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Applying Detective Analytics for Mitigating Financial Crime in an Organisation

Research Paper

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ABSTRACT

Despite the growing popularity of detective analytics, it is consistently challenging to understand the factors that influence the adoption. This is increasingly discouraging organisations, even though the tool is important for tracing, tracking, and mitigating financial crime. This study applied concepts of 'follow the actors' and shifting negotiation of actor-network theory (ANT) to gain a better understanding of the factors that influence the adoption of detective analytics in a qualitative case study using a South African-based financial organisation. From the analysis, integration of analytics tools, integration of detective analytics with other systems and processes, development of a template for each factor, and training were revealed as some of the factors that influence the adoption of detective analytics in an organisation.

Keywords

Actor-network theory, detective analytics, financial crime, influencing factors.

INTRODUCTION

Data has become the backbone of many organisations in their quest for value, sustainability, and competitiveness. The increasing capabilities of big data demand techniques such as detective analytics. Detective analytics are tools for innovatively detecting activities of irregularity or anomaly in real-time within datasets (Empl & Pernul, 2023). Menezes, Kelly, Leal and Le Roux (2019) described detective analytics as the determining element that can be used for achieving a level of precision. This increases the value associated with the outcome from the data analytics, which boosts process manageability. In detective analytics, data is gathered to conduct a diagnosis (Raeesi Vanani & Majidian, 2021).

From organisational perspectives, one of the reasons detective analytics is rapidly gaining recognition is that it enhances diagnostics on data (Menezes et al., 2019). Also, detective analytics can be used to facilitate online transactions and activities that may include deformation (Sangwan, Kumar, Herrmann,

Sharma & Patel, 2023). From an empirical perspective, Mlambo and Iyamu (2024) explained that many organisations are increasingly exploring detective analytics as an additional mitigative solution.

Despite the advancement of detective analytics, challenges persist, such as applying the tools, making organisations fall short of the benefits, which include tracing, tracking, and preventing financial crime in organisations (Mlambo & Iyamu, 2024). This could be attributed to a lack of understanding of the influencing factors. According to Iyamu, Adelakun, Mlambo and Badro (2025), some familiar challenges in the literature of applying detective analytics include adoption and implementation.

Firstly, financial crimes are increasing in South Africa and many parts of the world. This research is intended to contribute to reducing financial crimes in organisations. Secondly, detective analytics could be used more effectively for understanding and mitigating financial crimes. However, many organisations do not understand the factors that influence the implementation of detective analytics. Thus, applying the detective analytics remains challenging. This study focuses on identifying the factors influencing the application of the tool to mitigate financial crime in organisations from the context of South Africa. The study entails two main aspects: (1) What are the factors that could influence the application of detective analytics in an organisation? (2) How do the relationships between the influencing factors aid the application of detective analytics?

In achieving the objectives of the study, actor-network theory (ANT) was selected. The theory was selected because of its strength in power relationships and shifting negotiation. These factors were required in gaining an understanding of influence. Power relationship helps to understand the relationship between humans and non-humans (Crawford, 2020). Within a network (group of people), negotiation shifts among the actors, consciously or unconsciously (Iyamu, 2021). Financial crimes are committed by humans using non-humans. The power relationship, therefore, helps to understand how detective analytics is applied to mitigate crimes. This includes following the actors in how they apply the tool to trace and track financial crime in the organisation. Also, this helped to gain insights into how the shift in negotiation among actors happens to get to the point of applying detective analytics. With the power of technology being used to store and process financial transactions, human actors cannot commit financial crimes without non-human actors

The paper is organised into eight main sections. The first and second sections set the focus of the paper and present the review of literature, respectively. The theory that underpins the study is covered in the third section, followed by a discussion of the methodology applied in the study. The fifth and sixth sections present the factors influencing the application of detective analytics and the relationships between the factors, respectively, in the organisation used as the case in the study. In the seventh section, the limitations of the study are highlighted. Finally, the conclusion is summarised in the eighth section.

LITERATURE REVIEW

Detective analytics is a measure for fraud prevention, access control, and prediction, but remains a theory in the literature (Miller, 2015). A decade later, organisations are still being challenged on how to apply the tool. Mlambo and Iyamu (2024) argued that many organisations do not understand or know how to apply detective analytics. From an empirical perspective, Iyamu et al. (2025) explained that despite the growing popularity and essentiality of detective analytics, organisations continue to struggle with applying the tool.

For many organisations, detective analytics is used to generate new insights from big data by relying on factors such as rules and linking the insights from historical data (Empl & Pernul, 2023). Also, detective

analytics is a technique for detective analytics is the multi-unit data-driven real-time estimation and optimisation problem (Menezes et al., 2019). Among other things, detective analytics is an early detection mechanism (Getachew, Beshah & Mulugeta, 2024). Detective analytics is primarily concerned with identifying anomalies and fraud patterns within datasets (Iyamu et al., 2025).

Based on the detective analytics' diagnosis and infeasibilities, including inappropriateness, can be identified and eliminated within datasets (Menezes, Yaqot, Hassaan, Franzoi, AlQashouti & Al-Banna, 2022). In doing so, the influencing factors must be known. The influencing factors have significant implications for improving the efficiency and effectiveness of detective analytics, from both technical and non-technical perspectives (Mlambo & Iyamu, 2024). How is unknown. However, it remains challenging for many organisations to identify the factors that influence the adoption of the detective analytics. Pramanik, Lau, Yue, Ye and Li (2017) attribute the persistent challenges to a lack of visible factors, such as conflict of interest in applying detective analytics on data. Hoelscher and Shonhiwa (2021) suggest that for detective analytics to function appropriately, a control mechanism is required to identify anomalies.

The persistence of the challenges is continuously affecting the adoption of detective analytics in many organisations. According to Menezes et al. (2019), this is because many organisations have limited detective analytics skills. Detective analytics is a specialised field which assists an organisation to understand the present and can be used to predict financial crime activities (Weller et al., 2023). Empl and Pernul (2023) state that detective operations are meant to know about an incident based on certain variables that should alert the organisations to any anomalies occurring at a given moment. However, the 'variables and given moment' must be programmed into the system, within context, based on the influencing factors that must be understood. This is one of the challenges some organisations encounter because it requires deep knowledge and expertise, which they often lack (Ara, Maraj, Rahman & Bari, 2024).

UNDERPINNING THE STUDY

Actor-network theory (ANT) was used to underpin the study. The theory aimed to determine how actors play a role in a network and vice versa (Gao, 2005). According to Walsham (1997), an actor network is formed immediately when the actors have aligned interests or when actors have found a common ground, which can occur. ANT is a sociotechnical theory that is not new to information systems (IS) and information technology (IT) research. The theory has been used for many years in various ways in IS research (Iyamu, 2012). This includes ANT's use to explain the relationship between humans and non-human actors (Couldry, 2008) and to understand the technology innovation process (Shim & Shin, 2016). Crawford (2020) describes ANT as a methodology used in the sociology of science and technology that defines the activities of the social system of actors (human and non-human).

The theory's focus and concern with human and non-human interaction, including technological innovation, make it most appropriate for this study. Also, applying ANT allows the researcher to follow the actors in their heterogeneous networks. This is because the theory offers methodological steps in the activities, actions, and interactions between actors in a network (Callon, 1986; Heeks & Stanforth, 2015). According to Iyamu (2021, p.73), "ANT provides a platform which allows for the analysis of both human and non-human interaction in a network. This means that ANT is a resource for understanding the actions of humans". This study focuses on identifying the factors influencing the application of the detective analytics tool to mitigate financial crime in organisations from the context of South Africa. The nature of the study requires a socio-technical view, enabling the following of the actors, based on which the actors' activities can be understood through shifting negotiation.

From the ANT viewpoint, negotiation is constantly shifting, including the relationships between actors (Iyamu, 2024; Prado & Baranauskas, 2012; Callon, 1986). Through shifting negotiation of knowledge, certain things are revealed. Thornton, Mueller, Schoutsen and Van Hillegersberg (2013) state that fraud detection is used mostly to detect unknowns and known unknowns. Thus, by following the actors, it helps to gain insights on how to better track, trace and monitor financial crimes using detective analytics. To detect means to discover and identify a problem before it occurs. The use of detective analytics is not only advantageous for future purposes but also to detect traces and track incidents using historical data (Sun, Huang & Gong, 2011).

ANT's mantra "follow the actors" as described by Latour (2005) was useful in following both human to non-human actors, to gain a deeper understanding of why things happened in the ways they did in mitigating financial crimes in the organisation. This helps to gain an understanding of the factors that could influence the application of detective analytics and the relationships between the influencing factors in an organisation.

RESEARCH METHODOLOGY

The qualitative method was applied, which guided and informed the design, being a case study and documentation of existing materials. Inductive reasoning was applied to gain more knowledge about the phenomenon and to create themes and patterns of the data collected. Data was collected using semi-structured interviews and through a literature survey using document analysis (existing documents). This also outlines how the data was collected from database sources. The two keywords used to search for the papers were detective analytics and financial crime. The ethical implications, a brief discussion of the data analysis, and the unit of analysis are also presented.

The Case Studied

Following Yin's (2018) approach, the case study approach was applied in the study. A South African-based financial institution, Nikiwe Federal Finance (NFF), was voluntarily involved in the study. NFF is a pseudonym to avoid identity disclosure. The organisation is one of the largest financial institutions in South Africa. The organisation is structured into 2 departments, namely, business and IT. This was also supported by obtaining academic papers from credible sources (databases). The focus areas were crime in financial institutions and detective analytics. This process supports the credibility and usefulness of the research in guiding further inquiry.

From the business department, the participants were from different units: the compliance and enforcement unit (CEU), financial surveillance (FinServ), risk management unit (RMU), prudential authority (PAU), and the money laundering unit (MLU). The participants from the IT department were selected from the business solutions, data analysts, IT security, and machine-learning units. All the participants were from the senior management level.

Data Collection

Data was collected focusing on understanding how financial crimes occur in South African financial institutions. This is intended to foster preventative and mitigative measures and how the detective analytics tool can be applied to trace, track, and prevent financial crime in a financial institution. Thus, qualitative data were gathered using the semi-structured interview technique. A set of criteria was used in selecting the participants. The criteria include that the employee must (i) be employed in the finance or IT department or division of the organisation; (ii) have experience with financial crime in the organisation; (iii) know about detective analytics; or (iv) be part of the unit or department that provides,

supports or manages solutions for mitigating financial crimes in the organisation. A total of 12 participants contributed to the study. Of the 12 participants, six were employed in the business department and the remaining six in the Information Technology (IT) department. A point of saturation was reached at the 12th participant. In qualitative studies, a point of saturation is reached when the researcher begins to receive the same information repeatedly from participants (Moser & Korstjens, 2018). The data was analysed following the interpretive approach.

Data Analysis

As stated in the introduction section, the study has two objectives. The first objective was to understand the factors that influence the application of detective analytics for detecting and mitigating financial crimes in organisations. Thereafter, examine the relationship between the influencing factors to gain deeper insights into the preventative and mitigative measures. The study used ANT to first understand the actors involved with the application of detective analytics. At the time of this study, the human actors were employed in both the business and IT departments of the organisation. In the two departments, various units were involved in ensuring that adequate measures were in place to prevent and mitigate financial crimes. These units have built a comprehensive framework for preventing and mitigating financial crimes in NFF. Additionally, there was more attention on actors who had a direct interest and involvement in the operations of the organisation. Moreover, the perpetrators also act as stakeholders in NFF due to their interest in committing financial crimes. Thus, the preventive and mitigative measures in NFF are not operating as intended.

In the first step, the factors were identified. In the second step, the relationships between the factors (findings) were established. The relationships among the actors helped us to understand how the factors can influence the deployment of detective analytics in an organisation. Also, the relationships draw on both technical and non-technical influences. The first step is critical because it establishes the foundation towards mitigating financial crimes. Primarily, this is because the influencing factors have a relationship between them as they do not operate in silos.

FACTORS INFLUENCING THE APPLICATION. OF DETECTIVE ANALYTICS

From the analysis, the factors influencing the application of detective analytics were revealed. The factors include Integration of analytics tools, integration of detective analytics with other systems and processes, development of a template for each factor, and training.

Integration of Analytics Tools

The integration of analytics tools such as detective analytics, descriptive analytics, diagnostic analytics, predictive analytics, and prescriptive analytics aids the ability to gather insights, monitor, trace and track (Menezes et al., 2019). Organisations' objectives can be leveraged by integrating their analytics tools to make informed decisions. However, it is critical to understand the abilities of these analytical tools to ensure that the various selected tools achieve the objectives of the organisation. Sreemathy, Nisha and RM (2020) state that the integration enables data collection from various applications and systems within the organisation. Therefore, the data integration layer needs to be well-defined to extract, transform and load (ETL) processes from these different sources. Furthermore, controls need to be in place to ensure compliance and security between the different layers of the integration process.

Integration of Detective Analytics with other Systems and Processes

The integration of detective analytics with other systems and processes will enhance organisations' ability to detect anomalies, trace, track, and monitor potential threats (Martínez-Fernández, Jovanovic, Franch & Jedlitschka, 2018). However, for the integration to be successful, the objectives of using detective analytics for the different use cases must be clearly defined (Delgado, Price, Speaker & Stoiloff, 2021). This will ensure that the organisation can track the effectiveness of using detective analytics for the various use cases. Moreover, Loshin (2013) argues that for the integration to be a success, data aggregation needs to be clearly defined to understand the different data sources and what the detective analytics tool needs from these sources to operate as intended.

Development of a Template for each Factor

Templates provide a structure that guides the process of integrating detective analytics using different factors (Bloomfield, Fletcher, Khlaaf, Hinde & Ryan, 2021). This also enhances the collaboration and quality through the process followed by the organisation. The development of a template for each factor in the integration of detective analytics with other systems and processes assists in creating a standard approach and ensures a thorough coverage of each aspect. The purpose of developing a template for each factor is to clearly define the objectives of the detective analytics integration and how they will be achieved based on the defined templates. Developing a template ensures that processes and documentation are done consistently across all different use cases.

Training of Stakeholders

Some financial institutions have the skills to enhance their data analytics capabilities. However, the gap of not being able to detect anomalies as and when they occur needs to be covered by implementing detective analytics. Both the business and IT departments' employees need to be part of the process to develop and implement a new solution, such as a framework or model, in applying detective analytics. Therefore, personnel at all levels should be trained on how to apply detective analytics.

RELATIONSHIPS BETWEEN THE INFLUENCING FACTORS

The influencing factors depict the links and dependence between the factors. Arrows are used to illustrate links and dependence between these factors. Also, the influence of the factors is facilitated by various attributes. These attributes include communication, control, requirements, synergy, leverage, and intrusion. The attributes were revealed in the data analysis. The influencing factors can be used as an instrument for applying detective analytics in an organisation. This includes recommendations for developing templates through which the influencing factors towards mitigating financial crimes in an organisation can be detailed.

In the business department, the organisation has introduced and implemented various policies and standards that govern how financial crimes should be prevented and mitigated in NFF. The IT department has also implemented these policies and standards in configuring their applications and systems. The rules and configurations that these applications and systems follow can be defined within a financial crimes framework that both the business and IT departments adhere to.

Based on the interwoven links between the factors, detective analytics can be more effective in using it to trace, track, and prevent financial crime. This includes the discovery of anomalies post-occurrence of the incidents. This fortifies the usefulness of the influencing factors as a measure or control to detect and

disclose financial crime. Therefore, there is a need to gain a deeper understanding and how to practice the influencing factors.

LIMITATIONS OF THE STUDY

Primarily, three limitations were identified for this study:

i. The study focuses on the use of detective analytics, specifically from a South African financial institution perspective. This means that the study does not include all developing countries and is primarily focused on the South African context. However, the study can be applied in other financial institutions in developing countries that utilise detective analytics as a mechanism for detecting financial crime.

ii. The study did not include the technological tools used by intruders as a part of its investigation.

iii. The data analytics family has other tools such as descriptive analytics, diagnostic analytics, predictive analytics, and prescriptive analytics. However, for this study, only detective analytics was used as a tool to detect financial crimes as and when they happen.

CONCLUSION

The research contributes to academics and society, including business and government. The study is a major contribution to the body of knowledge for two reasons. Very importantly, it revealed how the influencing factors and the attributes linking them are connected. Secondly, it provides a compendium of how the influencing factors can be deployed to guide the implementation of detective analytics to prevent and mitigate financial crimes. Additionally, it adds to the existing literature in the fields of information systems, finance, and detective analytics. Currently, the literature on detective analytics is scant. The practical contribution is very important to the South African context. This is particularly so because there is currently a gap and loophole in how the organisation prevents and mitigates financial crimes. Thus, the study is critical in ensuring and enabling financial institutions in South Africa to trace, track, and prevent financial crimes. Also, the study offers a better understanding of the factors that influence the use of detective analytics to mitigate financial crimes in organisations.

However, some areas could be further studied to enhance and expand the topic as an academic stream. The proposed areas include a research stream, the IT solutions used in committing financial crimes and testing the framework as a research stream in IT solutions and data analytics usage. The researcher suggests further study to develop a framework in financial institutions.

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