

# Exploring Perceptions about the Role of CDOs in the C-Suite during the Era of Big Data

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## Keywords

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## Abstract

More organisations continue to invest in big data analytics recognising the vital strategic value for achieving sustainable competitiveness. To fully leverage its potential, companies are creating a new C-suite role, the Chief Data Officer (CDO), with the number of such appointments rising. However, there is a paucity of empirical research, and the specific responsibilities of CDOs remain unclear. To bridge this knowledge gap, we conducted interviews with senior managers from large retail JSE-listed companies as well as local and international data analytic consultants to explore their understanding of the CDO role.

The findings revealed that the primary focus of CDOs is to transform their organisations into data-driven entities. However, there was a lack of role clarity about the CDO as well as the relative relationship between the CDO and CIO within organisations. Additionally, experts interviewed emphasise that companies wishing to enhance big data analytics should implement hybrid structures to adequately respond to the demands of big data. Through this research, we provide valuable insights into this emerging C-suite executive role and offer guidance on how companies can maximise the value of their CDOs. By recognising the significance of CDOs and understanding their functions, organisations can better capitalise on the potential of big data in gaining a competitive edge.

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# 1. Introduction

Data has become an asset and strategic resource for organisations. In the era of big data, companies have reaped benefits through the utilisation of big data; such as better retention and acquisition of new customers; focused campaigns; preempted risks; innovation, and new supplier markets, amongst others (Mills, 2019; Kushwaha et al., 2021; Fanelli et al., 2023). In 2019, approximately 250 billion terabytes of data were produced daily. It is predicted that by 2025, the amount of data generated will be 463 exabytes per day, which is equivalent to a staggering amount of billions of terabytes (Vuleta, 2021). According to Vopson (2021), the primary sources of data produced in a single day are 500 million tweets, 294 billion emails, 4 petabytes of data created on Facebook, 65 billion messages exchanged on the WhatsApp messaging app, and 5 billion searches conducted on internet browsers.

The insights from this data, referred to as big data, can drive financial gain for organisations today. Big data has caused organisations to increase their data warehouses, which has underscored the need for high-quality data in organisations. Thus, more organisations continue to invest in big data analytics (Fanelli et al., 2023). To enhance the data quality and further make the best use of the data assets, organisations need to establish an enterprise-level, executive-rank position to focus on data quality, data analytics, data architecture and data strategy. This executive-rank position is commonly referred to as the Chief Data Officer (CDO).

In the past, many organisations relied on the chief information officer (CIO) responsible for data in the organisation, but the complexity of the analysis and interpretation of it with the advent of big data, a different type of executive leader is required in organisations. For these reasons a CDO has become a necessity. The CIO is responsible for the management of the data, whereas the CDO is responsible for using data as an asset for commercial value (Davenport et al., 2023). The CIO and CDO do, however, have to collaborate closely to ensure the commercial value of data (Violino, 2023). Since 2017, companies with a CDO have reported higher relative growth rates of revenue and profitability, defined as earnings before interest, taxes, depreciation, and amortisation (Chandler et al., 2022). However, Business of Data (2022) suggests that there is still resistance in certain industries for a data leader such as the CDO in the C-suite despite the role's reported benefits.

The purpose of this study was to fill the gap in research regarding the value of the CDO role, especially with the growing importance of big data. To achieve this, senior managers from large retail JSE-listed companies and data analytic consultants from both local and international markets were interviewed to gain insights on their understanding of the CDO position. The study utilised a content analysis approach to explore the experts' perceptions, and three major themes emerged: *Role Uncertainty*, *The CIO-CDO Relationship*, and *Positioning of Data Analytics in an Organisation*.

This paper is structured as follows: First, we present the problem and research objectives. Next, we provide a literature review that starts with the theoretical perspectives utilised. The literature review then discusses the CDO role, the relationship between CIOs and CDOs, and the significance of data analytics. We then provide a brief overview of the methodological process, including the context, sampling, data collection methods, and analysis procedure. The analysis includes the major themes and data interpretation, followed

by the implications for organisations. Finally, we discuss the conclusions, limitations, and future research opportunities.

## **2. Problem Investigated**

The position of the CDO is a new and growing role in many large organisations. While some companies have already incorporated the CDO into their organisational structure, there are still industries that resist having a data leader like the CDO. Additionally, there is limited empirical research in this area, and the specific responsibilities of the CDO are not well-defined. To fill this gap, this research aims to gain a better understanding of the CDOs role and contribute to the existing literature on ICT executives.

## **3. Research Objectives**

Consequently, this study aims to explore the necessity of an effective functioning CDO as part of the executive leadership teams of a large organisation. The objectives were:

- To explore the role of the CDO;
- To explore the relationship between the CDO and CIO; and
- To identify factors that influence the positioning of the CDO.

## **4. Literature Review**

### **4.1. Theoretical Perspective**

#### **4.1.1 Collaboration Theory**

To establish a theoretical framework that drives this research, it is essential to first define the concept of collaboration. Wood and Gray (1991, p. 4) note that to devise a general theory of collaboration, a definition is required, which is a “a process through which parties who see different aspects of the problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible”.

Collaboration, according to Rosen (2007), can also be defined in many ways. Firstly, Rosen (2007, p. 8) cites the Oxford English Dictionary definition of collaboration as “united labour, co-operation; especially in literary, artistic, or scientific work”. Similarly, Schrage (1995) defines collaboration as “the process of value creation that our traditional structures of communication and teamwork can’t achieve”. Collaboration used to mean that shared creation can only occur between people within the same field of expertise like science or literature. However, more recently collaboration has occurred across disciplines. Hence, Rosen (2007, p. 9) finally developed a broader definition of collaboration – “working together to create value while sharing a virtual or physical place”.

Thomson, Perry and Miller (2009) postulate that there is no real consensus among researchers about the meaning of collaboration. They argue that it is difficult to compare across different disciplines, as well as to measure it in practice. For the sake of this research, as part of the theoretical framework, various collaboration theoretical perspectives and how to implement them are considered to assist in the

understanding of collaboration among the various stakeholders in the optimal use of big data in marketing strategies in corporate organisations, as well as to assist in devising a guiding model of collaboration in the marketing environment. Many of the collaboration theories are based on inter-organisational collaboration in the public sector in the USA.

#### **4.1.2 Organisational Theory**

Barzilai (2010, p.1) describes organisational theory as “the study of organisations for the benefit of identifying common themes for the purpose of solving problems, maximising efficiency and productivity, and meeting the needs of the stakeholders”. Barzilai (2010) further states that organisational theory encompasses three concepts: individual, group, and organisational processes. Motivation, personality, and role theory are explored under individual processes. Employees’ behaviour is driven by what motivates them and in organisations this can be different things, for example, their salary, level or certain ‘perks’. The role of an individual in an organisation ‘shapes’ him/her and it determines how the individual sees himself/herself within the organisation. When collaborating with others, the employee’s role needs to be clearly defined to avoid unnecessary conflict in the collaboration (Barzilai, 2010). Different personality types can either encourage or hamper meeting goals. Personality types A and B are most common and known types. Type A is more competitive and Type B more patient, thus less competitive.

There are theories that propose that individual processes form a significant part of the success of an organisation. The group processes considered by Barzilai (2010) are Leadership, Power and Influence. Parry (2011, p.55) states that leadership can greatly influence team performance and is responsible for identifying the “possible obstacles between the team and its goals”. Power and influence can affect both individual and group activities in an organisation. These are mostly seen as negatives, but according to Barzilai (2010), it is a positive to generate productivity in an organisation and to achieve team goals. The author further states that it is important to work in groups, as these constitute the building blocks for achieving the goals of the organisation. Managers should choose individuals with the right traits and talents to create groups that will be successful, according to Barzilai (2010).

The third process in organisational theory comprises organisational processes, which consist of organisational structure and design, and organisational culture (Barzilai, 2010). Edwards (2003) differentiates between the concepts of management and leadership, noting that it is not mutually exclusive. Management refers to a social construct of individuals overseeing others and implementing processes, whereas leadership is being responsible for the strategic direction of the company. In terms of the hierarchy of the organisation, the higher up the manager, the more leadership is required.

#### **4.2. Conceptualising the role of the CDO**

The CDO is described as an emerging executive-rank position, which focuses on data quality, data analytics, data architecture and the data strategy of an organisation (Kessel & Graf-Vlachy, 2022; Zhao & Kamioka, 2022). Such an appointment reflects a formal organisational change in line with a data-driven mission, and the CDO leads the planning to shift the organisation (Wiseman, 2017; Zhang et al., 2017). In fact, the CDO should champion the data for the entire organisation at board level and take the ultimate responsibility and

leadership for managing the enterprise data. The role is also characterised as promoting innovation, transformation and includes data-related responsibilities to ensure the strategic utilisation of data (Lee et al., 2014; Steele, 2017; Nie et al., 2018; Zetlin & Olavsrud, 2022). For instance, it was reported that organisations with a CDO are twice as likely to have a clear data strategy (Fadler & Legner, 2021; Forbes, 2019). Essentially, a clear data strategy leads an organisation to meet the strategic objectives of data by understanding customer behaviour and advanced analytics, which creates business value.

New Vantage Partners reported in a 2022 senior data and AI leadership survey that 74% of companies appointed a CDO (Eastwood, 2023). Despite the growth in the appointment of the CDO role, the average tenure is 30 months with a honeymoon period of 18 months (Davenport et al., 2021; Eastwood, 2023). The main reason is attributed to role uncertainty, resistance to move away from legacy systems and dissonance between the business and the CDO.

Despite the challenges associated with the CDO role, Davenport et al. (2023) argue that traditional data management approaches in organisations would not create business value. Thus, the CDO position was created as a response to a competitive business environment (Zhao & Kamioka, 2022, p. 14). For example, startup companies are disrupting traditional organisations as these startups inherently have data-driven cultures, which gains their market share. Similarly, McDonald's improved sales in its largest territories by 60% from its digital channels (Eastwood, 2023).

Against this background, De Koker (2019) asserts that the realisation of the need for the CDO in big data has great significance in terms of building a sustainable data-driven strategy in organisations to drive value from the huge volumes of data (generated from the products, services and customers) for financial gain and competitive advantage. In this line, companies with a clear CDO role and strategic objectives have gained new customers; focused campaigns; preempted risks; innovation and new supplier markets, amongst others (Lee et al., 2014; Mills, 2019). Thus, it can be argued that a company with a data-driven mission would make CDO appointments (De Koker, 2019).

### **4.3. The relationship between the CDO and the CIO**

Broadly, both CDOs and CIOs are executive-rank positions that work in related areas within an organisation. CDOs focus on enterprise-wide governance using data as a strategic asset while CIOs maintain the technology infrastructure (Data Meaning, 2022; Violino, 2023). The CIO focuses more on the technical side of data, while the CDO focuses more on the business side of data, which includes analytics and high-level data management (Suer, 2022). Thus, the CDO fulfills the chief data stewardship role, which extends accountability into the analytics organisation (Fadler & Legner, 2021).

Davenport et al. (2021) distinguish between the two roles by acknowledging the need for different management approaches. In this line, Wiseman (2017) and Steele (2017, p. 22) assert that CDOs are more effective in a position of sufficient seniority by reporting directly to the CEO and supporting the board in understanding the importance of data and being a data-driven organisation. This is notable as traditionally the Information Technology (IT) departments housed organisational data, but with increasing volumes and

complexity of data such responsibility cannot be within this department. Therefore, the need for the CIO and CDO to collaborate to reap value from its information resources (Zhang et al., 2017; De Koker, 2019; Violino, 2023).

Additionally, the CDO of the organisation is also responsible for the data science function in the organisation, and the data science function can be centralised, reporting directly to the CDO, or decentralised in the different business units within the organisation, where they are domain experts, and working collaboratively with the CDO (Steele, 2017; Zetlin & Olavsrud, 2022). Suer (2022) concurs by stating that the data science function does not belong with the CIO, but that it forms part of the functions of the CDO.

Against this backdrop, the CDO is a key stakeholder, leading from the CEO's table in collaboration with the IT specialists and with the data scientists or statisticians, either reporting to this role or the role actively collaborating with them.

#### **4.4. The importance of the Data Analytics functional area within the emerging era of big data**

The data analytics functional area refers to a specific area within an organisation that focuses on deriving actionable insights from big data, which influences the decision-making processes (Fanelli et al., 2023). Decision making processes derived from big data improve firm overall performance and lead to better bottom-line results (Vidal-García et al., 2019; Talaoui & Kohtamäki, 2020). In fact, organisations aiming to mitigate risk use big data to influence their approach to problems, which supports strategic actions. Therefore, data analytics has become an essential function for businesses across various industries and plays a crucial role in providing organisations with a competitive advantage, optimising operations, improving customer experiences, and identifying growth opportunities.

Given the increasing influence of big data, Hall (2021) advocates that decentralised data analytics is the better option for organisations. Wienzierl (n.d.) argues that there are benefits to both structures; centralised and decentralised. Centralised data analytics have specific drivers, which are related to control, cost and conformance. Control refers to weakness in regulatory compliance, cost relates to concerns regarding the benefits appropriated and conformance refers to the analytics maturity. In contrast to centralisation drivers, decentralisation is focused on vision, value and velocity (Anand, 2018). The major benefit of a centralised structure is its focus on cost, which allows for leveraging synergies and optimisation of work. On the other hand, decentralisation promotes collaboration and speed of deliverables, which satisfies the fast-paced market. For example, Amazon, which is the most successful analytics organisation does not work with a centralised analytics structure and functions as an autonomous business team, which has led to the agile creation of business value (Hall, 2021).

Anand (2018) and Wienzierl (n.d.) suggest that a hybrid analytics approach is optimal for organisations to adequately respond to the demands of big data. The hybrid approach includes a centralised team that functions as a center of expertise and others are distributed across the business domains. Notably, big data

is driving business revenue and operations, and companies must rethink traditional management practices to realise value from this information asset (Kushwaha et al., 2021).

## 5. Research Methodology

### 5.1. Context and Sample

The study entails the relatively new position of the CDO in large organisations and required an in-depth understanding of key stakeholders in the organisation as well as experts in big data and data analytics. Thus, a purposive sampling strategy was undertaken.

A qualitative study in the form of in-depth interviews with ten (10) individuals was conducted to gauge their understanding of the need for the function of the CDO amongst data experts. The interviewees include senior managers and executives at a large retail JSE-listed South African company (i.e., CIO, Head of Business Intelligence, Marketing Director, Data Analytics Manager and Head of Data Analytics), as 5 business consultants (i.e., 3 working in South Africa and the rest of Africa, one working in India, The Middle East, and the UK and a consultant working with fortune 1000 companies in the US). The study was conducted in Cape Town, South Africa. Table 1 provides the participant identifier and associated roles.

**Table 1. Descriptive information for the participants**

<b>Participant ID</b>	<b>Role</b>
P1	CIO
P2	Head of Business Intelligence
P3	Marketing Director
P4	Data Analytics Manager
P5	Head of Data Analytics
P6	Business Consultant: South Africa and rest of Africa
P7	Business Consultant: South Africa and rest of Africa
P8	Business Consultant: South Africa and rest of Africa
P9	Business Consultant: India, Middle East and UK
P10	Business Consultant: US Fortune 1000 company

### 5.2. Data Collection and Analysis Procedure

Upholding the research principle of beneficence is crucial when conducting research on human subjects (Barrow et al., 2020). As such, an ethical clearance application was submitted for approval. The University of Western Cape Research Ethics Committee - Human (REC-H) granted full ethical clearance for the study.

Once permission was granted by the interviewees, the researcher used their cell phone to record the interview sessions. For email interviews, the researcher first requested permission and then sent a list of questions via email for the interviewees to respond to. All in-person interviewees agreed to have their interviews recorded. The audio recordings were saved in an MP4 format on the cell phone and sent to a professional transcriber for transcription. This ensured that all details of the interview answers and

discussions were accurately captured, and also allowed the researcher to listen to the interviews without the need to take notes.

Content analysis was the technique used to analyse the transcribed interviews. The specific type used was a summative content analysis, which involves the counting and comparing of keywords or the content and then interpreting the underlying context (Hsieh & Shannon, 2005). In this study content analysis was applied by determining the different words or themes throughout the interview transcriptions. Once the transcriptions had been received in MS Word format, the researcher read the transcribed interviews and organised them by highlighting the themes emerging from the different interviews. Thus, the judgment was based on the comparison of codes that revealed links between codes to allow for the nomination of themes, which satisfied the aim of the analytical procedure to find patterns derived from the participants' perspectives, both their similarities and differences (King, 2004; Braun & Clarke, 2006). These views and sentiments based on the themes were organised in MS Excel for ease of comparison and included three major themes: (1) *Role Uncertainty*; (2) *The CIO-CDO Relationship*; and (3) *Positioning of data analytics in an organisation*.

Table 2 provides a selection of participant quotations, which includes associated themes. Participant quotations selected to illustrate the themes are provided in the Results and Findings (Section 6) section with pseudonyms, such as *Participant 1*.



**Table 2. Sample participant quotations and themes**

Sample participant quotations	Participant Identifier	Major Themes
<i>“I feel hard-pressed to see how a chief data officer role would work in a traditional sort of corporate value chain enterprise type environment like retail.”</i>	P1_CIO	Role Uncertainty
<i>“... a CIO should be someone with more understanding of the organisation’s systems, architecture and technologies, etc., whereas the CDO actually needs to be an evolution of a data scientist, someone who understands how to connect different pieces of data and what kind of models are required, as well as the type of measurement required.”</i>	P3_Marketing Director	The CIO-CDO Relationship
<i>“CIO’s are certainly not CDO material as data is a weak aspect of most of their repertoire. Also, most CIO’s are not quite deeply aware of business dynamics to deliver business value directly. They simply deliver a platform full of data and expect business to figure out what to do with it! So, while CIO will be responsible for all IT infrastructure, CDO will own the data Infrastructure part.”</i>	P9_Business Consultant: India, Middle East and UK	The CIO-CDO Relationship
<i>“Might be a way for innovation and processes and policies perhaps to be aligned across an organisation by a group of people who are more than interested parties, experts in doing that...”</i>	P3_Marketing Director	Positioning of data analytics in an organisation
<i>“I think [it should] not [be] centralised, because you would lose the expert knowledge of the data of that business unit which I think is critical to being a statistician”</i>	P1_CIO	Positioning of data analytics in an organisation

To ensure the credibility of a qualitative study, it's important to establish trustworthiness to meet the standards of validity and reliability in research (Lincoln & Guba, 1985). The analysis was conducted as follows to meet the trustworthiness criteria: First, one author read through all the text to get a sense of its content. Next, to minimise potential biases, a second author read the text. Then, various meaning units were extracted and condensed to assess similarities and differences, ultimately leading to the development of major themes.

According to Fusch and Ness (2015), content validity will be hindered unless data saturation has occurred. In this study, different business consultants from across the globe were interviewed regarding big data and the role of the CDO and saturation occurred once the content from the interviews could be replicated. Further interviews were thus not required.

## 6. Results and Findings

Three major themes emerged from the interviews with the senior managers from large retail JSE listed companies as well as local and international data analytic consultants. Notably, the major themes are *Role*

*Uncertainty; The CIO-CDO Relationship; and Positioning of data analytics in an organisation.* The participants expressed these themes repeatedly, and they made similar statements about them. The following sections aim to explore each theme.

### **6.1. Theme: Role Uncertainty**

Interviews with the CIO and a marketing executive were conducted to scrutinise the concept of the CDO. An email interview with a business analytics consultant, consulting in the USA, the UK, the Middle East, and India, was also conducted around the concept of the CDO and the role it plays in organisations. The results from these interviews are reviewed in the paragraphs below.

The CIO, when asked about the role of a CDO indicated, *“I don’t have a view for or against it, actually”* [P1]. He believes that much of the data strategy resides with either the CEO or COO in a traditional retail organisation. In addition, he states: *“I feel hard pressed to see how a chief data officer role would work in a traditional sort of corporate value chain enterprise type environment like retail”* [P1]. The CIO believes that a case for a CDO is more applicable to a digital business, rather than to a complex business, like large sized retailers, where there is a foods business, a fashion business, and a financial services business. Suer (2022) cautions that CIOs are more likely to focus on the technical side and therefore may question the strategic role of a CDO.

The marketing director supposed that the role of the CDO was to communicate to the CEO and other executives of the organisation the importance of data as an asset going forward into the future, as well as communicate the benefits of data in the era of big data. When asked whom the CDO should report to, the marketing director responded:

*“Ideally reporting into the COO or CEO, depending on the size of the organisation. He could be a part of the Board in the future. Reporting to the CFO (like CIOs do in a large number of companies) is a bad idea as CFOs are typically not agents of innovation, creativity, out-of-box thinking and risk taking”* [P3]. This assertion is supported in literature and addresses the strategic role CDOs are likely to play in using data to add value and gain competitive advantage (Lee et al., 2014; Steele, 2017; Nie et al., 2018; Zetlin & Olavsrud, 2022).

Regarding the role of the CDO, the business analytics consultant interviewed considered the role of the CDO as an emerging role. According to the interviewee, many organisations are still not sure at what level of the hierarchy of the organisation this role should reside. In the opinion of the interviewee, the role should be as follows:

*“Ideally reporting into the COO or CEO, depending on the size of the organisation. He could be a part of the Board in the future. Reporting to the CFO (like CIOs do in a large number of companies) is a bad idea as CFOs are typically not agents of innovation, creativity, out-of-box thinking and risk taking”* [P6].

*“The function of the CDO should ideally focus on delivering major business value across the organisation”.* The interviewee further stated, *“To deliver business value, they need to be in constant touch with the business leadership, understand strategy, vision, challenges and know all initiatives”* [P6].

Based on interviews, there were varying opinions on the importance of a CDO in traditional organisations. Some believed that a CDO is not necessary, while others argued that they are crucial for data strategy and data science in larger organisations. Despite the contrasting views, Davenport et al. (2023) argue that traditional data management approaches do not create business value, and the creation of the CDO position was a response to a competitive business environment (Zhao & Kamioka, 2022).

## 6.2. Theme: The CIO-CDO Relationship

During interviews, the relationship between the CIO and CDO in an organisation was discussed. The CIO expressed that the CDO should collaborate closely with them, as their roles are complementary and should not overlap. On the other hand, the marketing director believed that the CDO and CIO should be on the same level and work together closely. This idea is supported by various authors, such as Zhang et al. (2017), De Koker (2019), and Violino (2023), who highlight the significance of collaboration between these two positions.

Regarding the role of IT and the CIO in data and analytics, the marketing director believed that without “*proper direction*” in the organisation in terms of data strategy and analytics, the IT department merely does their jobs and is “*just trying to service all the different business units and their requirements*”. She stated that if the organisational data strategy sat in the correct place with a role like a CDO, “*that centralisation of the data requirement ... will only help IT and the CIO and make their lives a heck of a lot easier because they now have proper direction*” [P3]. The difference between the CIO and the CDO, according to the marketing director is that:

*“... a CIO should be someone with more understanding of the organisation’s systems, architecture and technologies, etc., whereas the CDO actually needs to be an evolution of a data scientist, someone who understands how to connect different pieces of data and what kind of models are required, as well as the type of measurement required”* [P3].

In probing the difference in the roles of the CIO and CDO at an organisation, the business analytics consultant from India commented:

*“CIO’s are certainly not CDO material as data is a weak aspect of most of their repertoire. Also, most CIO’s are not quite deeply aware of business dynamics to deliver business value directly. They simply deliver a platform full of data and expect business to figure out what to do with it! So, while CIO will be responsible for all IT infrastructure, CDO will own the data Infrastructure part”* [P9].

It is clear from these comments that the roles of the CIO and CDO are distinct. The CDO's role is to use data to deliver business value to the organisation, while the CIO ensures that the necessary infrastructure is in place to hold the data. The comments align with Suer (2022) assertion that the CIO is more focused on the technical aspects of data, whereas the CDO is more focused on the business side of data, including analytics and data management at a high level. Thus, the CDO serves as the chief data steward (Fadler & Legner, 2021).

### **6.3. Theme: Positioning of data analytics in an organisation**

One of the main themes that emerged from the research is the debate over whether analytics in an organisation should be centralised or distributed in a federated model. The federated model involves having a core team of data scientists and statistical analysts who report directly to the CDO, while the decentralised teams work within specific business units and collaborate regularly with the core team. This model is commonly used in many organisations. When asked about his preference for centralised versus federated analytics models, the CIO stated that he favored the federated model, with advanced analytics being done by the central team and decentralised teams operating within the business units. He acknowledged that both models had their pros and cons but felt that the federated model would work best in a large retail organisation like theirs.

The Head of Data Analytics felt that the centralised view would be ideal by stating the following:

*“it should be centralized ideally, have a point person, work across business units so they need to kind of bring together parts of the business” [P5].*

On the other hand, the Marketing Director indicated that the necessity of an analytics Centre of Excellence (CoE) within a large organisation was pertinent and that it:

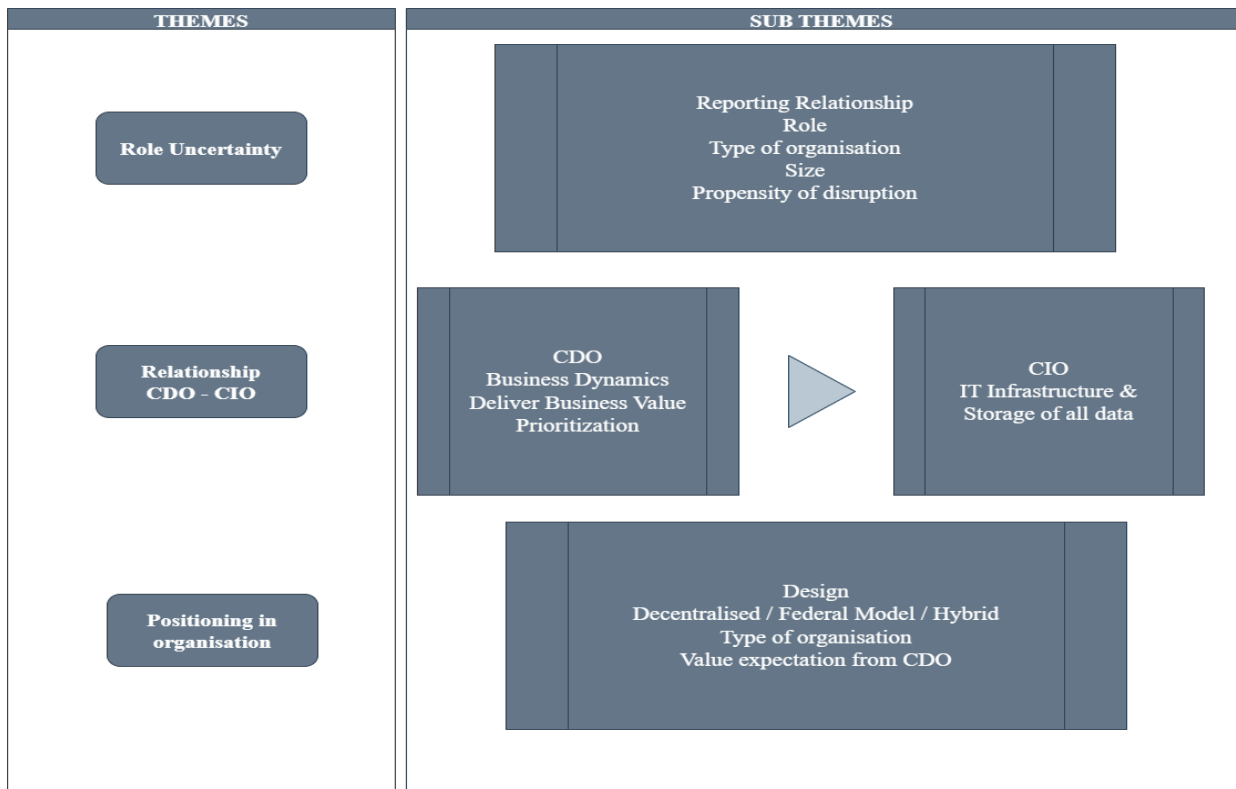
*“might be a way for innovation and processes and policies perhaps to be aligned across an organisation by a group of people who are more than interested parties, experts in doing that...” [P3].*

The marketing director further contended that the CoE should have a permanent leader with a small highly skilled analytics team. The subject matter experts from across the organisation would work with this specialist team, headed by either a chief analytics officer or a CDO, driving the data and analytics strategy of the organisation. Support for CDOs focusing on enterprise-wide governance using data as a strategic asset is offered by Data Meaning (2022) and Violino (2023).

Despite varying opinions, literature acknowledges the advantages of both structures. Specifically, Anand (2018) and Wienzierl (n.d.) propose that a hybrid analytics approach is the most effective way for organisations to meet the challenges of big data. This approach involves a centralised team that serves as a center of expertise, while others are dispersed throughout the various business domains.

### **6.4. Overview of Key Themes**

The thematic map in Figure 1 shows the factors that arise from the emerging themes, namely *Role Uncertainty*, *The CIO-CDO Relationship* (referred to as *Relationship CDO-CIO*), and *Positioning of data analytics within an organisation* (referred to as *Positioning in organisation*). Section 7 (Managerial Implications) elaborates on the emerging themes and associated subthemes as depicted in the thematic map.



**Figure 1. Thematic map of key themes (authors' own construction)**

## 7. Managerial Implications

Findings are aligned to managerial implications by briefly referring to the key theme that emerged from the study, followed by managerial implications/recommendations.

From the literature reviewed and data analysed, there exists a great need for large organisations to have a leader whose primary role is to understand and advocate on behalf of data. A key business leader and driver of data in the organisation – the CDO. It is imperative that organisations with high potential for disruption, to their businesses and commensurately business models, have data officers operating at an executive level. Crucial roles of the data executive, in high-risk businesses prone to startups disrupting existing business models, include early identification of risks challenging existing business models and assisting C-suite executives to develop strategies for sustained competitive advantage using big data.

Since the culture of analytics is driven from the top, and traditionally the CEO is not equipped to handle this task, this means that there is an executive role missing that should be driving the value of data throughout the organisation. Such a leader should be driving analytics and big data strategies within the business and the role should reside at the executive committee level, reporting to the CEO, to influence him/her and other executive teams. Our research has recognised the CDO as this executive and leader of the organisation in creating a data-driven culture and driving data as an asset in the organisation.

The CEO of the organisation, responsible for creating a culture of collaboration, as well as the CDO, should drive the culture of analytics and value from big data. The CDO should be responsible for facilitating a change in the culture of the organisation to become a data-driven culture. People are generally resistant to

change and cling to existing systems. Culture change initiatives should be carefully implemented with a well-structured organisational change process in collaboration with the Human Resource function. In addition to the culture change process, upskilling of staff and managers in new business processes and data analytics will be imperative.

Big data is driving business revenue and operations, and companies must rethink traditional management practices to realise value from this information asset (Kushwaha et al., 2021). As such, a crucial differentiating role of the CDO, from that of the CIO, is understanding how to connect different pieces of data and what kind of models are required, as well as the type of measurement required. As such, the CDO should drive the data and analytics strategy of the organisation thereby enabling CIOs and IT to provide the infrastructure necessary to execute strategy. Respondents indicated that CIOs were not acutely aware of business dynamics to deliver business value directly and were more intent on simply delivering reams of data. CIOs and IT therefore take their cue from the CDO that provides the blueprint for the data architecture. In contrast, CDOs provide leadership in developing new business strategies that reflect and exploit data, as opposed to using data in the standard business sense. This is the true value-adding role of the CDO position.

Literature clearly indicates organisations that have appointed CDOs showed increased revenues, reduced cost and increased innovative product developments. The value that CDOs add to organisations operating in a data-driven environment is unquestionable, regardless of size. Where role uncertainty vis-à-vis positioning and function of the CDO in the organisation is perceived, we postulate (thematic map) that size of the organisation may determine whether the chief data analyst enjoys executive status. Additionally, we postulate that type of organisation (retail, manufacturing, etc.) and propensity for business disruption of the industry (IT, data-driven) will determine the value adding role and positioning of the CDO.

The third key theme (represented in thematic map) derived from our study includes positioning the data analytics function within the organisation. Should data analytics be centralised in the organisation or distributed across the organisation in the form of a federated model. The core team of data scientists and the statistical analysts should sit within the hierarchical line of the CDO, for the large international retail company under study, with the decentralised teams sitting within the business units, collaborating regularly with the core team. It was indicated that many organisations have this model within its hierarchy. The CIOs response to whether analytics should be centralised versus a federated analytics model was that he favoured a federated analytics model, thus decentralised within the business units, with the advanced analytics being done in the centralised team. He believed that both the centralised and decentralised (or federated) models had pros and cons, but in a large retail organisation, the federated model proved best. Derived from the thematic analysis, we propose that the final design/structure may be influenced by the type of organisation and value-adding role expected from the CDO.

## **8. Conclusions, Limitations and Future Research**

The empirical study, conducted with big data analytics consultant experts, provided a clear indication that the role of the CDO should reside at an executive level, reporting to the CEO. A significant contribution is

made to the theoretical understanding of the CDO vis-a-vis the CIO, presented in the thematic map outlining factors including role uncertainty, relationship CDO – CIO, and positioning in the organisation. Key roles of the CDO are; to develop the data-driven strategy in a way that new value is added, to collaborate with both business leaders and technological stakeholders, to facilitating a change in the culture of the organisation to become a data-driven culture, to work closely with the CIO and use their combined skillsets to turn data strategies into operational success, to lead an analytics Centre of Excellence (CoE) within a large organisation that paves the way for innovation and alignment of processes and policies to be aligned across an organisation.

Limited research is available on the role and positioning of the CDO in organisations which merits further investigation. The current study followed a phenomenological approach, and it would be of interest to quantitatively test the proposed factors presented in the thematic map. This study focused on the role of the CDO in a large international retail organisation in South Africa; further investigation into how CDOs will be positioned in small to medium-sized businesses and would they have executive status? Further research into specific skill sets required for CDOs especially with the rapid advances in AI and country specific contextual insights are required.

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