can make right decisions and the most important to do it in time. Obviously, above mentioned results of Data Governance quality, influence corporate performance management of companies positively.

The aim of this study is to define the Data Governance affecting factors, and overall significance of these influencing factors. Furthermore, to determine to what extent, Data Governance affects the corporate performance management. According to Tallon et al. (2013), there is need for the researches concerning where and how Data Governance influences productivity of firm on all aspects, and it is very valuable during today's information era.

1.2. Goals, metrics, indicators and purpose of the thesis

How can organization ensure data governance quality, in order to obtain better corporate performance?

Table 1. Goals, Metrics and Indicators of this thesis

Goal	Metrics	Indicator
1. Analyze what attributes constitute quality of Data Governance.	Does the description explain what attributes constitute quality of Data Governance?	The main quality attributes that constitute quality of Data Governance are analyzed, also, Conceptual framework of Data Governance are created.
2. Analyze what factors affect data governance in organization and how these factors impact quality of data governance.	Does the description explain what factors impact the quality of Data Governance in an organization and how these factors affect it?	The set of identified factors which affects quality of Data Governance are analyzed detailly, through created conceptual model of Data Governance.
3. Analyze how data governance could contribute to corporate performance management.	Does the description explain, how Data Governance impacts the corporate performance management?	The set of the identified Data Governance impacts on corporate performance management would have been validated.
4. Assess quality of data governance and its contribution to corporate performance management in selected organizations.	Does the research describe the current quality of Data Governance and its contribution to corporate performance of chosen organizations?	The set of the identified Data Governance quality factors and their impact on corporate performance management of the chosen organizations would have been validated
5. Propose improvements that could enable to increase the quality of data governance and its contribution to corporate performance management of the given organizations.	Does the research describe the ways how the chosen organizations can increase the quality of Data Governance and how it will contribute its corporate performance?	The set of identified recommendations, how these chosen organizations can increase quality of its Data Governance and how it will contribute to corporate performance management would have been validated.

Table 1 above describes the list of defined goals, metrics (used measure for goal fulfilment) and indicators (threshold for determining if the metric can be considered as successfully fulfilled).

The purpose of this study is to identify and investigate factors that affect data governance in chosen organizations and determine the influence that quality of data governance has on the corporate performance of the organizations.

1.3. Research approach

Although it is recognized that, data is a valuable corporate asset, many companies cannot realize its full business value, which leads to poor Data Governance (Panian, 2010) (Newman & Logan, 2006). An effective Data Governance program allows the development of official policies and standards and provides data oversight so that decision makers can receive accurate and timely information to respond to the challenges and opportunities.

Literature has shown that a complete conceptualization of the factors influencing Data Governance is missing. There is also a limited research about the influence of Data Governance on performance of organization. Therefore, this research seeks to fill this gap, by investigating the factors influencing Data Governance quality in the chosen organizations which operate in different areas and also explain how these identified set of factors influence corporate performance management of given organizations.

The conceptual framework or model created based on current literature was used to investigate this study. This study was carried out in three different companies from various areas of operation. Interviews were provided with management of three chosen organizations, whose job description are related with Data Management via either phone calls or online messenger calls.

This study also ensures that the poor Data Governance negatively influences the corporate performance management of organizations. There are also set of recommendations regarding how these chosen organizations need to improve the quality of their Data Governance, in order to realize their full business value and to enhance its corporate performance.

1.4. Research Propositions

How can organizations ensure rigorous data governance in order to attain better corporate performance? In order to find out that, below mentioned prepositions were listed. Our literature review and research is held out to confirm or disapprove these prepositions.

These propositions are (Ndamase, 2014):

Proposition 1: Inadequate compliance with data requirements affects negatively the quality of data governance.

Proposition 2: Inefficiency of data ownership and stewardship negatively affects good data governance.

Proposition 3: Effectiveness of data integration within the organization contributes positively to data governance.

Proposition 4: Inadequacy of data modeling has a negative influence on data governance.

Proposition 5: Effectiveness of data quality contributes positively to data governance.

Proposition 6: When the quality of data governance is poor, it will impact the corporate performance negatively.

1.5. Outline of the Dissertation

This document is organized as follows: Chapter 3 and 4 presents a review of Literature on data governance and synthesizes the existing literature. The literature review expands on underlying theories and concepts which are applicable to this research. From the synthesis of the literature, a conceptual model was developed to illustrate the relationships between the identified factors affecting data governance and data management with corporate performance and creating a concept to properly address research propositions and answer research questions.

Chapter 5 presents research design which describes the research paradigm, strategy and methods which are relevant and helpful to get to the objectives of the study. It discusses the research instrument, sampling and data collection and analysis techniques used in this in study.

Chapter 6 presents the discussion and conclusion which interpret and describe the significance of the research findings in relation to the existing literature and draws conclusions.

The last 7th chapter presents recommendations and suggestions for future research and implications of the findings to practice.

2. Review of Literature

This chapter describes the search execution process, completed by researcher during whole period of writing this thesis, including which key words and which sources are used in order to get relevant information due to construct this Master thesis properly.

The list of necessary key words related to this Master thesis are the following:

- Data Management
- Corporate Governance
- Data Governance
- Quality of Data Governance
- Data Governance impact on corporate performance

The list of search engines, which were used to gather information for this study are specified as following:

- https://scholar.google.com/ - free accessible search engine, which includes scientific articles and research papers.
- http://www.openthesis.org/ - free repository of theses, dissertations, and other academic documents, coupled with powerful search, organization, and collaboration tools.
- https://oatd.org/ - Open Access Theses and Dissertations, open access graduate theses and dissertations published around the world.

Table 2. Overview of key words and sources with numbers of findings

Source / Key words	https://scholar.google.com/	http://www.openthesis.org/	https://oatd.org/
Data Management	6,320.000 results	80,163 results	83,474 results
Corporate Governance	1,990,000 results	5,912 results	5,139 results
Data Governance	3,050,000 results	8,911 results	5,559 results
Quality of Data Governance	2,770,000 results	7,643 results	3,176,311 results
Data Governance impact on corporate performance	1,650,000 results	4,250 results	2,283,134 results

Table 2 above describes the overview of the search results. The number of found results is shown in each field, for particular key word and for each source respectively.

It is obvious that, these mentioned in the Table 2 key words are common. That is why, too many results were found during the execution of search. It is also obvious that not all these results were investigated by author of these thesis. None of investigated articles and theses are fully covers the same topic as Master thesis. The reason could be that, the Data Governance and its quality are often discussed, but not from context of Data Governance quality impact on corporate performance management.

Besides above-mentioned web databases, below mentioned important sources are used in this study:

- ✓ **Dama DMBOK Framework** for specification of Data Management and evaluating Data Governance in its context (Cupoli, Earley, & Henderson, 2014)
- ✓ Book "**Aligning MDM and BPM for Master Data Governance, Stewardship, and Enterprise Processes**" for getting more deeply information about Master Data Governance and its relationship with data-driven processes in organizations (Ballard, et al., 2013).
- ✓ The scientific article "**Need for Data Governance**" to show importance of Data Governance (Cheong & Chang, 2007) and "**Some Practical Experience in Data Governance**" article to show practical points of Data Governance in organizations (Panian, 2010).
- ✓ The scientific article "**A Framework for the corporate governance of data – Theoretical background and empirical evidence**", which published in "Business, Management and Education" Journal (Dahlberg & Nokkala, 2015).
- ✓ Master Thesis written by Zimasa Ndamase (2014) for helping to gather ideas on the first steps of master thesis preparation.

For last 30 years, researchers have investigated the data management area to found out framework or model, which could ensure companies with fully integrated and high-quality data (Smith & Mckeen, 2008). It has been data dictionaries (1970's), data warehouses (1980's), Enterprise Application Integration (1990's). Though, this area has been intensively studied, there are still huge problems for organizations, such as poor quality of data, policy of data

ownership, synchronization problems, regulations and standards for data management and etc. (Smith & Mckeen, 2008). The following two chapters define the studied problems, where the scales and relevance of these researches have been specified.

3. Data Management and Governance

The following chapter introduces Data Governance, explains two types of Governance and describes the role of Data Governance within the context of Data Management.

3.1. Data

The concern increases, when too many indistinct or fuzzy concepts are used currently in the field of Information System. The scientists and, also practice oriented people are in a loss, because of this uncertainty. The reason for it, is that the different parties confuse meanings of the same term in this area. There is no standard conceptual link and terminology which should be applied for explanation of the existing or new concepts in information systems area (Falkenberg, et al., 1998).

However, the quotation mentioned above treats the last century, its message is still relevant (Weinberger, 2010).

Information systems are social and technical communication systems which are used for representation and transferring of data (Claver, Llopis, González, & Gascó, 2001) (Allen J. P., 2000) (Beynon-Davies, The 'language' of informatics: The nature of information systems., 2009a). The hierarchy of data, information, knowledge, wisdom (DIKW) (see the Figure 1) which is also called by hierarchy of knowledge, information hierarchy and a pyramid of knowledge, creates a basis for researches in information systems area (Rowley, 2007). Although, the hierarchy exists in literature of information systems, there is limited discussion about content and structure of hierarchy, especially about "wisdom" (Zins, 2011) (Rowley, 2007).

Figure 1. The DIKW Hierarchy (Rowley, 2007)

DAMA DMBOK (Data Knowledge Book of Knowledge) distinguishes data, information and knowledge. Data is defined as fact views, such as text, digits, graphics, images, sound and video. Data transforms to information and information could be transformed to knowledge in its turn with adjustment. Data has seven phases during their life cycle. These stages are: creation, acquisition, storing, using, archiving, extraction and cleaning (Dahlberg & Nokkala, 2015).

Data - is the non-material asset, which has great importance in the organization. It is a key to effective process and real manifestation of business. Data represents clients, employees and suppliers of the organization; its activity and operations; and its outcome and results (Panian, 2010). Data helps with the development of internal opportunities, which can be used for finding out optimal ways of resource usage (De Abreu, Gastaud, & Kumar, 2013). It is very common to use data and information as synonyms in Information System field. We are also going to use these terms in our research interchangeably.

There are three types of data namely, domain data, reference data and metadata. Domain data on its turn is divided into master and transactional data and presents business domain of organization. Master data refers to the main business units that the company reuses in many different business processes and systems, along with their associated metadata, attributes, definitions, roles and connections (Cleven & Wortmann, 2010) (Silvola, Jaaskelainen, Kropsu-Vehkapera, & Haapasalo, 2011). Master data can be parties such as customers, suppliers, people and vendors, or places such as branches and locations, or things such as policies, products, assets and accounts. Main characteristics of master data are:

➢ Master data objects do not depend on other objects.
➢ Master data usually remain largely unchanged (static data).
➢ Instances of the master data classes are constant in terms of volume.

Next chapter is going to describe data by Data Management perspective.

3.2. Data Management

Data Management itself can be described as the summary of projects, tasks, processes, roles, functions and implementations which have a purpose of governing data as an asset inside the company (Cupoli, Earley, & Henderson, 2014). Data management is a function which is also known as high level business process. It is the planning and implementation of policies, practices and projects, which acquire, control, protect, deliver and increase the value of data. (Mosley, Brackett, Earley, & Henderson, 2009).

DAMA International defines 11 knowledge domains enveloping the main areas in DAMA-DMBOK2 Guide for Data Management. In each knowledge domain there are sections which logically group activities. There is also an additional section of data management containing subjects which describe requirements to knowledge for professionals in the field of Data Management. The new knowledge area namely – Data Integration and Interoperability is added recently to this list (Cupoli, Earley, & Henderson, 2014):

- **Data Governance** – planning, controlling and monitoring over data management and the using of data and related resources.

- **Data Architecture** – the general data structure and resources, connected to data, as an integral part of an enterprise architecture.
- **Data Modeling & Design** – analysis, design, construction, tests and maintenance of data.
- **Data Storage & Operations** – for a technical basis of data storage.
- **Data Security** – support of confidentiality, privacy and appropriate access for data.
- **Data Integration & Interoperability** – acquisition, extraction, conversion, relocation, delivery, replication, virtualization and first-line support of data.
- **Documents & Content** – storages, protection, index and ensuring access to the data found in unstructured sources (electronic files and physical records) and provision of these data for integration and interaction into the structured databases.
- **Reference & Master Data** – Control of the general data for abbreviation of redundancy and support of the best quality of data at the expense of the standardized determination and use of data values.
- **Data Warehousing & Business Intelligence** – control of analytical data handling and provision of data access of decision-making support for the reporting and the analysis.
- **Metadata** – collection, categorizing, maintenance, integration, monitoring, control and provision of meta data
- **Data Quality** – determination, monitoring, maintaining integrity of data and improving of quality of data (Cupoli, Earley, & Henderson, 2014) (Mosley, Brackett, Earley, & Henderson, 2009).

Review of all 11 main functional areas, which defined above are shown in a Figure 2. This pattern was taken directly from DAMA-DMBOK2 Framework.
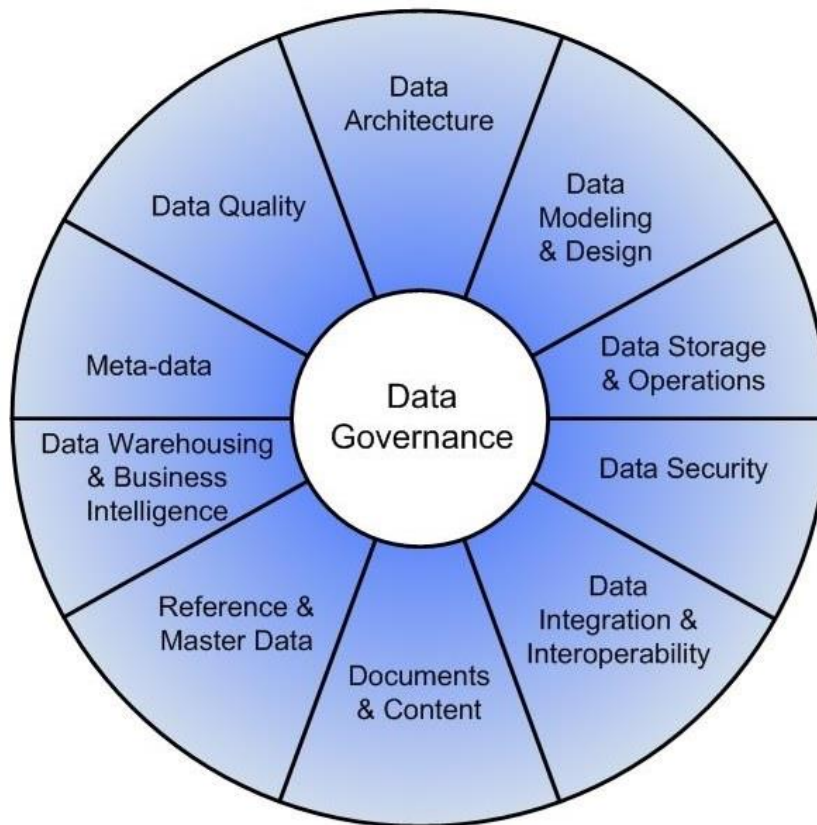
Figure 2. The DAMA-DMBOK2 Guide Knowledge Area Wheel (Cupoli, Earley, & Henderson, 2014).

In the late 60's data management generally meant only processing of business data. Afterwards, an interactive data management arrived and then new term namely online transaction processing (OLTP) was introduced to the world. Two big abstractions were born which assisted the community of data management and will continue to serve it within the next 50 years: (a) transactions and (b) relational data models and algebra. Fifty years ago, we entered the data-assisted world. Today the world depends on data - we cannot check in shop if their systems of data do not work. In fifty years, we will live in the world with dipping in data, doing what we never have done, thanks to ubiquitous integration of data into all aspects of our life. It has already begun (Lomet, 2017)).

3.3. Governance

In the beginning, we can consider Governance as ability of government to create rules and make society to rely on them due to delivering service. It doesn't matter if government is democratic or not (Fukuyama, 2013). Governance is the fact of the power. Approximately in 1900 when governance became an important subject for elite minds, knowledge ripened to become a basis of the comprehensive theory of human existence. The government is the vital institute of the power. Governance is a mental theoretical concept of the evolving ideas. (Natarajan, 2011).

Interpretation of term Governance in business differs by perspective point of view. According to Kooper, Maes, & Lindgreen (2011), governance helps to identify business goals. According to them, it also monitors business performance to ensure that, defined objectives are accomplished. Governance guarantee that, *"stakeholder needs, conditions and options are evaluated to determine balanced, agreed-on enterprise objectives to be achieved; setting direction through prioritization and decision making; and monitoring performance and compliance against agreed-on direction and objectives"* (Raval & Dyche, 2012). Governance helps organization to set, monitor and achieve its strategies (Weber, Otto, & Osterle, 2009).

3.3.1. Corporate and IT Governance

As specified by the classical and widely used explanation of Shieifer & Vishny (1997), corporate governance helps to return money to investors. They define the problem from agency point of view, by separating property and monitoring. According to them, in majority of the cases, managers sign the contract with investors in which it is clearly specified, what they will do with funds and how income will be divided between them and investors (Shleifer & Vishny, 1997). However, it is hard to act in practice, because of various uncertainties. Therefore, investors and the manager agree on the rights of monitoring, which are used for response in case of uncertainties are occurred. Activities such as setting of objectives, coordination of accountability and implementation of monitoring for the achievement of the goals have become the descriptive characteristic of corporate governance (Dahlberg & Nokkala, 2015).

According to Bebchuk & Weisbach (2010), return of money to investors depends on a set of legal and contractual mechanisms. Because of operations in various markets and behavior of different players, corporate governance has evolved into different sub-disciplines. Corporate IT Governance (for example, ISO/IEC 2008), or just IT Governance, is one of such sub-disciplines (Bebchuk & Weisbach, 2010). It is mainly concentrates on risk, governance and performance of Information Systems. IT governance is the system, which ensure that IT serves to strategies and objectives of an organization. It can be seen as an integral part of corporate governance. According to Tallon, Ramirez, & Short (2013), IT governance is responsible substitute for management of IT artifacts, such as hardware, software and network.

IT Governance is a part of business management. The mechanism of IT Governance in the organization will depend on characteristics and needs of the organization. ISO/IEC 38500 helps high-level managers within the organization to understand and fulfill the legal obligations, provisions and ethics to use of IT in the organizations by provision of the key principles (Telkom University, 2014).

IT Governance applies to corporate governance concepts, such as principles of IT and digital data. For example, family of the ISO/IEC 38500 international standards shows that, the governing body of the organization (corporate) should evaluate IT, i.e. should set the goals for IT usage and digital data according to the corporate objectives. The governing body should also direct information technologies, coordinate areas of responsibility of activities for IT usage and digital data due to achievement of the goals. Briefly, the governing body should control IT, by providing the monitoring mechanisms for achievement of IT objectives. In IT Governance literature, it calls Evaluate-Direct-Monitor (EDM) cycle. The main points of each are shown in Table 3. The cycle EDM regulates the daily use of IT and IT-related business processes. IT Governance emphasizes the role of business supervisors and managers ("investors") within two methods. Governing body of the organization, especially, council, the CEO, the executive committee, etc., i) bears responsibility for implementation of IT Governance; ii) evaluation of IT is based on principle that the business related goals should be set taking into account IT Governance and data (Dahlberg & Nokkala, 2015).

Table 3. (EDM) model applied to governance of data (International Organization for Standardization (ISO), 2008)

Governance body task	Description of governance body tasks
Evaluate	• Business Conditions • Constraints • Strategies • IT Proposals
Direct	• Sets IT Guiding Principles (how IT should be used) • Approach to risk and compliance • Investment on IT proposals
Monitor	• IT Strategy • Change • Capabilities • Operations

COBIT 5 is another widespread literature, which provides set of guidelines in area of Corporate and IT Governance and helps to transfer business-driven objectives to IT-related goals within the organization. It provides comprehensive

structure which helps enterprises with achievement of Corporate Governance and IT Governance. In other words, it helps the enterprises to create optimum value for IT, maintaining balance between optimization of risks and IT resources. COBIT 5 allows IT divisions to control and act all-in-one within the enterprise, by taking into account the interests of internal and external stakeholders connected to IT. COBIT 5 is useful for the enterprises of all sizes, whether it is commercial or noncommercial (ISACA, 2012) (International Organization for Standardization (ISO), 2008).

IT governance basically, concentrates more on IT as a whole and less on data inside it. Due to its concept, there are hidden constraints and limitations on IT Governance. One of these implicit restrictions is that, IT Governance doesn't focus on how organizations are creating, using, processing and managing information, in order to create business value. Another one is that, IT Governance doesn't cover administration, responsibility, authorization, policymaking, reporting, monitoring and audit of business domain (Tallon, Ramirez, & Short, 2013) (Kooper, Maes, & Lindgreen, 2011). Taking into account all above mentioned restrictions and limitations in IT Governance, Data Governance derived from it, which is more unique and specific to data. The intellectual and innovative application of information solves business challenges and creates value at a high speed, low cost and correct scale (Tallon, Ramirez, & Short, 2013).

3.3.2. Data Governance

To solve problems with quality of data, Friedman (2006) recommends for the organizations to introduce the integrated approach focused on people, processes and technologies, and the organizations on its turn need to measure and estimate quality of their data. It means that for the solution of problems with quality of data it is necessary to govern data. According to Thomas (2006), *"data needs to be governed as it has neither will nor intent of its own. Tools and people shape the data and tell it where to go. Therefore, data governance is the governance of people and technology"*.

There are various definitions of Data Governance. Newman & Logan (2006) define data governance as *"the collection of decision rights, processes, standards, policies and technologies required to manage, maintain and exploit information as an enterprise resource"*. Cohen (2007) defines data governance as *"the process by which a company manages the quantity, consistency, usability, security and availability of data"*. Thomas (2006) claims that data governance *"refers to the organizational bodies, rules, decision rights, and accountabilities of people and information systems as they perform information-related processes"*. Further she says that *"data governance sets the rules of engagement that management will follow as the organization uses data"*.

In the light of the above-stated definitions data governance is important as it defines the policies and procedures for ensuring active and effective management of data. The adoption of data governance structure also allows to interact from various levels of the organizations for data management. It provides an opportunity for coordination of different data-related programs, in alignment with corporate objectives (Cheong & Chang, 2007).
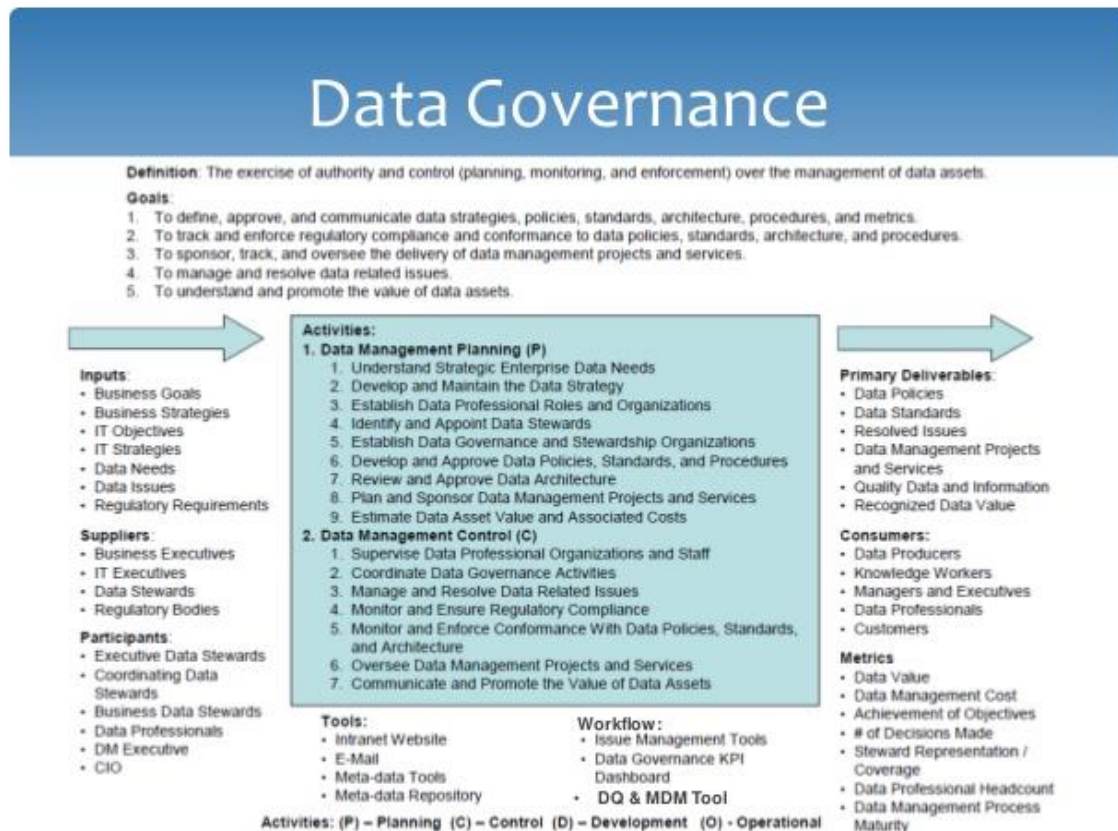

Figure 3. Data Governance context diagram (Mosley, Brackett, Earley, & Henderson, 2009).

DMBOK (Data Management Book of Knowledge) of Data Management Association (DAMA) International is probably the most recognized cumulative attempt for creation of concepts of data management. The definition and main aspects of Data Governance, according to DMBOK are shown in Figure 3. Data Governance context diagram ..

Otto (2011) claims that the most widespread business drivers of Data Governance are: a) ensuring compliance; b) provide decision-making; c) increase satisfaction of clients; d) increase operational efficiency; e) support business integration. One of main purposes of Data Governance - to provide that, the data is conformed to requirements of business, guaranteeing that data is reliable, safe and available for decision-making. Secondly, Data Governance reduces costs of data management. At last, Data Governance protects and processes data as the most valuable business asset, guaranteeing that its value doesn't decrease due to technology or human error, loss of timely access,

inadequate use or misadventure (Tallon, Ramirez, & Short, 2013) (Panian, 2010). Practice of Data Governance corresponds to the principles of IT governance which are already in use and tested.

The quality of Data Governance depends on its success. It means that, the main attributes which constitute quality of Data Governance are its success factors Summarizing the above-mentioned definitions and explanations, the critical success factors, which affect Data Governance in organizations are shown below (Marinos, 2004):

- **Accountability and strategic responsibility**. Data Government process needs to be driven. According to Cohen (2007) and Thomas (2006), duties and responsibilities of all participants of data management should be clarified accurately for successful implementation of Data Governance process.

- **Standards**. Standards for corporate data should be defined properly within the organization objectives.

- **Managerial blind spot**. There is a need for coordination of the data-related technologies, processes and organizational structures with the business goals.

- **The covering complexity**. Interested parties of data are producers and consumers of data. Management of data stakeholders is difficult as data can be collected, enriched, distributed, consumed and supported by various data stakeholders.

- **Cross divisional issue**. The structure of Data Governance should include participation from all levels of the organization for coordination of priorities, accelerations of conflict resolutions and encouragement of data quality.

- **Metrics**. Definition of data quality metrics is important for assessment of data governance success.

- **Partnership**. When the organization shares data with other organizations (partners), there should be required that, its partners become responsible for quality of data provided by them.

- **Choice of strategic points of control**. It is necessary to establish control point to define where and when the quality of data should be assessed and addressed.

- **Compliance monitoring**. It is necessary to monitor policies and procedures of data governance periodically, to be sure that all of them are followed.

- **Training and awareness**. Participants of data management should be aware of data governance value. Importance of data quality and advantages of quality data needs to be communicated through all interested parties of data for increasing their awareness.

3.3.2.1. Master Data Governance

Master data governance can be defined as *"a focus area of data governance that is dedicated to MDM [master data management] implementations. Master data governance, as a discipline, concentrates on controls, methodologies, capabilities, and tools that are developed my modern MDM over the last decades."* (Ballard, et al., 2013).

The main objectives of master data governance can be reduced to the following (Ballard, et al., 2013):

1. To establish a master data governance council or board. This body is destined to ensure the implementation of the very process of master data management and to monitor its ongoing and long-term outcomes, propose improvements to MDM and watch over their actual implementation and effects;

2. To develop and provide explicit master data governance policies, which is destined to ensure accountability and enforcement. Thus, such policies are destined to regulate clearly the whole set of relationships between all stakeholders in the course of master data governance and to achieve the best resolution of all issues which might occur throughout such processes.

3. To *"Monitor, oversee, and enforce proactive, collaborative, and effective data stewardship that is driven by data governance."* This is required in order to maximize the effectiveness in the outcomes of the wider processes of corporate data management (Ballard, et al., 2013).

4. To acquire and put to use tools for master data governance and data governance-driven stewardship, including all processes associated

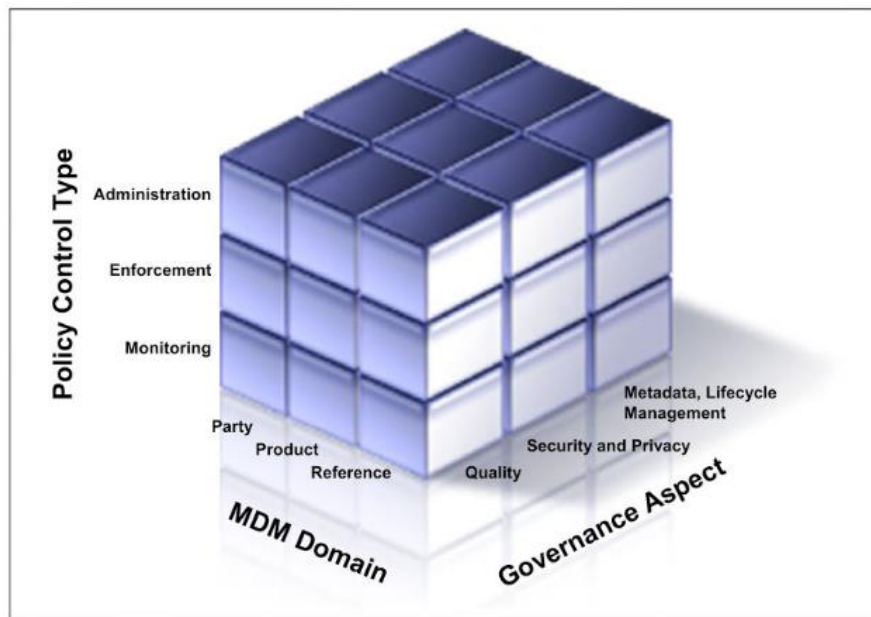with the administration of all corporate policies, their enforcement, and ongoing control and monitoring.

Figure 4. Multidimensional approach to master data governance (Ballard, et al., 2013).

As can be seen from the chart illustrated above, all master data governance processes within an organization are addressed by the policy administration, enforcement, and monitoring components. The performance of such policies should be seen as an ongoing effort and a cyclical process, and not as a one-time activity. Master data governance is a part of the wider discipline of data governance. Within it, the main emphasis is put on master data implementations, where modern MDM patters are combined with the use of MDM data hub technologies (Ballard, et al., 2013).

Master data governance is of major importance to organizations in the present conditions of doing business. The improvement of master data governance and wider MDM programs is destined to improve the quality of interaction between all corporate stakeholders within the framework of MDM, an thus to drive the best results in terms of the use and management of master data in the long run (Allen & Cervo, 2015).

3.4. Chapter summary

Summing up the results of the previous sub-chapters, data and information both can be used as synonyms in literature. We will take data as intangible asset of organization, which has great impact to its performance. It is the unit of measure performance of an organization. That is why, organizations, needs to manage it and to be ahead of their opponents. That is why organization needs to have strong Data Governance, so it can manage data and get benefits from it.

From literature, it is obvious to see that Data Governance went a long way and developed naturally, found the reflection in today's daily business. As it is described in this chapter, Data Governance evolved from IT Governance and IT Governance on its turn, evolved from Corporate Governance. Irrespective of the long story, it is underestimated as a theoretical subject for a long time, and the companies only open its importance, advantages and shortcomings. One conclusion of this chapter is that governance of data cannot happen without appropriate data management and that organization cannot live today without proper Data Governance. It is a vital part of data management as an asset.

4. Organizational usage of Data Governance

In this chapter we discuss conceptual framework or model for Data Governance and then to analyze all objects of this framework one by one. By this we are going to find out what factors effect Data Governance quality and how Data Governance quality itself has influence on corporate performance management.

4.1. Conceptual Framework

The conceptual framework logically describes the relationship between the applicable concepts to the investigated problem (Cavana, Delahaye, & Sekeran, 2011). As mentioned in the Introduction chapter, the purpose of this study is to get an idea of Data Governance and to summarize the existing literature on it.

From the synthesis of the literature, the approaches to governing data assets of an organization have been identified. The organization must comply with policies and regulations (Chen W. J., 2013) (Cheong & Chang, 2007) (Russom, 2006) (Panian, 2010), designate appropriate roles, such as data stewards and data owners (Rosenbaum, 2010), improve or maintain the data quality (Otto, 2011) (Newman D. , 2005), supporting efficient data integration (Magnani & Montesi, 2010) (Vasista & Al-Sudairy, 2011) and providing effective data modeling (Ponniah, 2008) (Moody & Shanks, 2003) (Davies, Green, Rosemann, Indulska, & Gallo, 2006). These approaches focus on particular aspects of Data Governance and have been investigated exclusively, which leads to an isolated solution. The fact that an organization should take them into account when trying to organize Data Governance leads us to our conceptual framework in Figure 5. The model shows the proposed independent variables that affect the quality of Data Governance and through it, it affects the corporate performance of the organization. The framework has seven objects that have been identified from existing literature; The interrelations between these objects can also been found in the literature. The conceptual model serves as a framework for organizing measurement, data collection and data analysis.
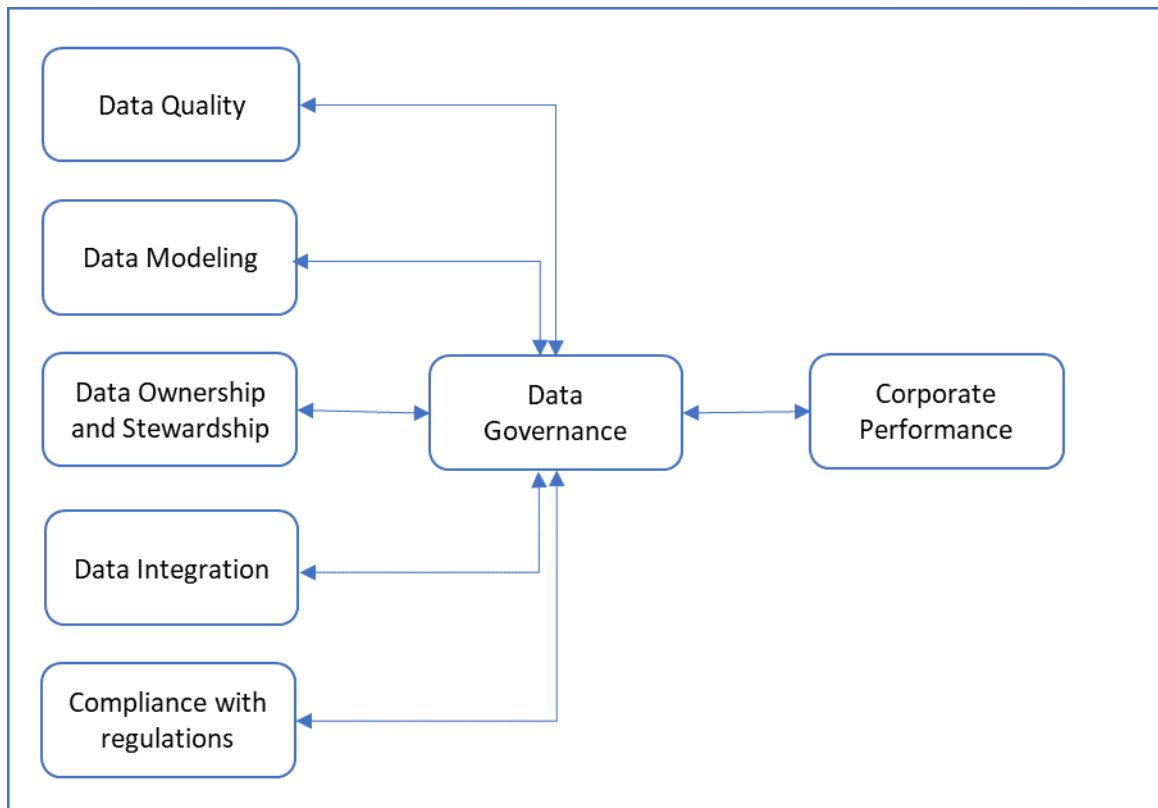
Figure 5. Conceptual Framework of Data Governance.

Data Governance is the collection of the rights, processes, standards, policies and decision-making technologies necessary to manage and ensure the availability, accessibility, availability, quality, consistency, audibility and security of data in the organization (Cheong & Chang, 2007) (Panian, 2010).

After the synthesis of the literature, seven variables were identified:

➢ Data Quality
➢ Data Modeling
➢ Data Ownership and Stewardship
➢ Data Integration
➢ Compliance with regulations
➢ Data Governance
➢ Corporate Performance

The following sub-chapters define these variables detailly.

4.1.1. Data Stewardship and Ownership

Stewardship is a term which assumes evasion from an element of the community which doesn't belong only to one person (Leopold, 1968).

Data Stewardship is one of the important parts of Data Governance, which is more operational (Plotkin, 2014). The concept of data stewardship is based on science and practice of collecting and analyzing data (Diamond, Mostashari, & Shirky, 2009). Data stewardship can be considered as a set of data governance methods, which cover data creation, storage, collection, analyzing. It also includes procedures for data release and use (Rosenbaum, 2010).

Data governance defines the processes, which include roles and responsibilities of data stewardship, through guidelines and policies. Data governance establishes wide guidelines of access, management and permission for use of data. It also defines the methods and procedures necessary for stewardship process and establishes qualification of those who will use data and conditions on which data access can be provided (Rosenbaum, 2010).

Data in the organization are always divided, integrated and used for organizational purposes. Data exchange is defined as distribution of data: well-structured or semi-structured (Ahmad, Abidin, & Omar, 2011). Data can be replicated and distributed easily at huge distances. It doesn't lose value in process of usage increase, instead gains value (Tallon, Ramirez, & Short, 2013). For effective exchange of these data between divisions of an organization and conflict prevention there should be an accurate distribution of the correct functions in the correct fields of decision-making, with the correct accountability. It is very important and critical because of access levels to data, namely: data enclaves, limited data and public data (Ahmad, Abidin, & Omar, 2011). First subgroup is classified as the most restricted data. Limited data have a smaller priority of access, but its privacy is defined by policies of data. At last, public data have no restrictions and can be shared among data access requesters.

Data stewardship concept differs from Data ownership. Data owners are people, who have the legal requirement concerning data and they have control responsibilities such as obtaining, creating, having access to share data (Ahmad, Abidin, & Omar, 2011) (Berson & Dubov, 2007). They always belong to business part rather than IT part of an organization. Data ownership is critical and sensitive due to fear of data manipulation, what can lead to negative consequences for the organization.

Data access is the main point in organization, which affects Data ownership. Rosenbaum (2010) beliefs that, organization can manage it through incentives and processing information as a public good. Departments reluctantly use their best resources (data) for projects of other department irrespective of whether the contribution will give value to the project or it is equitable to the interests of the whole organization. They need compensation for using their data. Providing the obvious contract which rewards those who create and support data "ownership", will be the best way of granting incentives (Rosenbaum, 2010) (Van Alstyne, Brynjolfsson, & Madnick, 1995). Above mentioned process will straighten the data ownership rights (Rosenbaum, 2010). The choice of the best

incentives which satisfy both the principal and the agent will be useful, as the organizations will use all available technology in full capacity. The small, non-material costs of low efforts will be displayed as distorted, absent or unsuitable data for use, which have negative effect on quality of data governance (Van Alstyne, Brynjolfsson, & Madnick, 1995).

As mentioned above, another approach - to consider data as the public, which can be used by various departments of the organization according to the principles of data stewardship. Stewardship bodies have board powers for collecting, preparation and support of data inside the organization. Also, to identify certain uses of data as being of public interest to other departments, that can demonstrate compliance with data stewardship responsibilities (Rosenbaum, 2010).

The responsibility of Data stewards is to be sure that all data quality metrics are met on a regular basis and to ensure that, the data quality improvement programs are set (Berson & Dubov, 2007) (Rosenbaum, 2010). They are helping IT department to improve architectural components, so data quality can be improved as well. Data stewardship is also making sure that business meta-data of the organization is defined, and data quality objectives are identified (Berson & Dubov, 2007).

In order to effectively manage the data exchange, someone needs to determine the nature of the data, the appropriate platform, the relevant questions and approaches, and how they can be divided between the departments (Ahmad, Abidin, & Omar, 2011). The next section is about data integration, which is an important building block for efficient data exchange, because it helps to collect data from different sources.

4.1.2. Data Integration

The Data Integration in Information Systems can be understood as providing a single unified interface for set of heterogeneous independent data sources (Levy, 2000). Such data sources can be traditional database systems that support various data models (relational, object, object-relational, graph, etc.), a variety of legacy systems, repositories, web sites, structured data files. In other words, it is about supporting the representation of data collection from a variety of independent sources in terms of a single data model. It is important to note that the set of sources composition can be predefined or dynamically replenished, data sources can have unchanged or updated content (Manolescu, Florescu, & Kossman, 2001).

Data integration systems can integrate data into physical, logical and semantic level. Data Integration at the physical level, from the theoretical point of view is the simplest task and is reduced to the conversion of data from various

sources into the required uniform format for their physical representation. Data integration at the logical level provides the ability to access data contained in various sources in terms of a single global scheme that describes their joint presentation, taking into account the structural and possibly behavioral (using object models) data properties. Support for a single presentation of data, considering their semantic properties in the context of a single ontology of the subject area, is ensured by the Data Integration at the semantic level (Kogalovsky, 2003).

According to Dittrich & Ziegler (2007), there are two main reasons for Data Integration:

> ➢ The integrated representation can be used as a uniform point of access to information and can promote simplification of access and reuse of information.
>
> ➢ Data from different sources give fuller basis for satisfaction of a certain information need.

Data sources can have different properties essential for choosing data integration methods - they can support data representation in terms of a particular data model, it can be static or dynamic, and so on. Multiple sources of integrable data can be homogeneous or heterogeneous with respect to characteristics corresponding to the level of integration used (Kogalovsky, 2003).

As for the ways of data integration, there are two possible approaches: virtual or actual (materialized) representation of integrated data. In the first approach, an access mechanism is created that, generates data in the required view directly from data sources. A complete materialized representation of the integrated data in terms of a single user interface is not supported. A virtual approach is most often used one. It is used within the frequently updated data sources. On the contrary, with the second approach, at the integration stage, a complete materialized view of the integrated data is formed, alienated from the main sources. This data view is always used to handle user requests. This approach is used in data warehouses particularly (Kogalovsky, 2003).

In data integration systems, the architecture with the intermediary has become most widespread. The mediator is assigned to support a single user interface based on a global representation of the data contained in the sources, as well as support for mapping between the global and local data views. A custom query, formulated in terms of a single interface, is decomposed into many subqueries addressed to the desired local data sources. Based on the results of their processing, a complete response to the query is synthesized (Levy, 2000).

Two types of architecture are used with the intermediary - Global as View and Local as View. The first of them (Global as View) provides for the definition

of a global representation of integrated data in terms of given representations of local sources. This approach is more effective when the set of all sources used is predetermined. If the integration system is designed to support a complete materialized view of integrable data, the processes of converting data from sources into their single global view are carried out at a time (Manolescu, Florescu, & Kossman, 2001).

Using the second version of the considered architecture (Local as View), it is assumed that the representation for each of the local data sources is defined in terms of the given integrating global representation. Although in this case the mapping of user queries into the local data source environment becomes more complicated, this approach allows the dynamics of the composition of multiple data sources. Each new source can be connected to the system both at the development stage and at the operation stage (Levy, 2000).

In the following chapter the main attention is given to Data Modeling, which helps with creation of the good conceptual scheme, in order to make Data Integration job easy to use.

4.1.3. Data Modelling

To analyze conceptual data modeling, it is worth providing a clear definition of the term conceptual data model first.

A conceptual data model is *"the highest level of abstraction to represent the information requirements of an organization. At this highest level, the primary goal is to make the representation clear and comprehensible to the domain experts."* (Ponniah, 2008). This level of data presentation is characterized by clarity and simplicity in the construction of conceptual data models. A conceptual data model describes a basic overview about the objects to which it refers. It indicates the general parameters and the relationships between such objects. Conceptual data models do not present any details of data structure, software features or hardware considerations. However, despite the model's simplicity and clarity, a key prerequisite for it is to present in an explicit form all data related to information requirements, as it is a global model for the organization using it (Ponniah, 2008).

Another definition of a conceptual data model states that it is *"a model of the proposed database systems that is independent of any implementation details. A conceptual data model must express the structure of the information in the system: that is, the types of data, and their interrelationships."* (Worboys & Duckham, 2004). While this type of data in a conceptual data model can be considered as static, it also has a dynamic component. The dynamic component relates to the model's behavior in operation. Namely, it might precondition the extent to which allowable transactions shape the system's dynamic properties. A

critical factor of a conceptual data model's effectiveness is the information it contains. It should specify a range of integrity constraints. It should represent framework for effective communication between the analyst, the designer and possible customers (Worboys & Duckham, 2004).
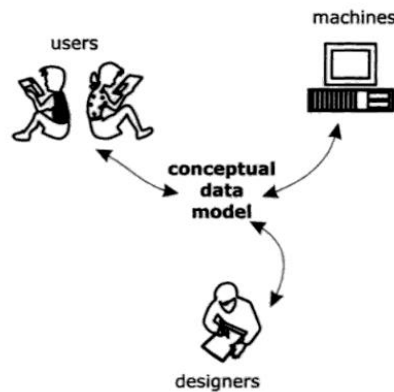

Figure 6. Conceptual data model as a mediator between users, designers, and machines (Worboys & Duckham, 2004)

Conceptual data modeling thus can be referred to as a process set to complete the development of conceptual data models. Conceptual data modeling is *"the central activity in a data modeling project. In this phase we move from requirements to a solution, which will be further developed and tuned in later phases."* (Simsion & Witt, 2004).

The development of a conceptual data model generally consists of several main stages, namely the following (Simsion & Witt, 2004):

1. Identification of requirements. On this stage, the main requirements to the conceptual data model and to the system are identified. Such requirements have to be in line with the vision of key stakeholders, and have to be consistent with the ultimate goal of the implementation of the system.

2. Design of solutions. On this stage, particular solutions are developed taking into account the requirements identified on the previous stage.

3. Evaluation of the solutions. On this stage the solutions developed are evaluated in terms of their actual applicability and expected effectiveness.

One of the important challenges in the course of conceptual data modeling is the need to work with business stakeholders in order to understand the core data concepts, and to make sure that all such concepts are understood well and are consistently throughout all business units and actors in the organization. *"The*

conceptual data model is a vehicle for this communication process – it should be visually simple in order to communicate the core definitions and business roles to a non-technical audience." (Burbank & Hoberman, 2011).

4.1.4. Data Quality

Data Governance is important for many organizations as achievements in the field of IT that allow the organizations to fix the structured and unstructured data (Lee, 2000). In literature the problems connected with data management and quality of data are also revealed. Wright (2006) said that the trust of the person making decisions in data is characterized by quality of data. The point of view that data are a valuable resource, is more and more widespread among business and IT heads. Recognition of data as corporate assets means that some form of data governance will be useful to effective management of data (Wright, 2006). Lee (2000) and Newman (2006) revealed the same problems connected with data management and Enterprise Information Management (EIM). Newman (2006) conducted a research in the EIM programs and defined that governance of EIM showed the lowest score in comparison with all other types of the EIM programs. He came to a conclusion that the organizations need to be guided by inclusion of management of EIM in the methodology of development of the software. He also found out that the companies interviewed in the USA, Great Britain and Europe are more informed on management of EIM, than other companies in the Pacific Rim. Its researches show that there is an insufficient awareness on importance of use of model of logical data at an initiation stage for definition of area of coverage, assessment of quality of data, the steward of consulting data, policy of storage of records and preservation, cataloguing and reuse of metadata of the project (Newman D. , 2006). In other research, he found out that management of information is not focused and is not disciplined (Newman D. , 2005). He emphasized the following problems; (1) expensive, excess and resource-intensive integration projects, (2) data sources and information which are not rationalized and (3) nonflexible design of system which does not meet requirements of change of business. Above-mentioned remarks were underlined by organizations with service-oriented architecture (SOA). SOA is characterized by an outcome of data, processes and applications which increase the need for an authoritative source of information (storage of a specification); location, structure, context and use of information (management of metadata); semantic reconciliation; profiling and ensuring quality of data; method of integration of data (data exchange); and an opportunity to encapsulate information model for support of various business processes (Newman D. , 2005).

According to Bair (2006), the quality of data can be defined by type and the domain of data, correctness and completeness, uniqueness and reference integrity, coherence in all databases, freshness and timeliness and compliances

to business rules. To define that data *"is suitable for the objectives"*, like Bair, Olson (2003) define 6 high-quality measurements of quality of accuracy, timeliness, relevance, completeness, understanding and trust.

The quality of data is important for business, from the point of view IT initiatives such as data mining and warehousing for business analytics (Friedman, 2006). Olson (2003) connected bad quality of data with growth of cost and complexity of development of the system of customer relationship management (CRM), supply chain management (SCM) and enterprise resource planning (ERP). Success of such investments into IT strongly depends on quality of basic data. In this situation the statement "Garbage in, garbage out" is most applicable. Wahedra (2006) also emphasized a need of creation of "the uniform truth" of data when data is stored in various separate databases. It is obvious that the effective business analytics leads to an effective decision-making (Friedman, 2006) with a trajectory of productivity increasing, as a result of little rework (Olson, 2003). It will also allow to provide monitoring of standard requirements by providing full, exact and timely data (Cheong & Chang, 2007).

The efficiency of any IT initiatives depends on quality of data. The reports and the made decisions based on them can be only the result of better quality data. The problems related to quality of data or lack of quality are aggravated with the fact that (1) data extend through separate systems in the organization, (2) data are collected, supported and used by various levels of the organization, and (3) many systems methodologies of development do not include ensuring quality of data (Cheong & Chang, 2007).

Above-mentioned problems with quality of data can be solved by effective management of a specification. Effective management of a specification provides high quality of data due to a use of the program of data management (Cheong & Chang, 2007). The program of data management gives to managers of data the mandate on quality management of data as a corporate asset (Russom, 2006).

Data stewards play an extremely important role in many corporate processes and initiatives which work with data. These roles include check and improvement of quality of data, management of reference data, establishment of identification of records of a specification, establishment of rules of survival for Master Data Management (MDM), processing of exceptions which go out of the MDM mechanism, with the indication of how elements of data should be classified for safety and confidentiality, supporting ensuring quality (QA) and the general management of metadata. Without participation of Data Stewards these efforts can make incorrect decisions, go down on deadlocks and even to realize "decisions" which don't meet needs of users of data for the company (Plotkin, 2014).

Data Quality Dimension	Description
Completeness	The degree to which data is populated based on the business rules that state when data is required to be populated with a value. For example, every account must have an account ID. A more complex rule might state that a collateral record is required *if and only if* a loan record is present and the loan type requires collateral (e.g., a mortgage).
Uniqueness	The degree to which data is allowed to have duplicate values. For example, the tax ID of each customer must be unique—no two customers can have the same tax ID.
Validity	The degree to which data conforms to the business rules for acceptable content. This can include: ■ Format ■ Pattern ■ Data type ■ Valid value list ■ Domain ■ Range
Reasonableness	The degree to which data conforms to rules about reasonable values when compared to real-world scenarios or in comparison to other data. For example, the prescription fill date must be later than or equal to the prescription written date.
Integrity	The degree to which data elements contain consistent content across multiple databases. For example, the prescribed drug is the same in the transaction database and in the pharmacy data warehouse.
Timeliness	The degree to which changes to the data are available within the timeframe required by the business. For example, the change to an assigned airline seat must be reflected on the website in real time.
Coverage	The degree to which data supports all business functions that need the data to perform their specific business purpose. For example, data collected for homeowner's insurance must include a birthdate to support master customer.
Accuracy	The degree to which the data corresponds to known correct values in the real world, as provided by a recognized or established "source of truth." For example, the address of a customer matches the address provided by the postal service. Many "sources of truth" are external, like the postal service. Others may be internal, such as survey data of company locations. What makes a source of truth is that people agree that it is a source of truth.

Figure 7. Data Quality Dimensions for Data Stewards (Plotkin, 2014).

4.1.5. Compliance

Compliance with regulations and policy requirements and standards play an important role in the process of master data governance, and they shape the system of interaction between all key stakeholders, thus shaping also their activities, roles and responsibilities.

The main data compliance and governance requirements are the following (Chen W. J., 2013):

1. A need to show repeatable processes for achieving data quality, auditing, reporting, storage, security, sharing, classification, and other parameters indispensable for the most effective use of such master data in the practices of organizations and entities;

2. A need to incorporate into corporate information management processes, namely *"aligned in common logical data model, complete information catalog, metadata standards, and information management maturity model."* (Chen W. J., 2013);

3. Compliance with standards such as the Foreign Account Tax Compliance Act (FATCA), Basel 111, Solvency II, etc.

Compliance with the applicable regulations is specifically important in the context of master data governance from two main perspectives. On the one hand, it allows optimizing the processes of such data governance based on the application of a common and mandatory legal framework, which serves to set mutual responsibilities for all stakeholders and standards for mutual interaction. On the other hand, legal compliance is of key importance to organizations for achieving their best positioning as socially responsible economic actors, and thus to boost their business results on the basis of such positioning (Chen W. J., 2013).

"Policy administration captures and maintains an organization's policies for use in monitoring and enforcement. Policy and monitoring provides visibility into master data health. Master data health is determined by translating a policy into a quantifiable measure of master data policy compliance." (Ballard, et al., 2013). Policies should be converted into particular metrics, as this should allow identifying where data fail to provide the required support for the business. The application of root cause analysis is destined to evaluate which policies are lacking the required consistency, and thus which policies the company should target for the purpose of improving its overall business performance. Such targeted policies are implemented in policy enforcement. *"Policy enforcement ensures improved data health by identifying noncompliant items and then bringing them into compliance through the appropriate remediation processes."* (Ballard, et al., 2013).

A data standard can be identified as an agreement between parties on the main business terms to be used as applicable to the identification and representation of data. It also includes rules describing how data are stored, exchanged, formatted and presented, and define other guidelines and regulations applicable to the interaction between stakeholders in the context of data governance. *"A data standards process is an approach to synchronizing the various metadata aspects of shared or exchanged data objects. By formalizing the process of gaining consensus among the different participants, and enabling their active engagement in both defining and governing that process, we can evolve a collection of well-defined business terms, information object models."* (Loshin, 2006). In addition to this, a data standards process is favorable for harmonizing common business language terms and other equally important elements to be used by the organization within the framework of its master data governance processes (Loshin, 2006). The next chapter is about areas of corporate performance, which are influenced by Data Governance.

4.1.6. Corporate Performance

Analyzing the general aspects of corporate governance, it should be noted that this concept can be defined as *"the social problem of holding powerful*

decisionmakers in large economic organizations accountable for their actions, in order to legitimate their continuing possession and exercise of power." (Moore, 2013). Corporate governance thus allows establishing a clearly defined structure of ties between all stakeholders in an organization, which contributes to its overall business effectiveness and growth.

Performance management can be defined as *"the process of communicating organizational aims and objectives to all stakeholders, setting performance targets in order to measure the achievement of those aims and objectives, and ensuring that all this activity provides the basis for continual improvement."* (Doherty & Horne, 2002). Corporate performance management is set to ensure the achievement of the best performance by companies through effective control and monitoring and through appropriate changes to corporate business policies based on their findings.

Performance measures are indicators which quantify a company's performance. Unlike the descriptive goals stipulated in the company's statements, its measures help identify the quantitative instruments for evaluating the entity's business effectiveness. Corporate performance measurement is essential for improving the processes of monitoring and control, and thus for achieving the best follow-up and review for adapting appropriately the company's business processes (Bourne & Bourne, 2012).

Data governance and the associated processes are directly interconnected with the ultimate level of corporate performance achieved by an organization. This is due to the fact that master data cover the most important sets of data on all corporate processes, stakeholders and counterparties. Putting such data to use effectively and managing them in a proactive manner is of essential importance for corporate managers to drive the best corporate results on all directions of business activities.

Maximizing the effectiveness of corporate Data Governance is important for business owners and managers to maximize the effectiveness of relationships with customers. *"Specifically, with the ever-growing importance of integrating insight from company-external data sources to enrich the customer profile, for instance, consuming processes have requirements to increase the trustworthiness of derived analytical insight that the master data governance initiative must achieve."* (Oberhofer, Hechler, Milman, Schumacher, & Wolfson, 2014). Data Governance is thus important for achieving an effective classification, grouping and subsequent use of the data on customers in order to maximize the effectiveness of satisfaction among customers and their loyalty through corporate business. Data Governance processes are destined to provide a better analytical insight for all stakeholders, and therefore play an essential role in subsequent improvement of the wider business policies and strategies (Oberhofer, Hechler, Milman, Schumacher, & Wolfson, 2014).

Data Governance systems allow companies storing their data more effectively and ergonomically, thus improving significantly the process of their subsequent analysis and practical application. Thanks to this approach, companies get an opportunity to retrieve data effectively and to analyze them quickly, distributing such tasks among appropriate stakeholders. In addition to this, Data Governance allows improving the quality of control, and therefore to monitor the achievement of results on different directions more effectively, at the same time enhancing the responsibilities of individual stakeholders. It should also be understood that the application of an integrated approach to Data Governance, companies and organizations get an opportunity to raise the consistency of their business processes. The application of up-to-date software solutions and hardware complexes in modern data management allows sparing the time required for such operations, and also reducing the cost for hiring personnel, which is important for the ultimate performance of any company (Dresner, 2008).

Ineffective application of data management might however bring major negative consequences for organizations, and might have a systemic negative effect for the overall performance of companies (Bracht, Rehr, Siebert, & Thimm, 2013).

The conceptual model, showing the independent variables of Data Governance, which influence positively corporate performance of the companies is presented in the following chapter.

4.2. Chapter Summary

Summarizing the results of previous chapter, factors which affect the quality of Data Governance were identified. These are:

- Data Quality
- Data Modeling
- Data Ownership and Stewardship
- Data Integration
- Compliance with regulations

Data Governance itself, has a positive influence on Corporate performance management. Organization shows better performance, while quality of its Data Governance increasing.

Existing literature of relevant theories were investigated and applied to our Master thesis.

Based on analyzed literature, Conceptual Framework or Model for Data Governance has been created. This framework shows how above-mentioned

factors influences Data Governance quality and Data Governance on its turn how affects corporate performance management. As a result, we can ensure that, factors affecting Data Governance, have also influence on corporate performance management of organization.

The next chapter describes the research design. It presents how this research was carried out in details. Mentioned chapter discusses the research goals and methodology of how this research was conducted.

5. Research Design

5.1. Goals of the Research

The main goals of this part of the research are to reveal the main specificities of the application of data governance in the business activities of companies. For the purpose of running this research, three different companies' practices in terms of data governance will be analyzed in detail. The focus of the research will be put on revealing how companies from different sectors of business perform their data management activities and build their data governance processes and procedures, and which impact such activities have on the companies' financial performance and ultimate business results.

The companies chosen for the practical part of research within the framework of this thesis are Entity X, a Czech-based company acting as a payment system and provider of payment services across the European Union (financial company); Entity Y, a UK-based online shop selling artists' goods such as acrylic paints, varnishes, etc. (webstore); and Entity Z, a tourism company registered in Ukraine (travel agency). The names of the companies were anonymized according to the agreement with the managers interviewed.

The choice of three companies from different business sectors and different geographic markets should allow understanding better how different approaches to data governance and data management are used by different business entities, and which practical results they can bring in terms of the ultimate indicators of financial performance.

5.2. Methodology

The research in this part of the thesis will be based on a case-study approach. The three chosen companies will be analyzed in detail for the purpose of revealing how they organize data governance and which practical results such activities yield to them.

Within the case studies of the three chosen companies, the main methodological tool to be used will be interview. Interviews will be held with the chosen companies' managers through personal communication by means of either a phone call or an online messenger call. The interviews will be semi-structured, and the managers will be offered to answer them within a time span of 40 to 60 minutes. The findings of the interviews will be collected and transcribed by the thesis author, and will be analyzed subsequently for revealing the information required within the framework of the aim and goals of this research.

The structure of the interview is the following:

1. To what extent is data governance important for your company?
2. What kinds of data does your company store and for which purposes are such data used?
3. How is your data governance system built?
4. Who are the key corporate stakeholders involved in data governance?
5. What are the main points of focus in your corporate data governance?
6. How do you control and improve the system?
7. To which extent does effective data governance affect your corporate performance?
8. What do you expect from your data governance in the future and what role do you believe it will be playing in your business activities?

Based on the findings collected from the three companies, the information on the implementation of the data governance system in the three entities will be compared, and appropriate conclusions will be drawn on the similarities and differences in the deployment of data governance in the chosen entities belonging to different business sectors.

6. Discussion and Analysis

Before starting analysis of topic and discussion of findings in chosen companies, it is better to list their current problems and factors first. Briefly discuss current data types, data governance and its factors, corporate performance situation in these chosen organizations, makes much easier to analyze topic.

Afterwards, it is easy to start investigation of the topic in details.

Prior to providing detailed findings, a compiled table of all information revealed through the interviews is provided in

Table 4 below.

Table 4. Summarized findings of the interviews

Investigated factors	Entity X	Entity Y	Entity Z
1. Importance of data governance	High	High	High
2. Kinds of data	• internal data • external market indicators	• internal data • data on customers and their parameters	• internal data • data on customers and their parameters • data on partners and their parameters
3. Organization of data governance	• integrated approach	• complex systems • real-time data processing	• integrated approach • use of different tools and systems, including third-party ones
4. Key stakeholders	• IT department • top managers • other managers and employees	• IT department • marketing department • top management	• top management • IT department • employees
5. Main focus in data governance	• database management • data quality management • data security	• data quality management	• database management
6. Control and improvements	• performed by top management • important for business policies	• performed by top management • important for business policies	• performed by top management • important for business policies
7. Impact on corporate performance	High	High	High
8. Forecasts for the future	Data governance is expected to play an essential role	Data governance is expected to play an essential role	Data governance is expected to play an essential role

Now it is possible to proceed to a detailed overview of the interviews.

6.1. Case Study: Entity X (Financial Company)

During the interview, the manager of Entity X stated that data management and data governance processes are of major importance to the company in terms of the effective implementation of its business activities. Entity X is a financial company operating with a great number of counterparties at once, acting as both a payment system and a mediator in financial transactions with cryptocurrencies. As a result, in order to perform its business activities effectively, the company has to manage wide arrays of data in real time, analyze them effectively, track and monitor any changes in such data and respond to all such changes effectively, modifying appropriately its business tactics and policies. Therefore, the manager of Entity X stated that the company pays the greatest possible attention to data governance, and aims to maximize the effectiveness of its activities on this direction, as the management of Entity X sees it as a key precondition of business success.

In terms of the actual data contents which the company monitors, analyzes and manages, it is possible to identify several key directions and essential data arrays. First of all, the company collects and monitors information on the turnover of its financial transactions on all directions. This is required in order to ensure the best customer service, maintain the history of transactions with all customers, ensure effective bookkeeping and recording, and to indemnify customers in case of any possible claims on their part. At the same time, maintaining and managing such information is required for the company to improve effectively the internal structure of its activities and to use effectively all reserves for boosting the quality of its data management. The company analyzes all financial flows, reveals which of its services enjoy the greatest demand on the part of customers and during which periods, thereafter identifying the reasons driving particular trends, and so on.

Another important array of data is the external data of the business environment which affect the company's business. Thus, Entity X needs to analyze and evaluate effectively the dynamics of the exchange rates of cryptocurrencies and international currencies such as the USD and the euro. At the same time, the company has to monitor in real time data from other electronic exchanges. This is required for Entity X to set the best exchange rates for the exchange operations with cryptocurrencies and international currencies against the evaluation of other similar companies' rates. Based on this, the company sets its profit margin and achieves the desired generation of revenues.

Finally, the company manages all its financial data. Taking into account the fact that the company is running its business activities on different directions in the financial market at once, it needs to understand well how it performs on each

such segments, where it has advantages and drawbacks, and where it can use additional financial leverage for driving greater business profits. In these conditions, doing manual calculations and evaluations would be ineffective, and therefore the business entity is using automate electronic data management systems for improving the collection, processing and subsequent analysis of data.

The data governance system in Entity X is based on an integrated approach to data management. It embraces the creation of a reliable data architecture, use of innovative approaches to database management, data quality management and data security, data maintenance, storage and updates, and real-time data monitoring. The company is rather small, and therefore doesn't have a separate department for ensuring the best performance on each such direction of data governance procedures and processes. The main department of Entity X responsible for the performance of all activities related to data management is the IT department. The IT department operates within the guidelines formulated by the company's top management. The top managers of Entity X stipulate the main requirements applicable to corporate data and the associated data management processes, and define the overall business policies to be implemented by the company, thereafter conveying such requirements to the IT department. The IT department focuses on the implementation of the best automated data management systems based on such general requirements.

However, data governance isn't confined solely to these main stakeholders. For the purpose of ensuring the best data management, the company requires its employees to ensure timely provision of all key data from their particular business directions. The effectiveness of each employee's appropriate activities for registering appropriate data and conveying such data to the processing center within the company is of major importance for Entity X in terms of the company's corporate data management processes.

In terms of the key points of the management's focus in the corporate data governance activities of Entity X, the entity's manager stated that there are several key aspects. First of all, the company watches over effective database management and data quality management. Entity X uses powerful and up-to-date hardware and software complexes which allow it processing vast data arrays at once in real time. The maintenance of the company's database management system is the responsibility of the IT department. The database management system is used by the financial department and all other responsible business units for improving the quality of their key business operations. The database system is regularly updated and maintained in a working condition, synchronization and back-up procedures are used with the aim of avoiding the risks of interruption of business activities or ultimate loss of valuable data.

Data quality management in the company relates to e constant replenishment of data, search for new reliable data sources, as well as to the maintenance of data integrity and to the improvement of data structuring. With the growing scope of the company's business activities and the coverage of new geographic markets, this function of data management is becoming specifically important for Entity X The company uses CRM software for ensuring the best updates and general maintenance of its key corporate data, and applies software for automated data processing and aggregation.

Of particular importance are also the company's processes related to the provision of data security. In addition to the back-up procedures outlined above, the manager of Entity X also stressed the importance of the use of effective cybersecurity tools, as the company might be a target of hackers' attacks. The company implements effective security mechanisms for avoiding not only direct financial losses, but also loss of any valuable data and violation of the integrity of its databases. The company also runs regular audits in order to confirm the due and effective use of all corporate data by the company's employees, and for avoiding any possible activities on the part of the company's employees, which might violate the integrity of such data or the effectiveness of the operation of the whole data management system.

The overall monitoring and control of the data governance system within the company is performed by the top management of Entity X The top management analyzes the current effectiveness of the system's operation and emphasizes the existing opportunities for boosting further the quality of corporate data management. Based on this, improvements are also developed and introduced to the company's wider business policies, so as to guarantee the most effective use of data available and to drive the greatest possible ultimate corporate benefits.

As for the extent to which data governance affects the overall quality of the company's financial performance, the manager of Entity X stated that no such impact can be measured, as the company's ultimate financial performance is based fully on the effectiveness of data governance. Any slight decrease in the effectiveness of data management translates directly into the company's impaired financial performance, and this is due first of all to the specificities of the corporation's business activities. Entity X invests funds for improving steadily the quality of its data processing and management, and the company emphasizes this direction as one having the greatest priority in its business management.

In the near future, the company plans to launch a new platform for cryptocurrencies, and thus it foresees the need to manage even greater volumes of data. Taking into account this fact, the manager of Entity X stated that the company expects the corporate data management system to keep playing an

even greater role in ensuring the company's effective financial performance in the future.

6.2. Case Study: Entity Y (Webstore)

According to the manager of Entity Y, as the company operates as a webstore of products for artists servicing customers all across Europe, it has quite important data arrays to be managed. The company thus believes data management and governance to be essential activities for ensuring the opportunities of the best ultimate financial performance. With due account for this, the company pays significant attention to effective data management, and it emphasizes data management and data governance procedures within the framework of its larger business policies and operating activities. The management of Entity Y integrates data management in the structure of the company's business policies and seeks maximizing its effectiveness.

The main arrays of data which the company analyzes and operates within its data management activities are data associated with the company's stocks and sales figures on the one hand, and data related to the company's customers on the other hand. Thus, the data related to the company's performance include its sales during particular time periods, changes in stocks and inventories, sales of particular products, purchases from suppliers, and so on. Maintaining effective monitoring and control of such data is indispensable for Entity Y to guarantee the most effective tracking of its financial performance and to make improvements to its cost management and other activities affecting directly the company's ultimate financial results.

As the company operates as a webstore, it offers its customers with opportunities of signing up and making purchases from their personal accounts. This is important for the company, as this approach allows improving the figures of sales through greater customer engagement and customer interaction. Moreover, this approach to customer relationships also allows making more effective the company's marketing activities and promotion. Registered customers can be targeted more effectively by the company, as it can track their preferences, history of purchases, history of browsing on the website, and so on. Such data relate to customer data arrays, and they are equally important for the company to maximize the effectiveness of its business activities. Entity Y maintains all data related to its customers in order to raise the quality it delivers to such target customers on the one hand, and in order to maximize the level of revenues generated through effective marketing activities on the other hand.

According to the findings drawn from the interview, the company's data management system is based on the implementation of a complex software system which allows for real-time data gathering and processing. The manager stated that this is important in order to provide customers with accurate and

reliable information on the company's products in stock, prices and expected terms of delivery. Through real-time data processing, Entity Y ensures regular updates of all information provided to the customers by the webstore, and thus ensures the minimization of negative feedback associated with obsolete or inaccurate data.

The company's IT and marketing departments are the main stakeholders involved in the data management processes. The marketing departments provides the overall framework for data management and ensures ongoing monitoring of all dynamics related to changes in inventories, sales dynamics, costs, etc., and the IT department is responsible for the implementation of the technical features required for ensuring this kind of data management. The IT department is also responsible for analyzing the overall robustness of the data management system, identifying its flaws and developing improvements for maximizing the quality of data management. At the same time, the manager stated that the entire system of data management is aligned with the company's general business policies and is deployed in line with the main principles stipulated in such policies. Therefore, the enterprise's top management is another key stakeholder involved directly in the process of data management and data governance, as it defines the general rules and principles based on which the entire system is built.

The main focus in the company's data management activities is put on data quality management. According to the manager of Entity Y, the company offers a wide portfolio of products for sale to a wide range of target customers. Therefore, it has some heavy databases containing information on the quantity of each specific product, its price, next expected shipment from suppliers, amount of products currently ordered by customers, and so on. This complex structure and large volumes of data precondition the need to ensure their timely updates and integrity in the long-term perspective for ensuring the best application of such data for profit generation. The company's data quality management is based on timely updates made to all databases, data quality assurance, and data cleansing. At the same time, the company pays specific attention to database administration, and has employees responsible directly for checking the consistency of databases with the company's ongoing business activities and ultimate business goals followed through its commercial policies. Finally, the company emphasizes the importance of data security. This is due to the fact that the company stores a great amount of customers' confidential personal data on its servers. In order to ensure the safety of such data and to prevent any possible unauthorized leakages, the company need to implement effective security mechanisms and to minimize the risks associated with security frailties.

The company's top management is responsible directly for the ongoing control and improvements of the company's data governance. At the same time,

the marketing department is responsible more narrowly for control and improvements in terms of the company's database management. There is ongoing communication between the top management and the marketing department for ensuring the best standards in terms of data governance and data management processes and procedures.

The manager of Entity Y stated that while the effect might be actually invisible in the company's financial statements, the effectiveness of data management preconditions directly the overall effectiveness of Entity Y's financial performance. It is important on the one hand for making effective managerial decisions based on the analysis of the company's revenues and costs, inventory management, and so on. However, of no less importance is the effectiveness of the company's data management for avoiding reputational losses and for maximizing customer loyalty. When customers are always provided with accurate data in a timely fashion, this raises their level of satisfaction, and thus the ultimate level of their loyalty to the company.

Taking into account the fact that the company operates on the segment of e-commerce, the manager of Entity Y stated that he expects effective data management and data governance to play an essential role in the company's overall effective business performance in the future. Therefore, Entity Y invests funds in the maintenance and improvement of its data management system based on innovative technologies in order to remain highly competitive in the market and to guarantee its steady business growth.

6.3. Case Study: Entity Z (Travel Agency)

The manager of Entity Z stated in the interview that managing its data effectively is important for the company in order to ensure the best use of resources available, and thus to guarantee the best achievement of corporate goals in the long run. The company thus sees data management and data governance as essential activities for ensuring the effective operation of its business. Applying the principles and approaches of effective data governance, the company aims to maximize the effectiveness in the structuring of its activities and their stage-by-stage implementation for fulfilling the desired business goals.

The company operates quite significant volumes of data in its activities, and thus has to pay significant attention to their effective management. Thus, as Entity Z operates as a travel agency, the company serves as a mediator in the tourism market, linking customers' demands for rest and relaxation, with the tourism services provided locally. The company maintains a database of local hotels, tourism facilities and the providers of various adjacent services, and at the same time a database of its own customers. As soon as there is an order for particular tourism services, the company submits this order to the local providers and organizes the customer's voyage to the desired place. Managing such data

is required in order to maintain accurate information on all offers the company provides to its customers, and at the same time to run effective accounting activities, so as to be able to analyze how costs are distributed along different directions of the company's business and how customers respond to particular business offers. Such information is also used for internal analysis, so as to reveal where the company underperforms and where it has to improve its business activities through a better use of resources available.

The data governance system in the company is quite complex, and this is due to the fact that it has to operate several different software complexes at once, covering the activities of third-party tourism institutions. Namely, the company operates a third-party hotel information system with a large database of hotels around the globe. This system is maintained globally in real time, so that travel agencies all over the world should be able to book hotel rooms simultaneously without any possible problems with double booking or inappropriate information. For the purpose of operating this system, Entity Z has dedicated employees. At the same time, the company maintains its own databases associated with its customers and the company's own business activities. Such databases are operated solely by the company.

The top management is the most important stakeholder in the company's data governance and data management procedures. The top managers of Entity Z stipulate the general principles of and approaches to corporate governance. They identify the company's need to use particular data in the course of its business activities, and formulate the general guidelines for the operation of such data, their analysis and subsequent use in practice. The company's IT department is responsible for the maintenance of uninterrupted access to all databases and the steady operation of the company's software and hardware for accessing all databases and making timely updates to them. The IT department also ensures the security of all such databases and guarantees the most effective data exchange between different business units and individual actors within the business entity. Of key importance to the company are also effective operations with data on the part of every single employee, as the operation with databases in performed on the lowest level as well. In order to maximize the effectiveness of database management on the part of employees, the company organizes regular trainings for its staff and runs audits in order to reveal to which extent the effectiveness of such data management activities is ensured.

The main focus of Entity Z in terms of data management is put on database management, and namely on real-time processing of all customers' orders and associated financial information. The company focuses on making timely updated to all its databases made public to the customers, and uses automation software for ensuring automatic updates of all such data. At the same time, the company focuses on data replications and back-ups, which it believes to be an important task for guaranteeing long-standing business security. Of particular

importance is to achieve data integrity, and thus the company emphasizes the need to avoid confidential data leakages. For this sake, Entity Z implements cybersecurity systems, and the company's IT department runs an ongoing evaluation of threats for the identification of the most vulnerable aspects and their gradual improvement.

The responsible stakeholders of the company analyze their competitors' activities in terms of data governance and data management, and they also monitor the general trends in the market in order to make timely changes to the system currently implemented. This is required in order to make the company's data governance and management procedures up-to-date and effective. Ongoing control is also performed by the company's top management and security department for minimizing the existing threats associated with data management, and thus for providing the company with the best opportunities of generating effective financial results in the long run. The company also resorts to the practice of third-party audits for the purpose of running an independent verification of the integrity of its database management and for avoiding any ineffective activities in this context. The conclusions of such third-party auditors are taken into account by corporate managers for the purpose of maximizing the effectiveness of corporate data governance and data management.

As for the impact which data governance has on corporate financial performance, the manager of Entity Z stated that the company's financial processes are interconnected directly with its data management. Any interruption in effective data management due to system faults or any other similar events leads to major negative financial conditions, and therefore it is vitally important for the company to maintain its effective data management and to avoid any flaws in such activities. Moreover, Entity Z uses data management actively in the course of its financial planning and wider development of corporate business policies for subsequent time periods. The company puts such activities into the core of its business management, and makes data governance the backbone of its financial effectiveness. Obviously, this is connected with the specificities of the company's business activities and the business model it uses in the course of such activities.

The manager of Entity Z expects data governance to play an even greater role in the company's business in the near future, as the entity plans to integrate an online ordering system in its business practice, and this will require more effective data management against the growing volumes of data flows.

6.4. Comparison of Results

The findings of this part of the research prove that effective data management and data governance procedures are important for ensuring effective performance of companies operating in different economic sectors and

in different geographic markets. As of today, business is driven by effective management of large data volumes, and therefore companies in different sectors need to be able to apply their data management policies effectively for ensuring the best understanding of their underlying business processes and for providing the most justified grounds for effective decision-making.

The focus of this analysis was put on three companies operating in different sectors, namely in the financial sector, in e-commerce and in tourism. What is common for all the three chosen companies despite the differences in their core business activities is the fact that they all need to maintain quite large databases containing information on their products, their customers and counterparties and their business activities. All companies rely heavily on the effective management of such databases, and thus are required to implement systems which would allow managing such data in the most effective manner possible.

A common thing in terms of data governance and data management identified in all the three companies is their approach to the organization of data management processes. Thus, in all the three companies the main stakeholders involved in data governance are largely the same. The top managers of the companies are responsible directly for providing the guidelines and defining the main approaches and principles for the implementation of the data management system. The top managers of the companies are also involved in the process of ongoing control and undertake the responsibility for adapting the system of data governance to the changing conditions of the market environment and in line with the company's business policies. At the same time, the IT department is responsible in the three companies for implementing the systems of data management in technical terms and for ensuring their smooth operation and minimization of the existing security threats. Also, in all three companies, employees are involved in the operation of the data management system, as they fill the system with data on the lower level.

In terms of the key focus put by the companies within the framework of their corporate data governance, it can be stated that there are great similarities as well. Thus, for all the three companies, the most important activities in the context of business management include database management, data quality management and data security. Thus, database management is emphasized in the three companies due to the fact that it is set to guarantee the uninterrupted operation of all databases and the most effective communication between the companies' business units and individual employees in the context of use of such data. Data quality management is required for the three companies to maintain their databases effectively, make timely updates to the business policies and improve the overall quality of data integrity and data presentation to customers. Finally, data security management is important for the three companies to keep the security of all their data at a high level, which is specifically important against the existence of both external and internal threats. For this sake, the companies

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implement their data security systems and focus largely on the adoption of effective security mechanisms.

Also, an important similarity is the fact that all the three companies use regular audits for revealing any inconsistencies or gaps in the operation of their data management and data governance systems. However, only the manager of Entity Z stated that the company resorts to the services of third-party professional auditors when analyzing the use of the existing data management system. These practices can also be recommended to the two other companies. While internal auditors might be more rigid and fail to reveal all shortcomings of the data management system, the use of third-party auditors' services might be important for revealing all hidden inconsistencies, and thus for maximizing the effectiveness of the whole data management and data governance systems.

It is also important to state that the managers of the three companies recognize the importance of monitoring the trends in data management and of making appropriate changes to the entities' data management and data governance policies. Without due to attention to such activities, corporate data management might risk of becoming rigid and outdated, thus depriving the companies of their inherent competitive advantages against the ones of market rivals.

However, most importantly, it is worth noting the scope of the impact of data management on the chosen companies' ultimate financial performance. The three managers recognized not only that effective data management is a key prerequisite for their businesses' effective financial performance, but also that any interruptions in the operation of the companies' databases might bring major losses to the enterprises. The activities of the three companies analyzed in this research are utterly dependent on data management, and thus it can be stated that data management and data governance affect directly the overall level of the chosen entities' financial performance.

7. Conclusion

The goals of the thesis were to analyze the attributes constituting the quality of data governance; to analyze the factors affecting data governance and its qualities; to reveal how data governance contributes to corporate performance management; to assess the contribution of data governance to selected companies' performance management; to propose improvements of raising the quality of data governance in the light of performance management in the chosen enterprises.

In the current conditions of doing business, companies have to be able to manage large data arrays. Their business activities tend to keep intensifying against the background of growing market competition and technological progress. Ensuring the most effective data management becomes of essential importance for companies to optimize the structure of their business processes and to ensure the best quality of control over the ongoing activities. The importance of data management only growth further taking into account the overall trends for the growing sophistication of the existing technologies. They allow companies reducing their costs, expanding their customer base, and achieving better financial performance in overall terms in the long run.

Based on the findings of the thesis, it is now possible to confirm or disapprove the propositions stated in the beginning of the research.

Proposition 1: Inadequate compliance with data requirements affects negatively the quality of data governance.

Proposition 2: Inefficiency of data ownership and stewardship negatively affects good data governance.

Proposition 3: Effectiveness of data integration within the organization contributes positively to data governance.

Proposition 4: Inadequacy of data modeling has a negative influence on data governance.

Proposition 5: Effectiveness of data quality contributes positively to data governance.

Proposition 6: When the quality of data governance is poor, it will impact the corporate performance negatively.

All the six propositions cane be confirmed fully. Based on the data provided in Table 4 of this thesis with summarized findings of the interviews, the propositions can be confirmed in the following manner:

Proposition 1: X1, X3, Y1, Z1, Z3.

Proposition 2: X3, Y3, Y4, Z3.

Proposition 3: X3, X4, X6, Y3, Y4, Y6, Y8, Z3, Z4, Z6, Z8.

Proposition 4: X1, Y2.

Proposition 5: X1, X7, X8, Y8, Z6, Z8.

Proposition 6: X6, X7, X8, Y1, Y6, Y7, Y8, Z6, Z7, Z8.

Indeed, any flaws in effective data management impose considerable risks on a company's financial performance and the overall organization of corporate business activities. The interviews with the managers of three companies belonging to different economic sectors held in the practical part of this research prove that as of today, it is important for companies belonging to different industries to organize all components of their data governance and data management in the most effective manner in order to ensure the best use of all their resources and to guarantee the best financial results to be achieved by the companies in the long run. Any inadequacy of data, their untimely updates, lack of an effective approach to the management of databases and data systems, technical failures in the operation of such databases, etc. lead to considerable negative results for entities, specifically for those companies, which have to operate large data arrays due to the specificities of their business activities and the underlying business model.

The findings of the practical part of the thesis prove that despite the differences in the business activities of the three chosen companies (financial sector, e-commerce, and tourism), data governance and data management play an essential role of each such company in terms of the effective organization of their business processes and in terms of the financial performance they are able to generate through such business processes. There are also significant similarities in terms of how companies deploy their data management systems and how they maintain their quality.

In each of the three chosen companies, the main stakeholder in terms of data governance is the top management. The companies' top managers set the guidelines for the implementation of data management, and align such practices with the general corporate business policies. They also ensure constant improvement of corporate data management practices and focus their efforts on ongoing control. The IT department in each of the three companies is responsible for the technical implementation of the data management system and its constant updates, identification of flaws and their elimination, etc.

Another important similarity revealed throughout this research is that the three companies emphasize the same components of their data management processes, namely database management required for maintaining effective control over all processes, data quality management consisting in regular updates to databases and improvement of their quality, and data security, which is set to minimize the threats associated with data leakages or other impairments of the database.

For all the three companies, effective data management translates directly into their effective business performance, and this allows ultimately confirming the existence of connection between data governance and corporate performance analyzed in this thesis.

The companies can be recommended to improve their data governance through greater involvement of all departments in the process and through effective distribution of tasks and responsibilities. Furthermore, particular attention should be paid to data modelling and the use of data modelling in subsequent planning and forecasting. As of today, a major inconvenience of all analyzed companies is the lack of adequate data modelling, which makes their entire data governance systems less effective. The management should also pay greater attention to the recommendations provided by employees in the context of data management and performance management. The fulfilment of these recommendations should contribute effectively to the improvement of corporate data governance and management.

8. List of used figures and tables

8.1. List of used figures

8.2. List of used tables

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