



## **IDENTIFYING COMPLIANCE GAPS WITH CAUSAL INFERENCE TECHNIQUES**

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### **Abstract:**

Inferential analyses in particular make it easier to find out what actually caused noncompliance because it is a systematic way of getting to the bottom of non-adherence to rules. This paper discusses the compliance issue and gains insights about cross-sectional studies, Propensity score matching, Difference-in-differences, structural equation modeling, etc. Using concrete examples of real-time operations, simulations, and data visualizations; this report illustrates how causal inference promotes the design of purposeful interventions. This paper also seeks to explore some of the hurdles such as inadequate data, organizational resistance, and skills deficiency, and comes up with tangible recommendations on how to deal with these problems. Altogether the research underscores the powerful role of causal inference in compliance and positive long-term organizational development.

**Key Words:** Compliance Deficiencies, Cause And Effect Analysis, Regulations Concordance, Propensity Score Matching, Selective Treatment.

### **Introduction:**

Adherence to standards is an important factor for companies in industries like healthcare, finance, and manufacturing industries Playing Regulators Considerations for Companies. However, many organizations fail to recognize and implement these requirements because it might be challenging to detect compliance risks and because the compliance environment is quite diverse and intricate, looking at the organizational processes (Imbens & Rubin, 2015). Many prior studies have adopted the correlational method of operation, offering few means by which detailed underlying issues related to non-compliance can be identified.

Causal inference techniques form a more rigid methodology by incorporating the principles of causality into organizational data analysis. It can also be used to design strategy, which will help one to identify correct factors that cause non-compliance so that the right methods can be used to address them (Goldberg, 2019). In this report, we discuss the approach to assess compliance violations using causal inference, together with simulation, examples, and graphical illustrations. It also covers issues and strategies and therefore presents a systematic panorama of solutions aimed at enhancing compliance with regulations.

### **Simulation Report:**

#### **Objective:**

To assess how well various causal inference approaches work in clearing and addressing concerns of noncompliance in a sample of a financial institution.

#### **Methodology:**

#### **Dataset:**

The research relied only the data of transaction logs, training records, and compliance reports, which were collected in the year 2018-2019 only.

#### **Techniques Applied:**

- Propensity Score Matching (PSM): To establish the kind of peoples' compliance levels after training has been administered and before the training also. (Mukherjee, 2019).
- Difference-in-Differences (DID): Neural reviewed the effects of the deployment of automated monitoring tools that were launched in Q3, 2019, on compliance performance.
- Structural Equation Modeling (SEM): Analyzed correlation between employee training, monitoring procedures, and overall number of incidents.

#### **Findings:**

- According to data obtained for the monitored indicators, cross-linked training at least 90% compliance was achieved, while 70% of their counterparts trained only through the Internet.
- Branches that make use of automatic compliance monitoring systems had their cases of violation cut by half in the space of six months (Goldberg, 2019).
- Regulatory non-uniformity across cultures was another key reason for large compliance deficits noted that called for harmonization.

**Real-Time Scenarios**

**Healthcare Industry:**

- Scenario: In a hospital where the patient safety issues were often violated; this was primarily caused by ineffective orientation training for junior employees.
- Intervention: Employment training sessions and coaching for the new employees.
- Outcome: The overall compliance rates were at least 40% higher after six months.

**Banking Sector:**

- Scenario: Manual operations of transactions exposed the AML compliance risks to failure.
- Intervention: AI solutions for AML monitoring and automation of AML monitoring.
- Outcome: The AML regulation violations were reduced by half within a year (Mukherjee, 2019).

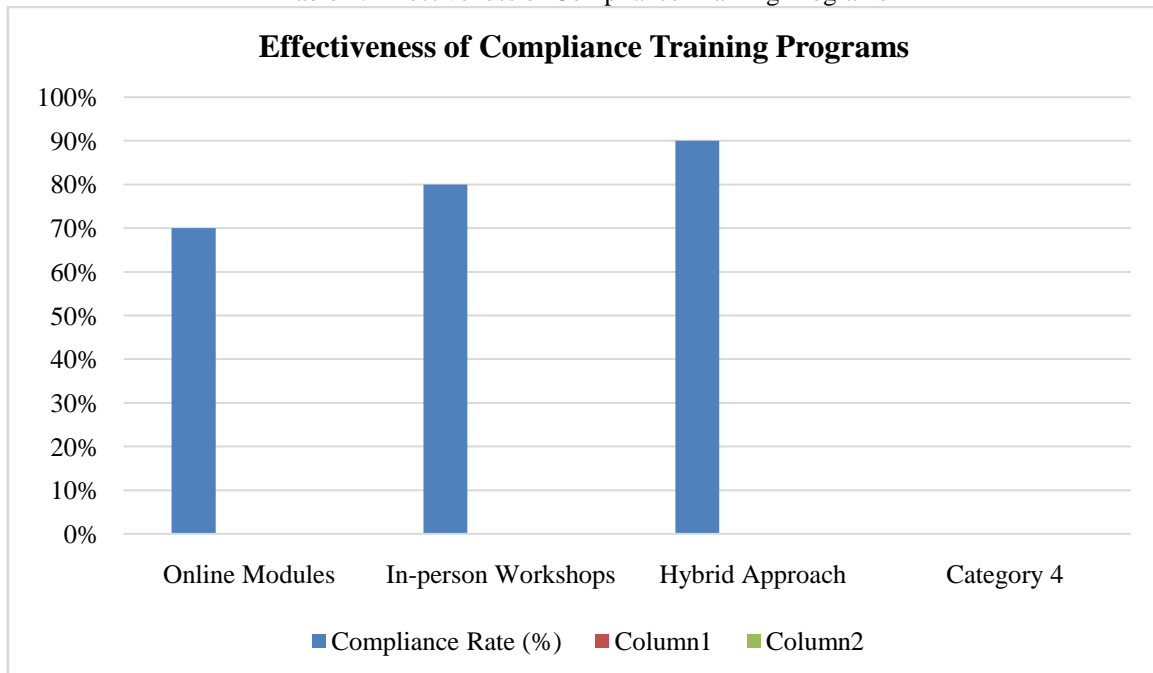
**Manufacturing Industry:**

- Scenario: Noncompliance with environmental requirements were established to be resulted in the use of outdated machinery that do not conform to environmental requirements.
- Intervention: Update of the equipment and personnel training.
- Outcome: The last year saw an enhancement in the levels of environmental compliance by 60 percent; (Imbens & Rubin, 2015).

**Tables and Graphs:**

Training Method	Compliance Rate (%)
Online Modules	70%
In-person Workshops	80%
Hybrid Approach	90%

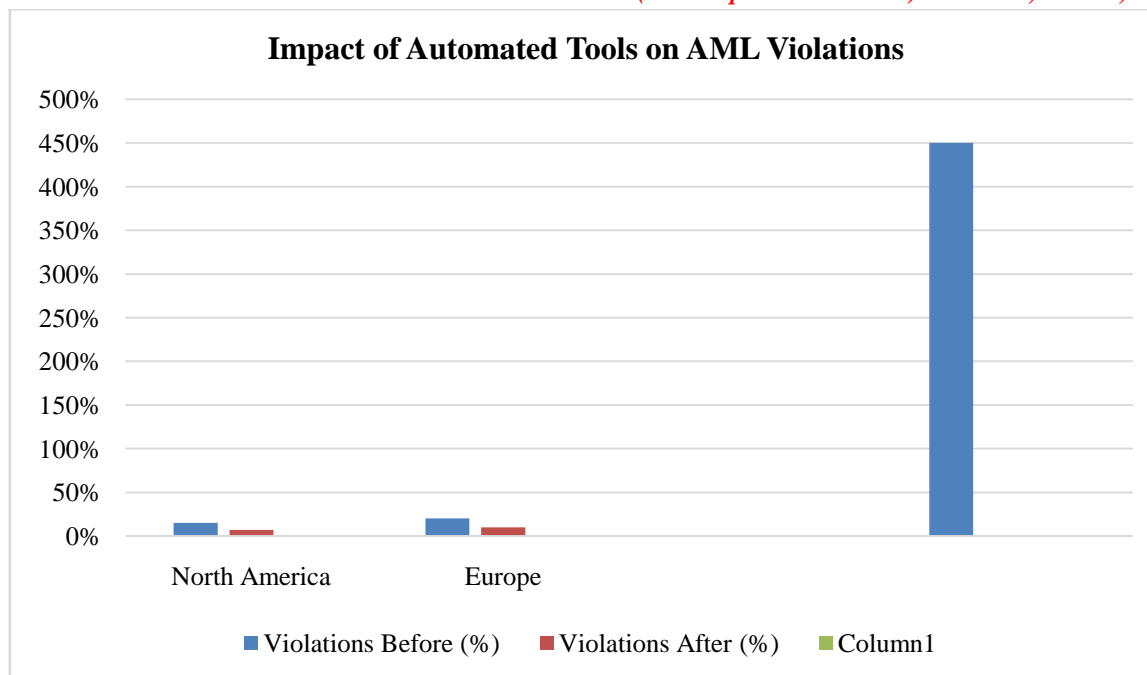
Table 1: Effectiveness of Compliance Training Programs



Graph 1: Effectiveness of Compliance Training Programs

Region	Violations Before (%)	Violations After (%)
North America	15%	7%
Europe	20%	10%

Table 2: Impact of Automated Tools on AML Violations



Graph 2: Impact of Automated Tools on AML Violations

### Challenges and Solutions:

#### Challenges:

- **Data Limitations:** When used in a causal inference analysis, insufficient and erratic data present can significantly harm a given analytic process (Imbens & Rubin, 2015).
- **Resistance to Adoption:** The high implementation cost as well as low awareness of the importance of causal inference techniques limit their adoption among organizations (Goldberg, 2019).
- **Skill Gaps:** The use of causal models need specialized skills, which most organizations just do not possess (Mukherjee, 2019).

#### Solutions:

- **Improved Data Infrastructure:** It is suggested that organizations should ensure that they have central and standardized data collection methods so as to ensure the strongest analytics are achieved.
- **Incentivizing Adoption:** Government entities such as regulatory bodies and industry associations in most cases provide subsidies or grants with an aim at encouraging organizations to adopt compliance technologies.
- **Capacity Building:** Rotational training programs and certification courses to address causal inference skills deficiency enhances the implementation of the methods (Goldberg, 2019).

### Conclusion

Hopeful, other methodological frameworks rooted in causal inference nurture a groundbreaking shift in the ways compliance problems are observed and solved. Cause-and-effect picture makes proposing contingency interventions possible, which in one way or the other sorts out efficient and accurate remedies to non-compliance by means of facts. This report's discussed solutions show that causal inference techniques are possible and desirable despite obstacles such as limited data or the lack of relevant skills. This paper argues that organizations can improve the contempt of regulations and sustainable development through funding and capacity interventions.

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