



# The complexity of governance: Validating a pragmatic systems model



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**Background:** Governance quality is an ever-changing phenomenon that is complex, emergent and dynamic. The requirement to assess the quality of governance is prescribed by many regulators and other authorities; however, evidence suggests that the methods used to observe the performance and development of governance do little to mitigate corporate failure. There needs to be a more performance and human-oriented model and assessment framework that observes and measures governance complexity, acknowledging and approaching governance as foundational in all organisational systems.

**Objectives:** This paper validated a pragmatic Complexity Governance Model proposed by Carey and Mahendran, 2025, so that governance assessments and reviews can move beyond compliance towards performance.

**Method:** The methodology followed a quantitative-based approach and used a combination of Opportunity and Non-Probability Sampling methods. Data were collected by way of a structured, internally validated survey instrument. Analysis was conducted using correlational and linear regression to determine if power law relationships existed within the data.

**Results:** Governance is appearing as a complex system through power law relationships and *R*-squared values across many of the 27 indices measured. There was an observable hierarchy across the indices of governance, indicating that some are more influential than others in effecting 'good' governance.

**Conclusion:** The Complexity Governance Model (GOVIndicia<sup>®</sup>) showed early signs of being able to observe and measure governance quality through the lens of complexity and withstood internal validation.

**Contribution:** The Complexity Governance Model and assessment framework can be used to support boards, organisations and regulators to measure, design and monitor governance, governance performance and the effectiveness of development programmes.

**Keywords:** governance; Complexity Governance Model; validation; governance measurement; board evaluation.

## Introduction

Corporate governance codes have proliferated over the last three decades; however, despite this, organisational corporate governance failures have continued to be identified by many regulators and authors (Cole, 2021; CoSteer, 2022; Monks & Minow, 2011). Along with this, failures within the corporate governance system have also been identified (Almashhadani & Almashhadani, 2022). There are also broad and varying perspectives on the methods used to conduct governance assessments and board performance reviews, and how these provide value and nurture good governance practice.

Governance, as an activity, has decision-making at its core, with both the implementation and oversight of those decisions being key responsibilities of the board or leadership. Given that organisations are groups of humans and therefore complex social systems, the culture that permeates and emerges within them influences both the decisions made and actions taken.

This paper validated a new model of governance proposed by Carey and Mahendran (2025) to provide a governance assessment tool (GovQ) and model (GOVIndicia<sup>®</sup>) that observes governance through the lens of complexity. By approaching governance in this way, it is possible to better determine what comprises 'good' governance. The Complexity Governance Model (GOVIndicia<sup>®</sup>) observes and measures governance as an interconnected system, which involves core *domains*

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such as organisational culture, decision-making and implementation and oversight. Therefore, if governance can be measured as a complex system, then this model and assessment tool can be utilised to enhance the value obtained from board performance assessments, governance evaluations and can be utilised by regulators to monitor the performance of governance across their jurisdictions.

## Governance

Corporate governance, in its modern form, emerged following the Cadbury Report published in 1992. It defined governance as '... the system by which business corporations are directed and controlled' (Shah et al., 1992, p. 15) [Cadbury Report]. Since then, governance codes have emerged across the world in order to address repeated corporate governance failings (Nordberg & McNulty, 2013; Shah et al. 2017).

More recently, governance theory has been progressing to support the Environmental, Social, Governance (ESG) agenda around climate change and societal equity (Abson et al., 2017; Boyd et al, 2015; Dietz et al., 2003; Geels, 2004). Governance, therefore, both in theory and practice, is adapting to a world of increasing complexity. Additionally, regulators, international organisations and academics have been recognising that the proliferation of codification is doing little to mitigate corporate failure (Cuomo et al., 2016; Financial Times, 2022; Nordberg & McNulty, 2013; Sjøfjell, 2017; Tacon & Walters, 2021).

As part of many regulatory and governance frameworks, boards are obligated or strongly encouraged to review their effectiveness. These evaluations, which often incorporate governance risk assessments, tend to adopt a compliance-oriented approach, using traditional linear dynamics and thinking.

The authors of this paper suggest that a new approach and model of governance need to be implemented, one that is a more action-based approach to governance, utilising interdisciplinary and transdisciplinary methodologies, such as complexity science (complexity). Therefore, if governance is to be observed and measured from an action-based perspective, then a validated model is needed that can steer towards this path.

## Complexity

Complexity is a scientific discipline that endeavours to observe and measure phenomena or systems beyond traditional linear models towards the inter-relational. Its focus is to observe and understand how numerous interacting individual elements, sometimes called agents (Bonabeau, 2002), affect the behaviour of the larger system, seeking emergent patterns and adaptive processes (the Santa Fe Group, 1996).

Complex systems can be understood and observed as either open or closed systems that continually evolve and are influenced by their historical trajectories (Mena, 2003). These

agents typically lack awareness or understanding of the overall system and its behaviour, whilst their interactions produce both reinforcing and stabilising feedback loops, creating emergent behaviours and system dynamics (Maguire et al., 2006).

The vast and growing body of complexity research has been in the spheres of physical and biological systems, with social systems receiving much less attention. However, this area is developing, with the determining difference being identified as independent free will. Kane (Ed. 2011) suggested that the frameworks used in biological systems can also be utilised in social systems, accommodating free will. This lends itself to governance and collective social decision-making, as well as the study of collective behaviour and how these groups structure themselves and their internal dynamics, evolve over time and are emergent (Coveney & Highfield, 1996).

With chaotic and uncertain characteristics being evident in complexity (Gleick, 1989; Parker & Stacey, 1994; Stacey, 1996; Wilding, 1998) and also in business environments, and therefore by extension governance, these conditions pose significant challenges to organisations and boards leading them (Mena, 2003).

Bringing this down to its essence, Kauffman (2022) describes this interplay most eloquently, bridging the divide between the biological and the social. Kauffman (2022) describes complexity as,

... a state of systems with a high degree of orderliness that provides stability yet also possesses flexibility and the potential for surprise. It's characterised by components that are relatively autonomous and interact in multiple ways, leading to non-linearity, randomness and emergence. In essence, complexity arises from the interplay of order and unpredictability within a system.

## Complexity and governance

Given that governance has been described as a system (Shah et al., 1992) [Cadbury Report], it's not a huge leap to conclude that governance could be observed as inherently complex. A system where authority is exercised, decisions are made and then operationalised (Ed. Commission on Global Governance, 1995).

Complexity provides an approach and methodology that embraces the interconnected nature, fundamental unpredictability and uncontrollability of such systems, as well as their nonlinearity. This enables scientific research to move beyond the pursuit of prediction and control, instead prioritising an enhanced understanding of the dynamics of a system. This approach is centred around participation in the system rather than linear causal relationships (May, 2022; Wahl, 2019). This is a key that could turnabout the continued failures of both governance within organisations and the systems and frameworks that surround governance.

According to Strand (2002), there are three ways of observing and understanding the complexity of governance (simple view, thin complexity and thick complexity). The simple

view observes the system as linear and reducible. By contrast, thin complexity acknowledges uncertainty and nonlinearity; however, it seeks to manage this through models or heuristics. Thick complexity describes the system as irreducible with uncertainty, emergence and dynamic interactions as inherent features of the governance system.

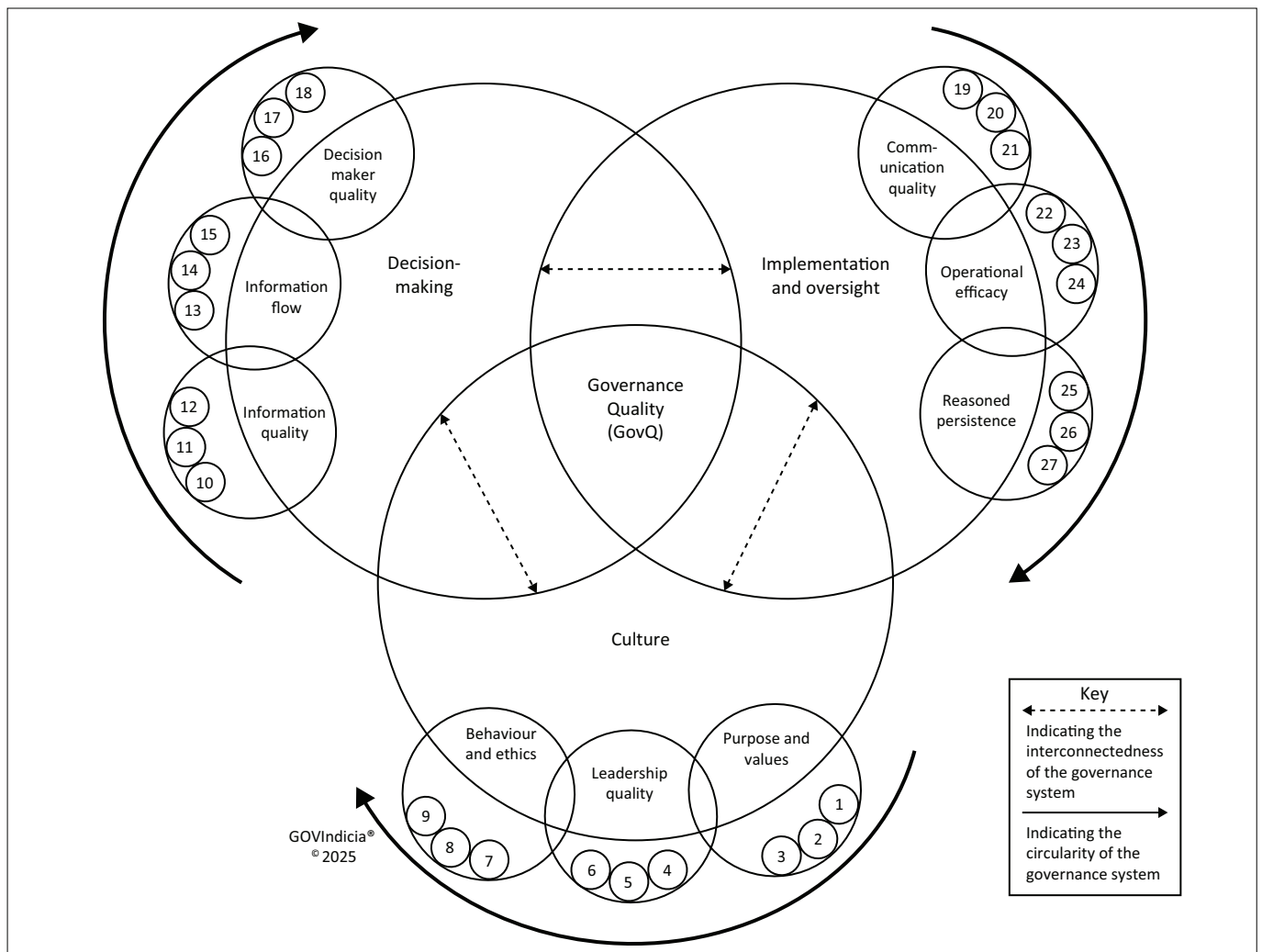
Although Strand further indicates the importance of complementarity and contextuality when understanding the complexity of governance, suggesting that complex systems cannot be governed with a 'one-size-fits-all' model, the model validated in this paper (Complexity Governance Model) considers governance as a human activity, the 'act of governing' and could be considered as a one-size-fits-all model.

### The Complexity Governance Model – GOVIndicia®

The Complexity Governance Model (Figure 1) was proposed by Carey and Mahendran (2025) as a dynamic systems framework that speaks to governance as a complex system. The model specifically addresses governance as an internal action-based system, which observes governance as the 'act of governing'.

There are three core foundational *domains* to the model: Decision-making, implementation and oversight and organisational culture. The model shows the intersection of these three *domains*. It illustrates how the decisions made (Crivelli & Balconi, 2023; Morrison et al., 2025) and the actioning of those decisions (Ellinas et al., 2017; Franca & Hollnagel, 2023; Zheng et al., 2024), individually and/or collectively, are influenced by the prevailing culture of any group. Additionally, it acknowledges how the culture of the group influences the manner in which decisions are made and the nature of those decisions. Organisational governance in this model is represented as more than the sum of its parts.

Governance Quality represents the outcome of the three interconnecting *domains*, each maintaining a reciprocal relationship with the others. The resulting outcome emerges through the dynamic interplay amongst these *domains*. Each *domain* is also in a constant state of change, feeding back into the wider system and contributing to a complexity model characterised by observable emergent properties and internal feedback mechanisms. The dashed arrows signify this interconnectedness, indicating that the relationships are multidirectional rather than linear. The model is also cyclical,



Source: Adapted from Carey, P.J.G., & Mahendran, D. (2025). The complexity of governance: Towards a pragmatic systems model. *Advances in Corporate Governance*, 2(1), a23. <https://doi.org/10.4102/acg.v2i1.23>

FIGURE 1: The Complexity Governance Model – GOVIndicia®.

modelling the process of collective decision-making from an internal governance perspective.

Each of the three foundational *domains* of GOVIndicia® has nine *categories* that contribute towards and influence them. The nine *categories* themselves also have three *indices* that influence them. The model, therefore, has three foundational *domains*, nine *categories* and 27 *indices*, as shown in Figure 1. The indices are noted in Appendix 1 (Table 1-A1) – The Domains, Categories and Indices of the Governance Complexity Model, GOVIndicia®.

## Research methods and design

### Study design

This research design documents the overall strategy and blueprint for investigating, collecting and analysing the research question (De Vaus, 2001). This consisted of constructing and implementing a survey instrument that produced quantitative data on each of the 27 *indices* of the Complexity Governance Model (GOVIndicia®). These data were then analysed using correlational and linear regression analysis in order to assess the validity of the model.

### Study population

The target and entire population studied was the full group of organisations surveyed as participants. No sample of the population was taken. Those who took part in the study were called the participants (Patten, 2016).

The study population were 34 organisations that self-selected to participate. They were located in the United Kingdom and the Channel Islands and involved private, not-for-profit and governmental organisations.

### Survey instrument and data collection

A survey is a systematised method for gathering information from participants for the purposes of collecting quantitative or qualitative data for analysis (Groves et al., 2011).

To collect quantitative data in this study, a 36-statement survey instrument was used, based on the Complexity Governance Model (Figure 1). This instrument gathered sentiment data from the employees of each participant organisation. The implemented survey covered all of the 27 *indices* as presented in Appendix 1 (Table 1-A1).

In order to facilitate complete customisation of the survey, a bespoke survey and reporting engine (GovQ<sup>+</sup>) was built. The semantic design, scaling of the survey statements and the aesthetics are detailed in the following sections.

### Survey scales

The survey instrument used three principal scales: a measure of agreement, a measure of quality and a measure of confidence. All of these were scored in the form of a Likert

scale (Jamieson, 2004), which was not visible to the participants. Being 'not visible' mitigates patterning of responses and subconscious bias, which is reported by Tourangeau et al. (2000) to improve data validity and accuracy. They go on to report that such patterning can occur due to cognitive shortcuts participants take to reduce effort, like anchoring on a previous answer and insufficiently adjusting when answering the next question.

Incorporating confidence scales into the survey assisted in reducing biases associated with social desirability (Fowler, 2013) and was again implemented to improve the accuracy and validity of responses. By allowing respondents to express how confident they were in their sentiment, as well as removing elements of social desirability, it created a subconscious process whereby respondents reflected on their scores of agreement or quality (Fowler, 2013; Koriat 2012). Essentially, respondents gathered evidence and reported on it to support their perspectives on each survey statement.

This approach of a two-dimensional survey instrument allowed reporting of respondents' sentiment against the 27 *indices* on a quadrant plot of agreement/quality versus confidence (see Figure 2).

The survey selection cursor was centred between the scales of agreement, quality and confidence (see Figure 3 – Survey Collection Engine – Statement Example). This was to encourage respondents to move towards a particular perspective rather than sit in the middle.

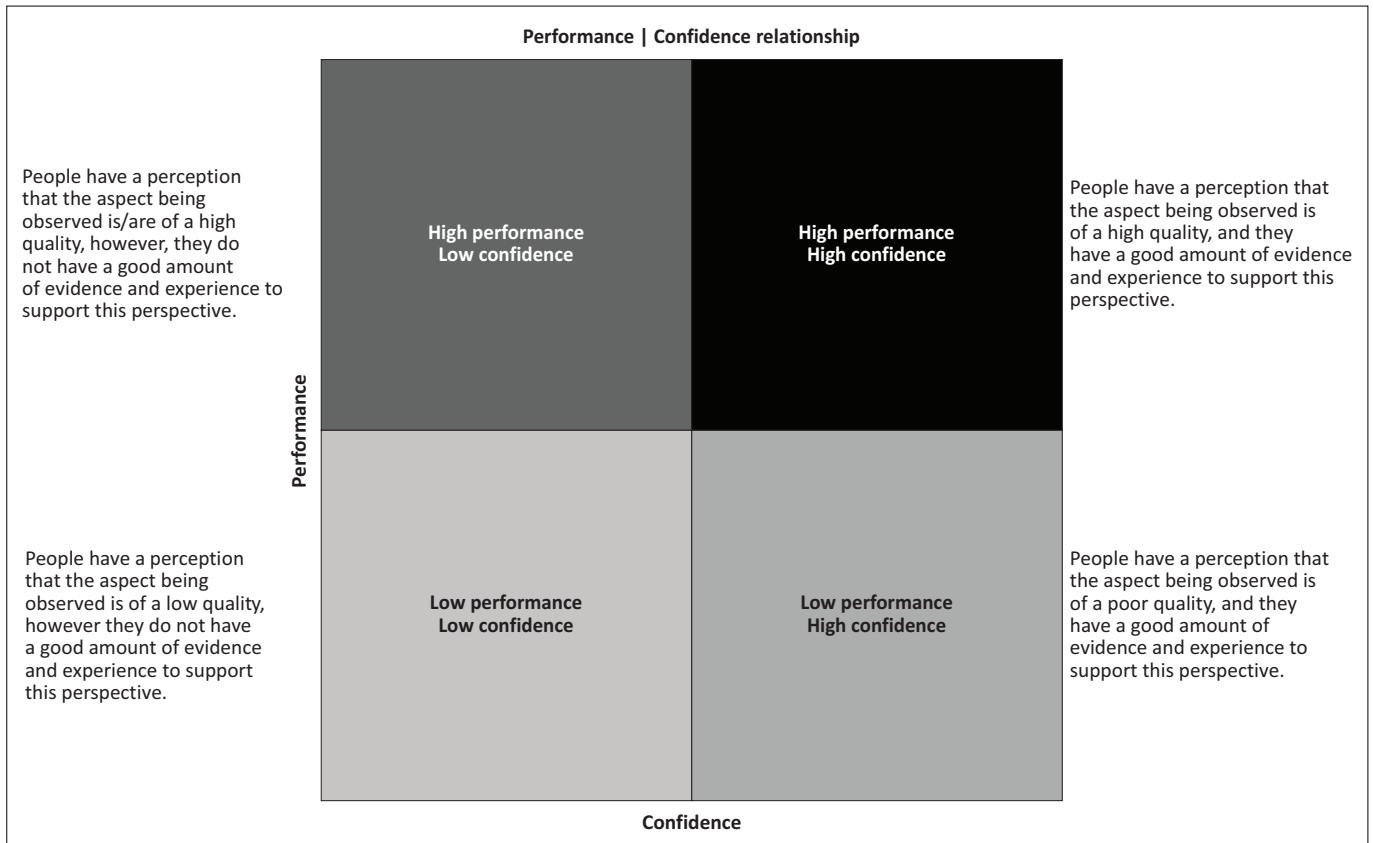
### Anonymity and encryption

Responses were collected with complete anonymity, ensuring high levels of honesty and therefore accuracy. This was ensured by the utilisation of an encryption method built into the survey collection engine (GovQ<sup>+</sup>), whereby the responses were pseudo-anonymised at the point of submission.

### Internal validation

Internal validity is the extent to which causal conclusions are warranted based on the study design, context and control of confounding variables (Shadish et al., 2002). Its importance in survey validation lies in establishing confidence that survey results accurately represent the underlying constructs being studied, ensuring reliability and precision in research findings (DeVellis & Thorpe, 2021).

The nature and uniqueness of the model and approach meant that it was not feasible to externally validate the survey; so, to ensure confidence in the accuracy, reliability and repeatability, the survey instrument was designed and constructed to enable internal validation. This was accomplished by encompassing two surveys into one instrument, utilising different quantitative assessments (one through agreement – strongly agree to strongly disagree; one through quality – very good to very poor).



**FIGURE 2:** The performance vs confidence relationship.

**Statement 1 of 36**  
The 'purpose' and 'values' in our organisation are clearly defined, articulated and communicated

Strongly disagree

Low confidence

Strongly agree

High confidence

**NEXT**

[< Previous](#)

**FIGURE 3:** Survey collection engine – Statement example.

Parallel administration of related surveys or multiple subscales allows examination of convergent and concurrent validity, which supports internal validity by showing that different instruments measuring related constructs produce consistent results. This is particularly useful in multidimensional constructs often studied in social sciences (Fowler, 2013; Groves et al., 2011).

Internal validity is particularly important in survey design because surveys often rely on self-reported data vulnerable to biases (e.g. response, recall, social desirability), which can impact any inferences from the results (Fowler, 2013). This paper sought to establish the internal validity of this new instrument by implementing two distinctly different surveys in one instrument. It also sought to demonstrate how observable differences between organisations could be both visualised and reported to display objectivity.

## Data sampling

Sampling can be explained as a process of choosing a group that represents a population which will be researched. There are various sampling methods. The study used opportunity sampling, the most significant benefit being that it is a remarkably straightforward way to gather participants (Thompson, 2012). It was expected that the nature of a new method of observing and measuring governance that was more invasive than usual may not necessarily have resulted in a large population, hence the preference for opportunity sampling. In addition to this, it was considered appropriate to get a broader coverage of organisations as systems tend towards simple rules under complexity (Kauffman, 2022). This means that the findings, however diverse in sample, could be defining attributes of good governance for all types, sizes and natures of organisations.

## Data collection

Data were collected through the survey collection engine GovQ<sup>+</sup>. The design of the survey was detailed above. Figure 3 is an example statement and shows the design of the survey, illustrating the sliding scales and cursor selection and control.

## Data analysis

### Identifying complexity

Observing and identifying complexity within systems has been approached by many different statistical means

(Ladyman et al., 2013; Rebout et al., 2021), two of which, suggested to observe social systems, are through power law relationships and *R*-squared (Flack, 2012).

### Power law relationships

Power laws describe a type of nonlinear relationship where a relative change in one quantity results in a proportional relative change in another, regardless of their initial sizes (Wooldridge, 2016). These relationships are common in complex systems and often appear as straight lines on log-log plots (Clauset et al., 2009). In order to evaluate and assess the presence of complexity, log-log plots were created and linearity determined.

### Coefficient of determination or *R*<sup>2</sup> value

In regression analysis, the *R*-squared value (also known as the coefficient of determination) is a statistical measure that indicates how well the regression model fits the data (Wooldridge, 2016). Wooldridge states that it represents the proportion of variance in the dependent variable that is explained by the variables in the model; a higher *R*-squared value suggests a better fit, meaning the model explains a larger portion of the variability of the dependent variable data.

*R*-squared values range from 0 to 1 (or 0% to 100%). When interpreting the data, the study used general understandings of *R*-squared values and their significance, as noted below.

***R*-squared values of: 0 (or 0%):** The model explains none of the variability in the dependent variable. The variables have no relationship with the dependent variable.

***R*-squared values of: 1 (or 100%):** The model perfectly explains all the variability in the dependent variable. The variables perfectly predict the dependent variable.

***R*-squared values between 0 and 1:** Indicate the percentage of variability explained by the model. For example, an *R*-squared of 0.60 (or 60%) suggests the model or indices explain 60% of the variance in the dependent variable.

In some fields like the social sciences, an *R*-squared of 0.50 (or 50%) might be considered strong, whilst in others, like finance, it might need to be much higher, e.g. 0.70 (or 70%) (Gupta et al., 2024).

This study utilised both these statistical techniques to evaluate the presence of complexity through linear regression. In all probability, it was possible that some of the variables [*indices* scores] were strongly correlated with one another (Multicollinearity) (in fact, this is exactly what the model suggests). If more than two variables are highly correlated, then only one of them at a time should be used in the regression model. A multi-correlational analysis and matrix were used to establish correlations between variables.

## Results

The aggregate mean results recorded for all organisational assessment data were then analysed for multi-collinearity utilising the Excel correlation function and reported in a matrix (see Box 1 – Correlational data inter-*indices*).

A number of strong (> 0.7) correlations between variables were discovered, so linear regression was conducted on each variable individually against the outcome variable, GovQ.

Box 1 – Correlational data inter-*indices* showing the correlational relationships between indices where the correlations are > 0.7 (those highlighted in bold). Box 1 strongly suggests that there is an emerging hierarchy of factors that influence GovQ. The three *indices* identified across each of the three *domains*, which were operationally independent, were then identified (those identified in the grey row and showing white with black text). These three were: Purpose and Values – Embedded (1.2.2); Information Flow – Speed and Transparency (2.2.3); and Communication – Clarity, Conciseness and Comprehension (3.1.2). These three were then analysed using linear regression against the mean GovQ score and presented in Table 1.

Table 1 – *R*-squared calculations for the three selected indices displays the *R*-squared values for each of the three *indices* selected by way of identifying the most correlated *indices* in each of the three *domains* of culture, decision-making and implementation and oversight. Values of greater than 50% are considered in social science to be evidence of high levels of explanatory variance and indications of complexity in the system. The three outcomes indicate that all three *indices* are 75% or above.

The log-log plots for each of the three selected indices (Appendix 2 [Figure 1-A2, Figure 2-A2 and Figure 3-A2]) highlight the emerging linear nature and therefore complexity of these relationships from the linear regression analyses and further suggest evidence of complexity within the system and model. Figure 4 is the log-log plot for one of the indices, Purpose and Values Embedded, as an example.

Internal validity was assessed through correlational analysis, specifically between the mean outcomes from the grouped statements (three for each of the 9-*categories* – ‘agreement’), and the nine statement scores assessing through ‘quality’. Table 2 (Internal validity of the survey instrument) reports the means and scores analysed and the correlational outcome.

Reporting organisational GovQ score against GovQ confidence, as per Figure 2 (The Performance vs Confidence Relationship), it can be observed that there are differences in what the authors have coined ‘Governance Murmuration<sup>®</sup>’ as a means of reporting observable differences between organisations. By way of three examples:

Organisation 2 (Org. 2) has the lowest mean GovQ score (6.4) and the second lowest GovQ confidence score (4.5).

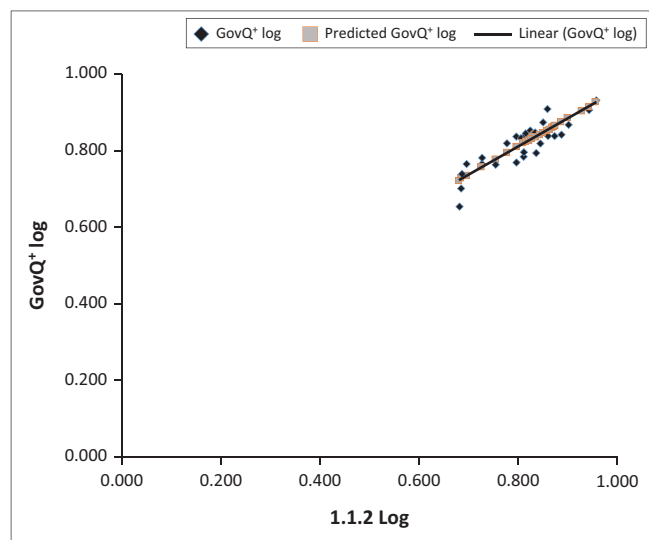
BOX 1: Correlational data inter-indices.

GOVindicia governance categories		Purpose & values			Leadership quality			Behaviour & ethics			Information quality			Information flow			Decision-maker quality			Communication quality			Operational efficacy			Reasoned persistence			
No.	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	3.1.1	3.1.2	3.1.3	3.2.1	3.2.2	3.2.3	3.3.1	3.3.2	3.3.3		
GOVindicia governance indices	1.1.1	-	0.75	0.54	0.31	0.45	0.58	0.39	0.47	0.59	0.61	0.65	0.54	0.44	0.58	0.22	0.18	0.49	0.59	0.64	0.49	0.51	0.18	0.42	0.36	0.60	0.32		
Purpose and values – clarity	1.1.2	0.75	-	0.82	0.74	0.82	0.77	0.88	0.69	0.72	0.68	0.69	0.75	0.77	0.79	0.44	0.25	0.62	0.70	0.73	0.76	0.73	0.24	0.55	0.50	0.44	0.34		
Purpose and values – embedded	1.1.3	0.54	0.82	-	0.69	0.79	0.76	0.83	0.59	0.70	0.61	0.59	0.60	0.68	0.70	0.46	0.22	0.43	0.78	0.71	0.79	0.67	0.25	0.43	0.39	0.45	0.31		
Purpose and values – challenged	1.2.1	0.31	0.74	0.69	-	0.85	0.86	0.83	0.81	0.63	0.45	0.38	0.53	0.77	0.56	0.46	0.24	0.54	0.56	0.46	0.84	0.57	0.21	0.20	0.26	0.18	0.12		
Leadership – courage, trust and empathy	1.2.2	0.45	0.82	0.79	0.85	-	0.85	0.86	0.78	0.57	0.48	0.52	0.71	0.74	0.77	0.58	0.35	0.59	0.68	0.67	0.79	0.57	0.32	0.37	0.49	0.34	0.38		
Leadership – values, responsibility and ownership	1.2.3	0.50	0.77	0.76	0.86	0.85	-	0.82	0.65	0.69	0.54	0.50	0.65	0.63	0.65	0.49	0.28	0.48	0.63	0.58	0.77	0.63	0.20	0.27	0.40	0.34	0.16		
Leadership nurturing creativity and resilience	1.3.1	0.58	0.88	0.83	0.83	0.86	0.82	-	0.71	0.74	0.72	0.61	0.64	0.73	0.75	0.50	0.24	0.60	0.69	0.72	0.88	0.75	0.29	0.48	0.36	0.38	0.24		
Behaviour – purpose and value driven	1.3.2	0.39	0.69	0.59	0.81	0.63	0.65	0.71	-	0.49	0.46	0.40	0.46	0.44	0.51	0.47	0.16	0.22	0.38	0.54	0.51	0.79	0.46	0.07	0.23	0.14	0.19	-0.01	
Behaviour – ethical, civil and respectful	1.3.3	0.47	0.69	0.70	0.63	0.78	0.69	0.74	0.49	-	0.48	0.41	0.46	0.50	0.49	0.63	0.55	0.29	0.40	0.69	0.59	0.72	0.70	0.43	0.32	0.37	0.42	0.49	
Behaviour – reward and remuneration aligned	2.1.1	0.59	0.72	0.61	0.45	0.57	0.54	0.72	0.46	0.48	-	0.93	0.94	0.84	0.85	0.35	0.05	0.51	0.56	0.79	0.57	0.73	0.27	0.73	0.53	0.49	0.31		
Information – data validity, accuracy and reliability	2.1.2	0.61	0.68	0.53	0.38	0.48	0.45	0.61	0.40	0.41	0.93	-	0.94	0.81	0.80	0.83	0.40	0.06	0.50	0.47	0.72	0.48	0.71	0.34	0.73	0.57	0.53	0.33	
Information – data meaningful, relevant and appropriate	2.1.3	0.65	0.69	0.59	0.38	0.52	0.50	0.64	0.46	0.46	0.94	0.94	-	0.80	0.76	0.87	0.33	0.00	0.40	0.57	0.84	0.53	0.69	0.27	0.74	0.51	0.57	0.30	
Information – clarity, conciseness and comprehension	2.2.1	0.54	0.75	0.60	0.53	0.71	0.65	0.73	0.44	0.50	0.84	0.81	0.80	-	0.91	0.86	0.49	0.30	0.61	0.47	0.75	0.51	0.83	0.36	0.74	0.76	0.51	0.44	
Information flow – availability	2.2.2	0.44	0.77	0.68	0.77	0.74	0.63	0.75	0.51	0.49	0.84	0.80	0.76	0.91	-	0.86	0.52	0.27	0.61	0.57	0.75	0.61	0.83	0.35	0.71	0.68	0.43	0.36	
Information flow – timeliness	2.2.3	0.58	0.79	0.70	0.56	0.77	0.65	0.72	0.47	0.63	0.85	0.83	0.87	0.86	0.86	-	0.47	0.19	0.56	0.67	0.85	0.64	0.78	0.36	0.68	0.65	0.54	0.43	
Information flow – speed and transparency	2.3.1	0.22	0.44	0.46	0.46	0.58	0.49	0.50	0.16	0.55	0.35	0.40	0.33	0.49	0.52	0.47	-	0.35	0.44	0.39	0.43	0.43	0.70	0.73	0.27	0.48	0.35	0.61	
Decision-maker – assessment and competence	2.3.2	0.18	0.25	0.22	0.24	0.35	0.28	0.24	0.22	0.29	0.05	0.06	0.00	0.30	0.27	0.19	0.35	-	0.43	0.27	0.25	0.34	0.43	0.41	0.01	0.62	0.33	0.48	
Decision-maker – training and development	2.3.3	0.49	0.62	0.43	0.54	0.59	0.48	0.60	0.38	0.40	0.51	0.50	0.40	0.61	0.61	0.56	0.44	0.43	-	0.34	0.46	0.56	0.52	0.38	0.48	0.37	0.41		
Decision-maker – disruption awareness	3.1.1	0.59	0.70	0.78	0.56	0.68	0.63	0.69	0.54	0.69	0.56	0.47	0.57	0.47	0.57	0.39	0.27	0.34	-	0.73	0.76	0.66	0.37	0.33	0.40	0.55	0.32		
Communication – method and relevance	3.1.2	0.64	0.73	0.71	0.46	0.67	0.58	0.72	0.51	0.59	0.79	0.72	0.84	0.75	0.75	0.85	0.43	0.25	0.46	0.73	-	0.69	0.75	0.31	0.71	0.53	0.69	0.42	
Communication – clarity, conciseness and comprehension	3.1.3	0.49	0.76	0.79	0.84	0.79	0.77	0.88	0.79	0.72	0.57	0.48	0.53	0.51	0.61	0.64	0.43	0.34	0.56	0.76	0.69	-	0.64	0.30	0.30	0.24	0.42	0.18	
Communication – emotional intelligence	3.2.1	0.51	0.73	0.67	0.57	0.57	0.63	0.75	0.46	0.70	0.73	0.71	0.69	0.83	0.83	0.78	0.70	0.43	0.52	0.66	0.75	0.64	-	0.63	0.57	0.68	0.55	0.56	
Operational – value and procedure based	3.2.2	0.18	0.24	0.25	0.21	0.32	0.20	0.29	0.07	0.43	0.27	0.34	0.27	0.36	0.35	0.36	0.73	0.41	0.38	0.37	0.31	0.30	0.63	-	0.26	0.51	0.49	0.72	
Operational – efficiency and effectiveness	3.2.3	0.42	0.55	0.43	0.20	0.37	0.27	0.48	0.23	0.32	0.73	0.73	0.74	0.74	0.71	0.68	0.27	0.01	0.38	0.33	0.71	0.30	0.57	0.26	-	0.59	0.56	0.44	
Operational – independence and conflict	3.3.1	0.36	0.50	0.39	0.26	0.49	0.40	0.36	0.14	0.37	0.53	0.57	0.51	0.76	0.68	0.65	0.48	0.62	0.48	0.40	0.53	0.24	0.68	0.51	0.59	-	0.54	0.68	
Reasoned persistence – systems and controls framework	3.3.2	0.60	0.44	0.45	0.18	0.34	0.34	0.38	0.19	0.42	0.49	0.53	0.57	0.51	0.43	0.54	0.35	0.33	0.37	0.55	0.69	0.42	0.55	0.49	0.56	0.54	-	0.64	
Reasoned persistence – feedback loops and review	3.3.3	0.32	0.34	0.31	0.12	0.38	0.16	0.24	-0.01	0.49	0.31	0.33	0.30	0.44	0.36	0.43	0.61	0.48	0.41	0.32	0.42	0.18	0.56	0.72	0.44	0.68	0.64	-	
Reasoned persistence – independent assurance																													

**TABLE 1:** *R*-squared calculations for the three selected indices.

Indices	Domain	No.	<i>R</i> <sup>2</sup> %
Information flow – speed and transparency	Decision-making	2.2.3	80%
Purpose and values – embedded	Culture	1.1.2	79%
Communication – clarity, conciseness and comprehension	Implementation	3.1.2	75%

No., number.



Note:  $Y = 0.7327x + 0.2227$ ,  $R^2 = 0.793$ .

**FIGURE 4:** Charted log-log outcomes for purpose and values embedded.

The range of mean GovQ responses are score (1.8 to 6.9); confidence (5.5 to 7.4).

Organisation 25 (Org. 25) has the highest mean GovQ score (8.5) and the fourth highest GovQ confidence score (8.4). The range of mean GovQ responses are score (7.6 to 9.4); confidence (7.2 to 9.4). Organisation 23 (Org 23) has the mean GovQ score (7.1) and the GovQ confidence score (7.6). The range of mean GovQ responses are score (6.2 to 8.0); confidence (6.1 to 8.9).

## Discussion

### Key findings

#### The complexity of governance

This paper sought to investigate, through the implementation of the Complexity Governance Model (GOVIndicia<sup>®</sup>), whether aspects of complexity, such as interconnectedness, could be observed within the governance of organisational systems. Two approaches were used: power law observations and *R*-squared observations. To determine which *indices* log-log plots should be drawn, the correlational analysis (collinearity) identified the *indices* with the highest correlation within each of the three *domains*. These were as noted in Box 1 (Purpose and Values – Embedded; Information Flow – Speed and Transparency; and Communication – Clarity, Conciseness and Comprehension).

#### *R*-squared observations

The outcome of the data analysis following the linear regression on the three *indices* above (Table 1) discovered high *R*-squared

**TABLE 2:** Internal validity of the survey instrument.

Categories	Category no.	Mean agreement	Mean quality	Variance	Correlation $\rho$ = value
Purpose and values	1.1	6.73	7.15	-0.43	-
Leadership quality	1.2	7.23	7.31	-0.08	-
Behaviours and ethics	1.3	7.09	7.81	-0.72	-
Information quality	2.1	6.76	6.90	-0.14	-
Information flow	2.2	6.56	6.54	0.02	0.74
Decision-maker quality	2.3	6.48	6.07	0.40	-
Communication quality	3.1	7.04	7.02	0.03	-
Operational efficacy	3.2	6.41	7.21	-0.80	-
Reasoned persistence	3.3	6.16	6.08	0.08	-

no., number.

values (< 0.74 [74%]). This indicates that the percentage of variability of GovQ explained by each of the indices is very high (Gupta et al., 2024). This infers each of these three *indices* significantly influences the variability of the GovQ.

#### Power law observations

The outcome of the data analysis following the log-log plots on the three *indices* above (Figure 4) discovered high levels of linearity when drawing lines of best fit. This infers underlying power law relationships between the variables (*indices*) and GovQ.

These key findings and observations strongly suggest that the Complexity Governance Model and its associated assessment framework (GovQ) are able to observe and measure governance as a complex interconnected system.

#### The validity of the complexity governance model

**The internal validity:** To assess the validity of any assessment methodology, it is essential to cross-validate an instrument internally or externally to evidence the practical applicability of that model. An internal validation process was undertaken for the Complexity Governance Model and its assessment framework, GovQ. Ideally, external validation is the preferred method to validate an assessment methodology; however, due to the uniqueness, internal validation was selected. The correlation analysis undertaken (Table 2) shows a high correlation between the overall mean agreement scores and the overall mean quality scores (the two-survey instruments). This indicates strong statistical evidence of the validity of both the Complexity Governance Model (GOVIndicia<sup>®</sup>) and its assessment framework, GovQ.

**The observable differences between organisations:** Gauging the validity of any model and assessment methodology should involve the exploration and analysis of observable differences. This process of exploring and discovering if the model and framework can observe differences between participants demonstrates an objectivity to the assessment framework. The three organisations identified in Figure 5 clearly show that by utilising this assessment framework, it evidences the capacity to explore and analyse observable differences between participant organisations, what the authors have coined 'Governance Murmuration<sup>®</sup>'. This indicates strong anecdotal evidence towards the validity of

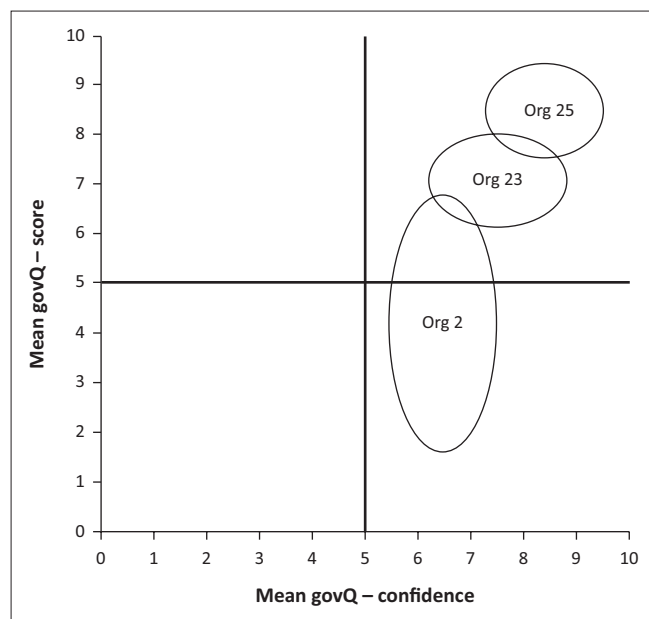


FIGURE 5: Participant organisational means of score and confidence.

both the Complexity Governance Model (GOVIndicia®) and its assessment framework, GovQ.

## Discussion of key findings

Governance is an interconnected system; a system where different aspects of an organisation's performance need to work collectively to influence and drive its overall effectiveness and efficiency. This perspective renders governance as a complex system. The lens of complexity allows us to observe, understand and perhaps even measure governance, not just from a compliance perspective but also performance.

The purpose of this study was to assess the validity of a new systems model of governance, the Complexity Governance Model (GOVIndicia®), along with an assessment framework, GovQ. This was needed because corporate governance failures continue (Cole, 2021; Monks & Minow, 2011), as well as failures within the corporate governance system itself (Almashhadani & Almashhadani, 2022). A new approach was required to measure organisational GovQ. There are also challenging perspectives on how to conduct governance assessments and board performance reviews in order to provide measurable value and recommendations for good governance practice.

The analysis of both power law relationships and *R*-squared to explore the validity of the Complexity Governance Model and its potential to represent and measure the complexity of governance has shown promising initial outcomes. Whilst these two measures are not a panacea to evidencing complexity (Flack, 2012), they do provide statistical means of demonstrating that a relative change in one variable (in this case, various *indices* of governance) can lead to a proportional relative change in another (GovQ), regardless of their initial sizes (Wooldridge, 2016). The outcomes reported, especially in *R*-squared values (>0.74), are suggestive of complexity in both the theoretical model and within the data collected using GovQ.

The purpose of validating a model and assessment methodology is to ensure its meaningfulness and relevance to the world. This signifies essentially that the results accurately represent the underlying constructs being studied (DeVellis & Thorpe, 2021), in this instance, GovQ. External validation was rejected as no similar methodology or assessment framework was identified. An internal validation method was adopted due to the methodology's originality and the absence of precedent standards against which it could be evaluated. The internal validation outcomes were assessed and analysed through the process of cross-validation, where two independent surveys were conducted contemporaneously and correlational analysis was undertaken.

As noted in this paper, it is increasingly acknowledged in the governance literature that the codification of governance practices and principles has fallen short in achieving their intended outcomes. Whilst such frameworks provide compliance-based structure and guidance, they frequently fail to grasp and understand the nuances of complex organisational dynamics and how governance effectiveness is enacted in practice. Governance failures are less a product of regulatory absence than of insufficient critical reflection (decision-making), inadequate interpretive capacity and the application of established rules within a specific organisational setting (implementation and oversight).

The Complexity Governance Model has shown itself as a potential paradigm-shifting approach to these challenges. Unlike linear conformance through codification, the model affords the ability to observe and understand organisational governance dynamics through the lens of complexity. This could allow for better alignment, assessment and measurement of governance practices within organisations and boards, as well as better design of development programmes for governance improvement.

## Implications and recommendations

The development and early advancement of the Complexity Governance Model was designed to observe and measure governance through the lens of complexity, using a quantitative data assessment tool to interrogate the complexity of organisational governance systems and propose practical application. Traditional governance frameworks have long been critiqued for their compliance-based approach and often fail to understand and grasp governance from its dynamic and complex dimensions.

The Complexity Governance Model provides a significant shift in both observing and understanding governance from an intra-organisational perspective. The model expands the opportunity for regulators, reviewers and boards themselves to move towards a more reliable, objective and robust governance measurement.

Beyond just observing, understanding and measuring governance through the lens of complexity, it has also evidenced the capacity and ability to surface patterns of

governance within organisations, being able to differentiate organisations from one another. This opens the opportunity to truly measure and distinguish best practice, shifting the perspective from rule-based evaluation towards proactive action-based governing models and assessments. The Complexity Governance Model (GOVIndicia<sup>®</sup>) extends measurement beyond current code frameworks; it has the potential to reshape the epistemological foundations of how governance performance and its effectiveness are conceptualised, observed and validated.

The broader implication is a possible transformative shift in governance research and its practical application. If governance can be captured through the lens of complexity, then the central question shifts from whether a rule or even principle-based approach is established and complied with, to how it is operationalised, adapted and sustained within complex organisational environments.

The recommendations are extensive; however, they involve doing further and continuing research on the emergent governance complex system within and across different organisational populations, such as jurisdictions, industries and maturities, to identify any differences or similarities in patterns. With governance emerging as a complex system, and with the value of agent-based modelling (ABM) (Carey & Mahendran, 2025), future research should consider the use of this modelling as a methodology to extend current understanding of governance dynamics. Agent-based modelling provides a methodological framework that is capable of simulating the interaction of heterogeneous actors and providing further understanding towards emergent properties of complex systems, in this case, an organisation. This approach will be of significant value in governance research, where outcomes cannot be reduced to linear causality. Based on these insights from the adoption of ABM and collection of new data, further research also aimed to continue the exploration of the integration of ABM with complementary methodologies such as network analysis, system dynamics and undertaking more qualitative case studies. This further research should seek to challenge and test the robustness and applicability of the Complexity Governance Model (GOVIndicia<sup>®</sup>).

The principal limitation of this study was its method of data collection, opportunity (or convenience) sampling, because it may not be fully representative of the larger population and can introduce biases. However, in the context of the study, it was the most practical and appropriate approach. The study aimed to capture organisations that naturally experience the governance challenges studied, which meant participants were selected based on the timing, location and context in which these challenges occur. Random sampling of the entire population would not have guaranteed access to these naturally occurring situations and could have resulted in data that does not reflect the real-world dynamics the study aimed to capture.

In other words, whilst opportunity sampling limits generalisability, it allowed the authors to study the

phenomena of governance complexity in a realistic, context-rich environment that aligns with the research objectives.

## Conclusion

This paper highlighted the limitations and the challenges of codified governance frameworks, emphasising that corporate failures often stemmed not from the absence of rules but from inadequate reflection, interpretation and application within organisational contexts – the ‘Act of Governing’. The Complexity Governance Model (GOVIndicia<sup>®</sup>) provides a possibility to observe, analyse and reflect on governance, not only through the lens of evidence-based complexity, but also through a sense of pragmatism. This paper discussed and demonstrated the potential for shifting governance evaluation beyond static, compliance-driven models and frameworks towards a more adaptive and anticipatory approach.

The findings underscored that the Complexity Governance Model (GOVIndicia<sup>®</sup>) and its assessment framework, GovQ, enhances the capacity of organisations to observe, measure and operationalise good governance practice. This is particularly relevant in the practice of conducting board evaluations and organisational governance risk assessments, where the outcomes feed into developmental programmes and can be used to conclude best practice. Early indications are that this model and assessment tool can significantly support these governance evaluation processes, which are embedded into various regulatory regimes, by providing boards with quantitative data around their governance performance, not just compliance.

Given that regulators are also transitioning from a purely compliance-oriented regulatory approach to one that is more risk-based, as well as the emphasis that many regulators are suggesting between the culture of an organisation and/or board and its governance, this approach and model afford a pragmatic and valid method of assessing the quality of governance across their regulatory populations.

In conclusion, this paper points to an epistemic transition in governance research and practice. Further exploration is recommended, specifically to strengthen and augment the Complexity Governance Model (GOVIndicia<sup>®</sup>) and its assessment framework, GovQ, to ensure the validity and diverse applicability of good governance practice through research and practical application.

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## Competing interests

The authors declare that there are no financial or personal relationships that may have inappropriately influenced them writing this article. The authors declare that the trademark and copyright for the GOVIndicia® Complexity Governance Model are owned by CoSteer Limited, a private company incorporated in Guernsey. The lead author, Perrin J.G. Carey, is the majority shareholder.

## CRedit authorship contribution

Perrin J.G. Carey: Conceptualisation, Data Curation, Formal Analysis, Investigation, Methodology, Resources, Software, Visualisation, Writing – Original Draft and Writing – Review & Editing. Divya Mahendran: Formal Analysis, Investigation, Methodology, Project Administration, Resources, Software, Validation, Writing – Original Draft and Writing – Review & Editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication, and take responsibility for the integrity of its findings.

## Ethical considerations

The research programme received ethical approval from the Good Governance Research Forum following submission on 06 August 2022. References to literature were always acknowledged. Explicit permission was obtained from the organisations where data were collected, and where applicable. The employees of the participant organisations were also provided with informed consent and confirmed their agreement at the commencement of the survey. Survey responses were collected with complete anonymity using encryption through bespoke software, as noted previously. Reporting of all outcomes only involved demographics and thus protected the anonymity of the participant organisations.

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## Data availability

The data that support the findings of this study are not publicly available due to confidentiality and ethical restrictions. The summary findings and aggregated results that support the conclusions are available within this paper. Further details may be available from the corresponding author, Perrin J.G. Carey, upon reasonable request.

## Disclaimer

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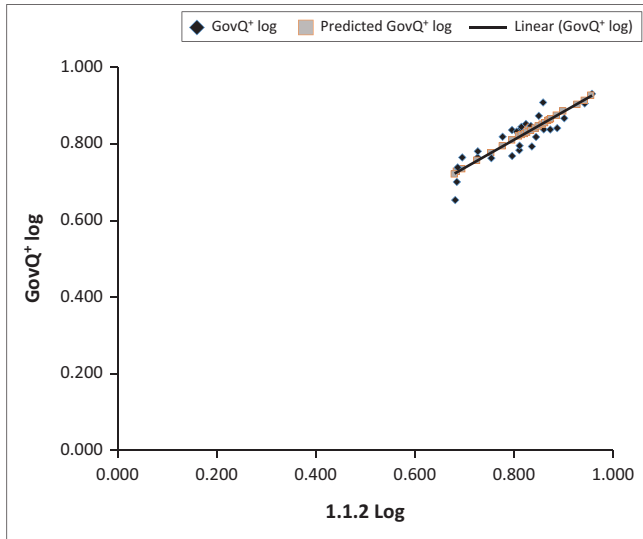
Appendices starts on the next page →

## Appendix 1

**TABLE 1-A1:** The domains, categories and indices of the governance complexity model, GOVIndicia®.

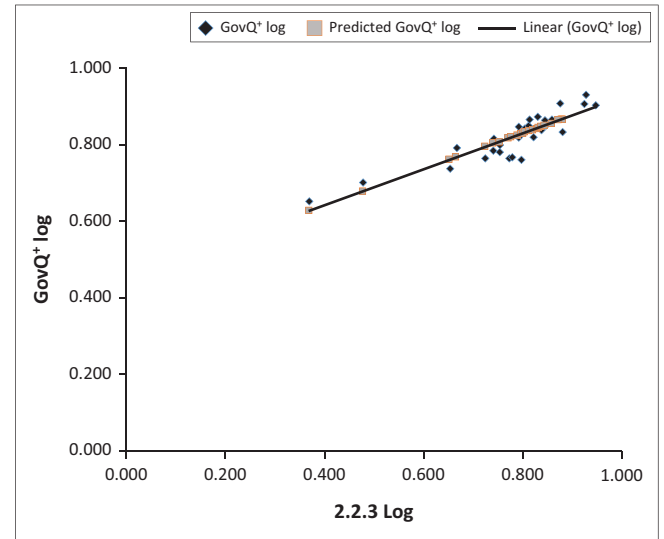
<b>Domain: 1 Culture</b>		
Category: 1.1 Purpose, values and beliefs		
Index 1	Purpose and values – clarity	Clarity of purpose and values
Index 2	Purpose and values – embedded	Embeddedness of both purpose and values
Index 3	Purpose and values – challenged	Challenge when values are not being lived or purpose is not informing decisions or actions
Category: 1.2 Leadership quality		
Index 4	Leadership – courage, trust and empathy	Leadership exhibits empathy and builds trust
Index 5	Leadership – values, responsibility and ownership	Leadership owns the values of the organisation and holds itself accountable
Index 6	Leadership – nurturing creativity and resilience	Leadership nurtures creativity and resilience across the organisation
Category: 1.3 Behaviour and ethics		
Index 7	Behaviour – purpose and value driven	Behaviours are aligned with the values of the organisation
Index 8	Behaviour – ethical, civil and respectful	Behaviours are ethical, civil and respectful
Index 9	Behaviour – reward and remuneration aligned	Remuneration is designed to support ethical behaviours
<b>Domain: 2 Decision-making</b>		
Category: 2.1 Information quality		
Index 10	Information – data validity, accuracy and reliability	Data is of a high standard of validity, accuracy and reliability.
Index 11	Information – data meaningful, relevant and appropriate	Data is consistently converted into meaningful, relevant and appropriate information.
Index 12	Information – clarity, conciseness and comprehension	Information is consistently presented in a clear, concise and easily understood format.
Category: 2.2 Information flow		
Index 13	Information flow – availability	Information is consistently available.
Index 14	Information flow – timeliness	Information is timely.
Index 15	Information flow – speed and transparency	Information moves easily, quickly and transparently.
Category: 2.3 Decision-maker quality		
Index 16	Decision-maker – assessment and competence	Decision-makers are regularly assessed for competence.
Index 17	Decision-maker – training and development	Decision-makers are regularly updated with training and development.
Index 18	Decision-maker – disruption awareness	Decision-makers are aware of the disruptors to decision-making.
<b>Domain: 3 Implementation and oversight</b>		
Category: 3.1 Communication quality		
Index 19	Communication – method and relevance	Communication methods are well chosen, relevant and fit for the purpose intended.
Index 20	Communication – clarity, conciseness and comprehension	Communication is clear, concise and easily understood.
Index 21	Communication – emotional intelligence	Communication involves the use of emotional intelligence skills.
Category: 3.2 Operational efficacy		
Index 22	Operational – value and procedure based	Implementation utilises both a value-based and procedure-based approach.
Index 23	Operational – efficiency and effectiveness	Implementation involves regular reviews for both efficiency and effectiveness.
Index 24	Operational – independence and conflict	Implementation ensures both independence and oversight where applicable.
Category: 3.3 Reasoned persistence		
Index 25	Reasoned persistence – systems and controls framework	Clear systems, processes and controls to detect risks and monitor successful outcomes.
Index 26	Reasoned persistence – feedback loops and review	Robust feedback loops to provide information on the reasons for poor performance and successes.
Index 27	Reasoned persistence – independent assurance	Internal and external independent assessments of the quality of the operational processes.

## Appendix 2: Log-log plots for each of the selected indices



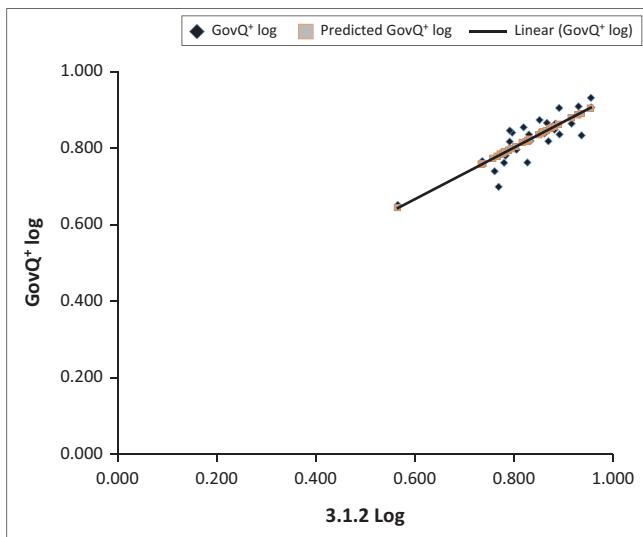
Note:  $Y = 0.7327x + 0.2227$ ,  $R^2 = 0.793$ .

**FIGURE 1-A2:** Purpose and values – embedded.



Note:  $Y = 0.4656x + 0.4571$ ,  $R^2 = 0.7959$ .

**FIGURE 2-A2:** Information flow – speed and transparency.



Note:  $Y = 0.6706x + 0.2647$ ,  $R^2 = 0.7545$ .

**FIGURE 3-A2:** Communication – clarity, conciseness and comprehension.