Deploying AI Governance Practices: A Revelatory Case Study

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Abstract. In recent years artificial intelligence (AI) has been seen as a technology with the potential for significant impact in enabling firms to get an operational and competitive advantage. However, despite the use of AI, companies still face challenges and cannot quickly realize performance gains. Adding to the above, firms need to introduce robust AI systems and minimize AI risks, which places a strong emphasis on establishing appropriate AI governance practices. In this paper, we build on a single case study approach and examine how AI governance is implemented in order to facilitate the development of AI applications that are robust and do not introduce negative impacts to companies. The study contributes by exploring the main dimensions relevant to AI's governance in organizations and by uncovering the practices that underpin them.

Keywords: AI governance, Case study, Performance gains, IT governance

1 Introduction

Artificial Intelligence is a technology that offers new potentials and benefits for businesses but introduces new challenges [1, 2]. AI has been seen as a tool that we can layer lots of different functions or as a solution for solving complex problems that traditional applications are not capable of assisting humans [3]. Companies aim to implement and deploy AI solutions in an attempt to automate their procedures, increase efficiency and reduce costs [4, 5] while also gaining a competitive advantage over their competitors [6]. AI governance is a key factor in achieving these goals. According to Butcher and Beridze [7], AI governance "can be characterized as a variety of tools, solutions, and levers that influence AI development and applications". However, there is room for investigating how to introduce AI Governance in a firm and how AI governance contributes to achieving a firm's goals.

Firms achieve competitive performance gains by building organizational capabilities, which emerge by combining and deploying several complementary firm-level resources [8]. By optimizing firm-level resources and adopting A.I. technological innovations, a firm enhances its transformed projects' business value, which leads to business value and influences firm performance [9]. Simultaneously, the AI algorithms can be considered performative because of the extent to which their use can form

organizational processes, and AI algorithms assist in decision-making or even take an autonomous decision [10, 11] that leads to new organization capabilities through AI. For example, AI could add value by creating more substantial customer acquisition or higher customer lifetime value and lowering operating costs or lowering credit risk.

The main goal of this work is to analyze AI governance when designing and implementing AI applications in order to achieve organizational goals. More specifically, this study focuses on how AI Governance helps top-level managers accomplish firm's goals by introducing robust systems that focus on automating processes and tasks without impacting employees. For instance, the employees might resist and do not accept new technologies because they might fear being replaced by AI. Based on the results, a better understanding of how companies use AI technologies will be gained, allowing to identify focal points and mechanisms of value generation (e.g., augmentation or automation of decision-making or processes) and what AI technologies bring specific organizational and technical challenges. This study, therefore, builds on the following research question: What governance practices underpin AI projects in contemporary organizations? To answer the research question, we collected data through a single case study, conducting interviews with multiple respondents within the company. The interview questions focused on the methodologies that the company currently apply, the mechanisms and processes used in the development of AI applications, the collection of data and the consequences of AI use in decision making (AI risk). In this case study, employees from different departments, primarily from the business department and the IT department, were interviewed because these two departments play a key role when developing an AI application. Also, the use of secondary data, such as reports and internal documents, is used to explore the dimensions and practices of AI governance as well as to triangulate and verify results.

The rest of the paper is structured as follows. The subsequent section presents the theoretical background, the relevant work and introduces IT and Information Governance. Section 3 details the methodology that is applied for gathering and analyzing the data. In section 4, we present the analysis of the data and the derived results. The paper concludes with a discussion of the findings and limitations in section 5, where we interpret and analyze the data.

2 Background

2.1 IT and Information Governance

Information governance captures the more purposeful path to government information that is required in the digital age, where information allows an even more central role [12]. Previous researchers, who addressed similar research, were seeking to answer questions like what Information governance practices are firms adopting and which are the performance effects of Information governance. Tallon and colleagues [13], in their empirical research found that Information governance is associated with a range of intermediate or process-level benefits and many of these intermediate effects could possibly affect firm-level performance. The authors suggest a need for extending structures

and practices used in I.T. governance and decomposing information governance into a range of structural, procedural, and relational practices. Another research describes how Intel, through Big data governance policies, managed to generate business value, which was the main goal, minimizing potential technical and organizational risks that arise because of data privacy [14]. Furthermore, research on developing AI capabilities by creating a unique set of resources to effectively leverage investments and generate business value that leads to competitive advantage has been conducted and supported through empirical evidence [8]. In this paper, the structural, procedural, and relational practices are used as the main dimensions to explain how to govern information and boost firm performance.

2.2 Governance of AI projects

AI increasingly influences many aspects of society, from healthcare and marketing to human rights. Allowing the development of AI applications that are not under any supervision could be harmful [1]; thus, it is important to promote a trustworthy AI that is lawful (complying with laws and regulations), ethical (ensuring ethical principles and values) and robust (from a technical and social perspective). Governing AI projects could be interpreted differently based on the perspective of different individuals. Microsoft researchers [2] see AI governance from a technical perspective, while European Commission (EC) [3] and Singapore principles see AI governance from a trustworthy angle where solutions are human-centric.

Researchers in Microsoft [2] have a deep focus on the technical aspects of AI. Their concentration was on the best practices that Microsoft teams have implemented over the years to create a united workflow that has software engineering processes and provides insights about several essential engineering challenges that an organization may face in creating large-scale AI solutions for the marketplace. Also, in their findings the researchers identified that AI government has three main aspects: (1) discovering, managing, and versioning the data required for machine learning applications is more complex than a typical software application, (2) the required skills for building models and customize them can vary based on the project, and (3) AI components could be hard to deal with as distinct modules as models can experience non-monotonic error behavior.

European Commission Singapore principles see AI governance as a way to promote Trustworthy AI through guidelines. Based on the EC's guidelines, a framework has been created that offers guidance on fostering and securing ethical and robust AI. In addition, the guidelines aim to go beyond the ethical principles by guiding how such principles can be operationalized in socio-technical systems [3]. Fairness and explicability are key principles that an AI application must have, which can be achieved by governing data, reducing bias and have diverse data collection. Hence, AI can be trusted when making suggestions or taking decisions. At the same time, AI should be human-centric by protecting the well-being and safety of individuals. That requires human oversight over AI where human agents are responsible for decisions and accountability can be applied.

As a result, it is argued that in the existing literature researchers investigated IT governance and data governance and they suggested frameworks or procedures for

improving performance or minimizing risks that were introduced by AI. However, there is a gap in AI governance, which deals with both IT governance and data governance and has a direct relationship with AI [15]. Hence, the literature would benefit from an investigation on how to achieve AI governance and through that the knowledge of boosting organizational performance, while at the same time neglecting negative consequences of AI use.

3 Methodology

3.1 Case context

Conducting interviews is a great mechanism for gathering information, especially when the researcher does not have a priori guiding theory or assumptions. Also, interviews can be used to refine a theory or understand a phenomenon [13]. As shown in the background section previous researchers decompose information governance into a range of structural, procedural, and relational practices, which could be used as a baseline to understand how to build practices in order to achieve AI Governance. The case study is chosen because it allows for in-depth analysis using interviews as generating method for collecting data. By exploring these data, new knowledge can be generated allowing for meaningful insights that explain similar situations [16]. Also, the research is qualitative as it involves the use of qualitative data, which can be used to understand and explain the research question [17], as it involves the use of experiences, beliefs, and attitudes of the key respondents through the semi-structured interviews [18].

3.2 Data collection

The company is in the power industry, based in Norway, and operates more than 60 years with around 500 employees. The interview design consists of five interviews exploring how participants themselves understand specific issues, according to their own thoughts and in their own words [19] and each participant was interviewed for at least one hour. Furthermore, the participants were part of either the business department or the IT department, as input from both departments is needed in order to understand how AI governance is designed to minimize AI risks. Hence, the guideline questions for the interviews were split into two parts. The first part was focused on the effects of AI use in the firm and how it was used to transformed existing processes. The second part was centered around the implementation and technical aspects that firms are following and the challenges they faced.

Table 1. Responders' role and length of interviews.

Respondent ID	Role	Years in company	Interview time
1	Chief AI officer	3	1hour and 32 min

2	AI Software Developer	3	55 minutes
3	Machine Learning Engineer	3	45 minutes
4	AI Software Developer	3	43 minutes
5	Project Manager	4	49 min

3.3 Data analysis

A narrative analysis is followed for analyzing the content from the interviews as the stories and experiences shared by employees are used to answer the research questions. The transcripts that were generated were imported in the software NVino, where axial coding is applied, and categories were formed based on the notation process (coding). The nodes that have been coded are procedural, relational and structural. In addition, comments and observations from different transcripts were combined to identify commonalities and patterns in the processes used when creating and deploying AI systems that assist the firms in minimizing AI risks. Grouping the comments and observations, known as axial coding [20], allowed for better interpretations since the employees could refer to the same concept using similar terminology, which could depend based on their technical skills, knowledge, experience and position in the firm. In order to obtain a high level of confidence researchers validated findings by examining reports, public information and presentations related to this research and focus on the AI aspects.

Table 2. Nodes and possible items under each node.

Dimension	Definition	Reference
Procedural	Practices associated with data migration, system messages, documentation and processes for expansion.	[13, 21]
Relational	Practices that deal with employees and communicating goals.	[13, 14, 22]
Structural	Practices associated with IT, optimization and automation.	[13, 14, 21, 22]

4 Findings

The interviewees talked about how the company transformed over the past ten years and the necessary steps that were taken in order to expand and maintain a competitive advantage, while minimizing AI risks. In the following table there is a sample of the grouped observations that are generated based on the interviews.

Table 3. Nodes and grouped observations (sample) based on the interviews.

Code	Observations
Procedural	AI assists in scaling up while expanding; giving a competitive advantage over rivals

Procedural	AI products are created for future use, and their current value might not be visible at once.
Procedural	Documentation is necessity to allow other developers to take over. Although there is no standardization of developing there are general guidelines.
Procedural	The system is able to detect problems and alerts human agents.
Procedural	Dashboards allow communication between machine and human.
Procedural	Use data to create intelligence.
Relational	Take away the fear from employees that were going to be automated away, since you need their domain knowledge.
Relational	Explaining situations such as why excels cannot work and the need of APIs from vendors are needed.
Relational	Invested a lot of time in making sure everybody understands how things work. Continuous reports and feedbacks.
Relational	Inform other departments of the progress, to make integration easier.
Structural	Limited use of sensitive data to avoid any problem with legal regulations.
Structural	Models and dashboards run in the cloud.
Structural	Standardize the set of tools used (Jupiter notebooks, python, GitHub etc.).
Structural	Automation is expected by employees to avoid repetitive and boring tasks.

4.1 Structural

As far as the structural practices are concerned, many challenges were addressed by the firm. One of the main challenges they faced was the choice of technologies, because there are different tools for developing AI products. Legacy code was part of the system and it was written in different programming languages making compatibility among applications an issue that needed to be solved. That created the need of having a process to unify and standardize the set of used tools was more than a necessity. Respondent 4 state the following:

> *"Developers were programming in MATLAB or Python, and everyone was doing their own thing".*

Furthermore, it became essential to increase the speed of models and scale up because the company increased the amount of data, while creating new intelligence based on the data. These changes were boosting efficiency and employees liked automation that lifts the heavy loading of the work. Respondent 2 added the following on the matter:

"One of the big changes and additions that everyone started programming, and automating stuff is that we went fully on cloud in all our systems, and it enabled us really be very flexible with our resources".

Another structural practice that was important was how to deal with sensitive data and law regulations. The firm's approach was simple but efficient. The developer team built their applications using limited (or not at all) sensitive data in order to be complied with all regulations and there are two main reasons behind that decision. Firstly, most of the models did not need sensitive data and secondly their technical approach was implemented in a way to avoid the need for personal data; thus, the firm did not have to worry about future regulation changes.

Table 4. Challenges encountered and firm's solution.

Challenges encountered	Solution
Employees use various programs	Standardize and unify tools to decrease ambiguity and guesswork, guarantee quality
Increase speed of model deployment	Move to a cloud solution for increasing speed, efficiency and flexibility.
Compliance with laws and regulations	Use limited, or no sensitive data to avoid future regulation changes.

4.2 Relational

Although automation is desired, employees started worrying that they might lose their position due to AI. The managers made sure to regularly explain to employees that their domain knowledge and expertise are needed, and the AI is not capable to do the complex part of their work. Respondent 5 stated:

"Part of their job now is taken by algorithms […] we had to have regular meetings with people explaining what AI will do and take away their fear that they will lose their job".

It is worth mentioning, that managers invest a substantial amount of time explaining to employee's new procedures, while reports and feedback were given back from the employees in order to improve the system. Also, informing all related departments about new capabilities and how the future would look like, in terms of procedures, was crucial so employees could accept and understand the new technologies. For example, explaining situations such as the need for APIs from vendors instead of the use of excels files or educate people on how AI really works by creating internal workshops. As respondent 1 stated:

"You need to ensure that model operates in a way that works and the operators understand that, and they have a good understand how it was developed, and what is capable of doing."

Table 5. Challenges encountered and firm's solution.

Challenges encountered	Solution
Employees fear of AI	Have regular meetings explaining why AI is not going to take their position.
Explain the need for new approaches	Explain the benefits of using new technologies to employees in order to accept change.
Employees lack AI knowledge	Train people in different departments in AI applications so that everybody has a good understanding of AI.

4.3 Procedural

As for the procedural practices, the focus was on the system and how to maximize performance through that. The use of data is a key to create new intelligence and through various dashboards the machine can effectively communicate the new information with human agents. What is more, the system is able to detect problems and anomalies, which are reported to human agents in real-time allowing them to solve problems as fast as possible. An additionally finding was that there was not a clear structure on how people developing an AI product. According to respondent 3:

"There is no formula, we just go as it feels right, but we have some general guidelines [..] and a wiki page that we describe things that we should follow".

Hence, although there was a documentation of code, processes and expected AI outcomes, the firm did not have a systematic way of building an AI product and many mini- projects were abandoned. Finally, not all AI products were developed for immediate use. Respondent 1 added:

"We try to think the future and some of our applications do not have a direct impact now, but these applications will give us an advantage over the competition in the future".

Table 6. Challenges encountered and firm's solution.

Challenges encountered	Solution
No clear way of developing	Provide guidelines to enhance appropriateness of practice and improve quality.
Employees cannot detect everything manually	The system detects and alerts for anomalies.

Be ready for the future	Build AI applications that might not add immediate value for the firm, but it will give an advantage in the long run.

Overall, the firm drastically reformed its ways of development AI products. Developers started to unify and standardize software and tools without neglecting efficiency and performance. Managers designed products that add value in the long run and assist human agents to manage work overload through automation and clever features, such as automating error detection. Equally important is the communication towards the employees and departments ensuring them that AI does not replace human agents rather supplement their efforts.

5 Discussion and conclusion

In this study we set out to explore the underlying activities that comprise an organizations AI governance. Specifically, we built on the prior distinction between structural, relational, and procedural dimensions of governance in order to understand how organizations are planning around their AI deployments. Through a revelatory case study of an organization that has been using AI for several years, we conducted a series of interviews with key respondents and identified a set of activities that were relevant under each of the three dimensions, as well as challenges they faced during deployments of AI and how they managed to overcome them. Our analysis essentially points out to the various obstacles that AI governance is oriented to overcoming, and the mechanisms employed to operationalize them.

Specifically, we find that the obstacles that are identified during the process of deploying AI are observable at different phases and concern different job roles. In addition, they span various levels of analysis, from the personal, such as fear of AI and reluctance of employees to adopt it, to organizational-level ones, such as organizational directives on how to comply with laws and regulations. While this study is just an exploratory one, it reveals not only that AI governance is a multi-faceted issue for organizations but that it spans multiple levels, therefore requiring a structured approach when it is deployed. In addition, different concerns emerge at different phases of AI projects, so AI governance also encapsulates a temporal angle in its formation and deployment.

5.1 Research implications

There is a considerable debate in the scientific community about what is considered AI and how companies should incorporate AI in their everyday operations. However, not all companies have managed to build AI solutions that have had significant organizational effects and resulted in added business value. Hence, it is argued that although it is important to adopt AI, it is equally vital to create the necessary processes and mechanisms for developing and aligning AI applications with the requirements of the business environment. One of the main challenges with AI is that it is a technology that requires continuous adaptation and modification as new data emerges or conditions

changes. Thus, there is a form of ephemerality which places an increased focus on establishing processes, mechanisms, and structures to ensure that it is functioning as required and that it aligns well with the goals of the organization.

Furthermore, there are a multitude of angles that a firm can approach AI governance; for instance, a recent article by Microsoft focuses primarily on the technical aspects of workflow implementation outlining the key phases in the lifecycle of machine learning applications [2]. Yet, this research concentrates on the development challenges and the practical solutions a firm could follow in order to build an AI through solid and effective organizational practices. In this sense, AI governance in this article is not seeing as a process but as a set of important aspects that need to be considered when designing and deploying practices and mechanisms, in order to ensure that the main challenges are overcome successfully and that AI applications are operating as planned.

Our exploratory work opens up a discussion about what AI governance comprises of, and how it can be dimensionilized. Furthermore, it explores the link between the challenges such governance practices help overcome, and the actors and practices they involve. This stream of research is particularly important in the value-generation of AI-based applications, as it paints a more detailed about how relative resources are leveraged in the quest of business value [23]. In addition, the work sheds some light on the process-view of AI deployments by opening up the dialogue about the different phases of AI deployments and the unique challenges faced within each of these.

5.2 Practical implications

Based on the findings, a firm needs to incorporate new procedures when adopting AI in order to maintain an advantage over the competition and boost efficiency. A unified system is required, which is consistent in the tools that developers use. Hence, the system will be more robust as it will be easier to maintain and improve different components of the system. In addition, managers should create procedures that employees are aware and follow and give clear guidelines; otherwise, time and resources might be wasted, which could be invested in other projects that would add more business value.

Firms should use AI for automating tasks that are repetitive, which is appreciated by employees since they do not want to do monotonous work, but at the same time managers should have extended conversations with employees of other departments ensuring them that AI will not replace them. This could be crucial for the company's internal stability as people might lose trust in the leadership, they might leave the company taking their expertise with them or resist using new technologies and try to undermine the value of AI.

Lastly, firms can use dashboards as an effective way to allow communication between human and machine. Dashboards are a great information management tool that is used to track KPIs, metrics, and other essential data points relevant to a business. That way the black-box nature of models and AI in general can be less problematic, because the use of data visualizations simplifies complex data sets and provides end-users useful information that can affect business performance.

5.3 Limitations and future research

In the current work, we investigate how to govern AI and minimize AI risks. However, there are certain limitations that characterize this research. First, the data are collected through interviews with only one company, and that company does not require extensive use of sensitive data; thus, there might be bias in our data or provide an incomplete picture of the entire challenges around relevant practices. Second, while we conducted several interviews with key employees within the organization, our data collection was based in a snapshot in time and may not accurately reflect the complete breadth of practices. Hence, generalizability could be an issue that should be taken into consideration.

As future research, it would be interesting to gather more empirical data through interviews and theorize the notion of AI governance from a positivist perspective, which could be tested with empirical data on the antecedents and its effects. It would also be beneficial for the field to know which resources firms deploy most in order to achieve their organizational goals and how they govern these resources to boost their performance, and how AI governance practices impact specific types of resources.

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