Information Governance Framework: The Defense Manufacturing Case Study

Completed Research Paper

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ABSTRACT

While many companies are facing problems with the information explosion, others are ensuring the appropriate value, quality and compliance of their information environment. Information governance is a set of standards, guidelines and accountability controls designed to ensure value, quality and compliance of information. Thus, the aim of this paper is to analyze how value, quality and compliance of information are defined in its information environment. A qualitative research is made, by a case study in a defense manufacturing company. The information governance foundations are explained, through theories from economics of information. Also, a framework was proposed plus three research propositions. In addition, this case study investigates a unified governance framework, which incorporates corporate governance, information technology governance and information governance. Therefore, two propositions were supported and one was partly supported. The main contribution of this paper is to identify and analyze dimensions and elements of information governance.

Keywords

Information governance, information value, information quality, information compliance.

INTRODUCTION

In a time of big data, cloud computing and internet of things, organizations must understand the importance of information if they want to survive. As companies invest in technologies, for example, customer relationship management systems and radio-frequency identification tags, to collect and store customers and process information, business units are not finding value in this information explosion (Beath et al., 2012). As stated by Davenport (1997), with the increase of information importance, there is a need to think beyond machines, and target the main information goal, that is to inform people. Information governance is a framework that provides a way to deal with this challenge, through its three dimensions: information value, information quality and information compliance. In consequence, information governance is a topic of interest to researchers and business practitioners (Otto, 2011).

Aligned with corporate governance and Information Technology (IT) governance, information governance is a set of standards, guidelines and accountability controls designed to ensure value, quality and compliance of information. With this perspective, information governance provides standards, guidelines and accountability controls to companies that are facing the information explosion, so these companies can obtain and ensure the value, quality and compliance of their information environment. Based on this concept, the aim of this paper is to analyze how value, quality and compliance of information are defined in its information environment. In order to achieve this, the chosen method is qualitative research, by a case study (Yin, 2009).

There are two main theories in the foundation of information governance, both from economics of information: Agency and lemons theory. Economics of information studies the information asymmetry, agency focused in agent-principal relationship (Jensen and Meckling, 1976) and lemons theory focused on the environment (Akerlof, 1970). In this research, information governance is seen as a framework to counteract the effects of asymmetric information.

The paper is organized as follows. The next section presents the foundation's theories, through economics of information. Followed by a literature review about information governance, with a proposed framework and propositions. Then the research method is presented, also the case study description as well as the case study analysis.

ECONOMICS OF INFORMATION

Economics studies often banished information discussions to footnotes (Rothschild and Stiglitz, 1976). Economics of information breaks with this practice and puts information at the center of analysis (Stiglitz, 2000). In this research, two theories from economics of information are combined to explain the foundations of information governance framework: Lemons theory and agency theory.

Lemons theory analyzes markets where it is difficult to distinguish good from poor quality goods, which is a common issue in information environments. This uncertainty of quality comes from the asymmetric information between buyer and seller (Akerlof, 1970). Asymmetric information means that different persons have different levels of information (Stiglitz, 2000).

Agency theory studies asymmetric information focused in a contract between principal and agent, and this contract minimizes asymmetric information effects (Dawson, Watson and Boudreau, 2011). Based on this theory, contracts are the essence of the firm, and are made to limit divergences in principal-agent relationship, generating agency costs (Jensen and Meckling, 1976). Consequently, governance structures can reduce agency costs, as they minimize information asymmetry (Hutchinson and Gul, 2004).

In markets with information asymmetry there are two future outcomes (Akerlof, 1970; Bond, 1982): market failure, with the reduction of transaction volume, or the development of institutions to counteract the effects of information asymmetry. In the information environment a market failure can generate loss of trust in information, and an information governance framework can counteract these effects (please, see figure 1).
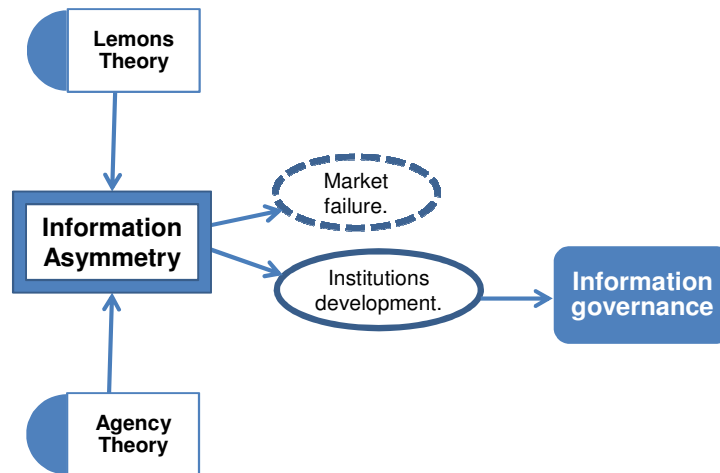

Figure 1. Theories to information governance framework

In the next section, it is presented propositions and an information governance framework.

INFORMATION GOVERNANCE

Governance can ensure executives receive reliable information (Datskovsky, 2009). Consequently, a strong governance framework is important for companies. Based on the research of Wende (2007) and Cheong and Chang (2007), this paper proposes an information governance framework that demonstrates a relation between IT governance and corporate governance. Information governance and IT governance should follow principles from corporate governance. Then, information and IT governance should be seen as coequals. Weill and Ross (2004) highlight the importance of information in their framework. As information governance is responsible for company information, there will be a frontier in their relation. Thus, a proposed relation is established in figure 2.
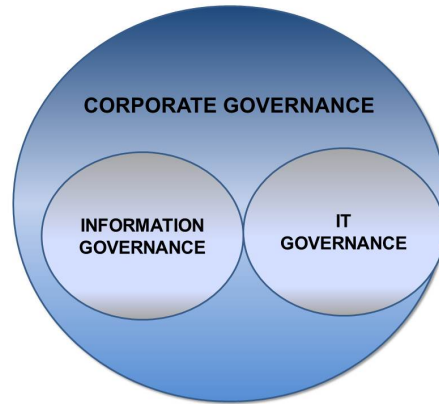
Figure 2. Structure of proposed governance framework

Based on the information governance concept, the framework combines three dimensions: information value, information quality and information compliance. According to Khatri and Brown (2010), data quality is pivotal to information governance and one of the decisions domains to information governance framework. In addition, information governance can manage and develop information quality in companies (Cheong and Chang, 2007; Panian, 2010). As stated by Wende (2007), Otto (2011; 2011) and Weber, Otto and Österle (2009), information governance can improve the effectiveness of data quality management. Thus, the first proposition is:

P1: Information governance is associated with information quality.

With information governance, companies can assure the compliance with data-focused regulations, policies and laws, as well as alignment with corporate governance and IT governance (Weber et al., 2009; Datskovsky, 2009; Moghe, 2009, Grimstad and Myrseth, 2011). Compliance can be defined as being related to the accordance with legal and regulatory requirements in the organization (Datskovsky, 2009). Barham (2010), Becker (2007), Rosenbaum (2010) and Williams (2008) researched information governance in the healthcare environment based on information compliance. Therefore, the second proposition is:

P2: Information governance is associated with information compliance.

As stated by Kooper, Maes and Lindgreen (2011), information can be difficult to valuate and govern. Information value is a subjective concept and depends on the user's perception. To increase information value, companies need to manage their data as an enterprise asset (Panian, 2010, Soares, 2011). So, information governance is designed to ensure that information value is identified and exploited (Gianella and Gujer, 2006). One goal of data governance, according to Otto (2011), is to maximize the value of information in companies. Consequently, the third proposition is:

P3: Information governance is associated with information value.

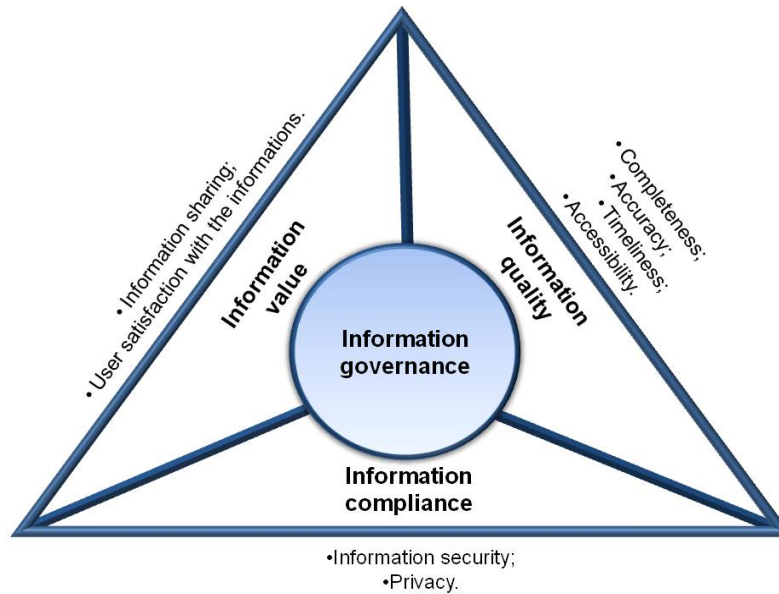Thus, the information governance framework can be seen in figure 3.

Figure 3. **Information governance framework**

As shown in figure 3, information quality has as elements: completeness, accuracy, timeliness and accessibility. These elements were the most frequently quoted in information quality papers, according to research conducted by the authors. In their study into IT value, Gregor et al. (2005) reported user satisfaction with information and information sharing as being elements of the informational dimension. In the present study, these elements have been used as components of information value. The information compliance dimensions are based on Becker (2007) and Williams (2008), for whom information security and privacy are elements of information governance.

METHOD

Research method is qualitative, based on case study (Yin, 2009). This case study is exploratory and descriptive in nature (Yin, 2009), and the case presented here is the pilot study of research. A southern Brazil defense manufacturing company was selected as the sample to this paper. According to literature review and by following the guidelines present in Yin (2009), a case study protocol was made with details of the research method and the script for the semi-structured interview. This protocol vas validated by two experts in case study, both with doctorate degrees in information systems.

The case study was done through the analysis of three in-depth interviews, documents provided by the company as well as public documents and direct observation, using triangulation in the evidence. Interviewees were selected using the snowball technique (Biernacki and Waldorf, 1981), in which the first interviewee indicated who will be next and the first interviewee was the IT manager. This technique is advised in cases that where target samples are hidden in the population (Salganik and Heckathorn, 2004), it was previously unknown who could answer the information governance protocol in AB. In this case, the interviewees were the IT manager, the quality supervisor and one planning analyst. All the interviews, which averaged 60 minutes, were digitally recorded and manually transcribed to be analyzed.

Thematic-based content analysis is used to analyze the interviews (Bardin, 2004) and a roadmap of the codification process was made, to help in the case of replication. Content analysis is a systematic process to interpret meanings from the content of the interview (or other message) (Hsieh and Shannon, 2005). As stated by Bardin (2004), the five principles were followed: homogeneity, mutual exclusion, pertinence, productivity and objectivity. In order to increase the reliability of the analysis two procedures were made, one to guarantee stability (the same coder analyzed the transcribed interview twice) and to guarantee reproducibility (the roadmap of the codification) (Krippendorff, 1990). Some steps of content analysis were made with MAXQDA, which is qualitative research software.

To analyze the propositions, questions about the degree of importance at each dimension were added in the case study protocol (as seen in Ngai et al., 2011). Content analysis recommends an investigation in the most-cited words. With this purpose, the number of words to each dimension were calculated, excluding conjunctions, prepositions, interjections and some words that are quoted because of their importance to the subject (as information and data). Later, verbs and related nouns are integrated in the counting, for example to access and accessibility, because they have the same meaning.

CASE DESCRIPTION

The case study was done in a manufacturing company, which develops and manufactures technological solutions for the areas of defense, space, homeland security and logistics. This industry is known for classified projects and information. Because of its intensity level of information use, this company, which hereafter will be named as AB, was chosen to analyze.

AB was founded in 1983, in southern Brazil. In 2001, AB became a subsidiary of one in the top 50 aerospace and defense companies, by Pricewaterhouse Coopers (2012). Since the change of ownership in 2001, AB has quadrupled the number of employees and almost tripled its revenue.

As the holding company shares are traded on the Nasdaq and on the Tel-Aviv Stock Exchange, the subsidiary is under Sarbanes-Oxley (SOX) regulations, as well as other regulations involving corporate governance. Therefore, AB has corporate governance, but its principles and practices are not well known by the employees. Disclosure and accountability are the main principles in their corporate governance, principles that are most used with shareholders and holding company.

AB is implementing IT governance framework, specifically, the Information Technology Infrastructure Library (ITIL) framework. This IT governance framework is being implemented without alignment with corporate governance, which appears to be something more to obey regulations. Maybe because of that, business units have different reasons to support IT governance than the IT unit. While driving factors of business units to establish IT governance are to support the business and to increase information, IT unit expects improved service productivity in their unit and guarantee the continuity in case of disaster. As can be seen by driving factors, AB information is IT governance responsibility. Therefore, AB structure of governance framework is presented in figure 4.
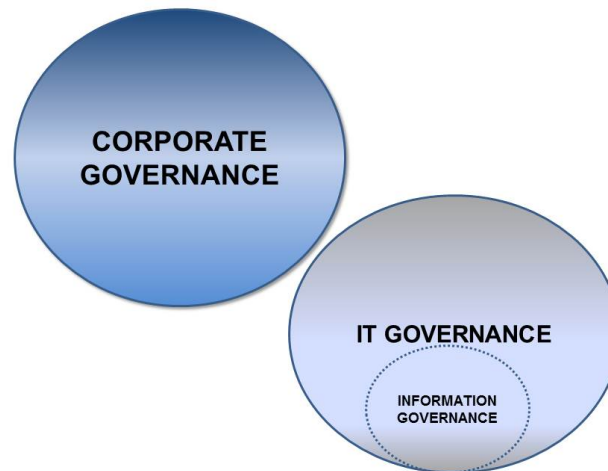

Figure 4. Structure of AB governance framework

There is not a formalized AB information governance framework, but some dimensions and elements from information governance are presented in AB. Information controls and decisions rights are more informal than formalized. When questioned about documents, procedures related to decisions rights controls, the interviewees and observed employees didn't know how to answer, but they are aware about how it is in practice. As a result, two elements: support business and information in the decision process, are driving factors of information governance. Formalized information controls and decisions rights, in AB, are associated with improvements in the overall business and decision process.

Information security is highlighted as one of the most important elements of information compliance. A few information rules and procedures that are formalized in AB are related to information security. In general, these rules and procedures are requested by customers or by the holding company, because the company deals with classified information about countries' defense. In addition, AB provides information for government agencies and departments, action represented in an element of information compliance. Also, the customers requested standards of quality and management, which demand some level of information control, an element of information compliance. There are no rules and procedures about privacy, some initiatives are starting in isolated units, but there are no rules and procedures involving the entire company. An unexpected element that arose in information compliance dimension was risk management.

Information quality has some divergences in the assessment. But, in general, the most important elements for the company are: accessibility, trust, timeliness, completeness and accuracy. Some practices and rules about information security are seen as concerns to accessibility, for example, limited reports access in the company enterprise resource planning (ERP). Problems with information quality are also related to the ERP change. In 2011 (one year before the interviews), the company changed the ERP, and information from there is still not seen as qualified by the users.

Three elements were founded in information value dimension: obtaining value, information sharing and user satisfaction. Obtaining value refers to ways to obtain information value, for example, determining information priorities. There is no proper information sharing in AB, and with the intensive use of classified information, official channels of communication do not work as well as rumors. In fact, rumor is one of the reasons why information sharing increases user satisfaction. Therefore, information sharing and user satisfaction, in AB information environment, are associated with information value.

CASE ANALYSIS

According to Soares (2011), prerequisites of information governance are: formulate policies, optimize information, secure information, leverage information, treat information as an enterprise asset and align the objectives of multiple functions. AB do have some prerequisites as formulate policies, secure information and treat information as an enterprise asset, even if they are only starting now, also AB has shown some information governance elements and dimensions. In concordance with Weber et al. (2009), each company demands specific information governance framework, because each company is affect by specific contingencies factors. Based on Otto (2011), there is no "off-the-shelf" approach for information governance framework. Therefore, this informal framework is the current AB information governance framework.

The structure of AB governance framework is not similar with that found in the past, as with Wende (2007), Kooper et al. (2011), Khatri and Brown (2010) and Cheong and Chang (2007) papers. A possible reason for that is the informal information governance framework. With a formalized framework, this relationship may well change. Khatri and Brown (2009) notes that common mechanisms about IT governance and information governance could induce improved company performance, so there is benefit from this non-conventional framework. Based on Beijer and Kooper (2010), the understanding of governance depends on organizational culture and context.

Some elements, such as information in the decision process and risk management, are not expected, according to literature. There are few academic papers about risk management and decision process in information governance. But, in AB, these elements were associated with information governance.

Information in a company represents the business, customers, employees, suppliers, outcomes and results (Panian, 2010), so it is important to analyze the dimensions of this information. Compliance in AB is more established than information quality and information value. There are few policies and procedures about information security and procedures in the context of laws and regulations, which are information compliance for Grimstad and Myrseth (2011). According to Beijer and Kooper (2010), information compliance might dominate information governance academic discussion, because there is an increasing need for guidelines in this context nowadays.

Based on Kooper et al. (2011), the success of an information governance framework is assessing by equilibrium of all parties in the information value balance, as a result, information value does not has to be neglected in an information governance framework. AB user satisfaction is associated with trust, from information quality, and obtaining value with accessibility, which connect quality with value. In order for AB to increase the information value, through user satisfaction, it is recommended actions to improve the trust in information, and to obtaining value element, AB could determine policies and procedures about accessibility of information. The association of information sharing with information security was also founded in AB, which connected compliance and value. In addition, information security is associated with accessibility in AB, which connected compliance and quality. With standards, policies and process about information well established in organizations, it is expected an increase in the information value (Panian, 2010). According to Otto (2011), the information value depends on its quality.

As stated by Khatri and Brown (2010), there are some duties to information quality, for example, providing standards with respect to elements and defining procedures to evaluate this information quality. These assignments are not seen in AB information environment. It is important to establish a roadmap to information quality in AB, just governing on compliance is not enough, in the actual information environment (Beijer and Kooper, 2010). To succeed it is necessary to have information value and quality.

DISCUSSION OF RESULTS

Case evidences (perceptions of each interviewee) about the propositions, as well as the most-cited words in the respective dimension are shown in table 1.

Proposition	Case evidences – interviewees perceptions	Most-cited words (by the interviewees)
P1: Information governance is associated with information quality.	- "I think it's fundamental. You cannot have governance without quality." - "If you are confident about your data, data is correct and well grounded, it allows you to manage this data, in the best way you know, and you will make the right decision, and will share to the right people, so, yes, no doubt." - "Wow, I think it's essential."	- To need; - To access/accessibility; - To get.
P2: Information governance is associated with information compliance.	- "It is essential. If I don't have these rules, I don't follow the procedures, so I cannot guarantee the results." - "Paying attention to all these demands helps your information quality to be pushed to the next level, it is an external motivation, you are forced to make, but brings benefits." - "Totally, I think it is important, so important that should be a culture, people should know and breathe information compliance, as meaning, I know this is in compliance with that..."	- To access / accessibility; - Project(s); - External.
P3: Information governance is associated with information value.	- "The user gets satisfied from information when it has that characteristic that you mentioned before [information quality elements] (….) Yes, yes, [when questioned about information sharing importance], but information sharing must be careful! I cannot share everything, it must respect some levels (…) I think it is fundamental [information value]." - "For sure [high], because with more access to information, people can realize the benefits that can be taken from this information, for sure it become more interested and desired." - "I don't know how governance influences information value. Information value, I think doesn't influence information governance."	- To access / accessibility; - To need; - To request.

Table 1. Case evidences – interviewees perceptions

Based on the case evidences of AB, information governance is associated with information quality, in accordance with Wende (2007), Otto (2011), Khatri and Brown (2010), Weber et al. (2009), Moghe (2009) and Panian (2010). The second proposition it is also supported by the case study and by the authors: Datskovsky (2009), Williams (2008), Grimstad and Myrseth (2011), Barham (2010), Rosenbaum (2010) and Moghe (2009).

The third proposition it is only partly supported. One of the interviewees didn't realize the association between information value and information governance, however the same interviewee made intensive associations between user satisfaction and information sharing with information value. Maybe there was some misunderstanding in this answer. Consequently, in the AB case study, information governance is partly associated with information value.

The first proposition is connected with the words as 'to need', 'to access/accessibility' and 'to get'. 'To need' is related with problems of access, as mentioned in the last section (case analysis). As the employees do not have access to some reports, they need to get these reports from someone else, in order to do their tasks. When the interviewees realized this association with information governance and information quality, they expected to have procedures and standards about accessibility. 'To get', also is related to the source of information. As the employees do not have easy access to information and do not trust in the AB ERP, they have personal files and databases to collect and share the company information. So, 'to get', is 'get' information from someone or somewhere.

Information compliance is associated with words such as 'to access/accessibility', 'project(s)' and 'external'. 'Project' and 'to access' are related to classified information that is handled in AB. Customers of AB demand some level of segregation in their information. So, some classified projects have special standards and procedures to comply with customers special

requests, isolated from the company. As standards and procedures are isolated in the company, it is hard for business units to access this information, and the employees are accountable for that information, but they cannot control the same. Additionally, information compliance has information demands made by government agencies and departments as element. This information, which is difficult to collect, as shown in information quality, must be sent externally.

The AB information environment is like a puzzle. So, there is a need to improve information quality and compliance to align the information pieces and provide value to users. Information value was not completely associated with information governance in AB case, but it is an essential subject to be improved in the company. This improvement can be done by reinforcing and formalizing the main elements in each dimension, shown in the case analysis.

CONCLUSION

The main AB case study findings are related to its propositions and goal. As shown in the last section, two propositions were fully supported by the findings: Information governance is associated with information quality and information governance is associated with information compliance. Based on the case description and analysis, these are dimensions of information governance that are more perceived in AB than information value. With an established information compliance and quality, the importance of value in AB information environment will be highlighted, perhaps changing these findings.

The aim of this paper was achieved by the description and analysis of AB information governance, and the propositions to widen the perspective for information governance framework. In addition, the case study protocol proves to be appropriate to the research goal, and changes were not necessary. Economics of information also raises benefits and reasons to implement information governance in companies, and goes to the essence of information environments problems. The main contribution of this paper is to identify and analyze dimensions and elements of information governance.

Future research on information governance should investigate these propositions through a survey. Also, qualitative researchers can investigate the existence of more dimensions and elements, according to companies' industry. More research in defense companies, as well as health and care organizations – from which came most of the information compliance papers – can provide a better understanding of this framework. Two elements deserve more research: risk management and information in the decision process, which are often neglected by information governance papers. More papers about this framework are expected, as this is a pilot study of a bigger research. Implications to practitioners and academics of business that can be cited are: the information governance framework, elements that were revealed in AB case study, and a wide approach to deal with the information explosion challenge.

ACKNOWLEDGMENTS

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