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Inter-organizational Governance Mechanisms and Healthcare Supply Chain Resilience in Dar es Salaam, Tanzania

Inter-organisational Governance Mechanisms and Healthcare Supply Chain Resilience in Dar es Salaam, Tanzania

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Abstract
The call for Universal Health Coverage under the Sustainable Development Goals (SDGs) has increased focus on the performance of healthcare service delivery systems. While operational improvements have been widely suggested to boost resilience, the role of inter-organizational governance (IOG) remains underexplored. This study examines how contractual, institutional, and relational mechanisms within the IOG associate with healthcare supply chain resilience (HSCR). A mixed-method approach was used, combining survey data from 365 healthcare supply chain personnel from public healthcare facilities with (n=12) key informant interviews from the Medical Stores Department and Accredited Prime Vendors in Dar es Salaam. Quantitative data were analysed using descriptive statistics and Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS4, and qualitative interview data were analysed using thematic analysis. The results show that all governance mechanisms are significantly associated with resilience, explaining 47.8% of the variance in HSCR. Contractual governance has the strongest positive association ($\beta = 0.361$, $p < 0.001$), followed by institutional ($\beta = 0.245$, $p < 0.001$) and relational governance ($\beta = 0.212$, $p = 0.005$). This study demonstrates that contractual, institutional, and relational governance mechanisms independently show significant positive associations with healthcare supply chain resilience, with contractual governance mechanisms exhibiting the strongest association. Policy makers and healthcare practitioners should strengthen enforcement of contractual mechanisms, review and streamline institutional procedures to enhance responsiveness, and improve communication and collaborative relationships to support resilience.

Introduction
Healthcare supply chains, despite their crucial role in ensuring the availability of medicines and medical supplies, are increasingly vulnerable to frequent and complex disruptions. Disruptions caused by pandemics, supply shortages, geopolitical shocks, and logistical inefficiencies have raised concerns about the fragility of health systems worldwide, leading to medicine stockouts and compromised patient outcomes (Katsaliaki et al., 2022; Chowdhury et al., 2021). The COVID-19 pandemic further exposed these weaknesses, highlighting critical gaps in the availability and affordability of medical commodities and resulting in widespread stockouts in both developed and developing regions (Sallwa, 2024). Therefore, surviving in such a volatile environment requires the

healthcare supply chain to improve resilience and develop the capacity to prepare for, respond to, and recover from disruptions while maintaining operational continuity.

To build resilience, many countries have invested in integrated digital systems, forecasting tools, and buffer stock strategies to strengthen supply chain performance (Senna et al., 2021). However, persistent disruptions in many low- and middle-income countries (LMICs) suggest that technical and operational improvements alone are insufficient (Githendu et al., 2020). Increasingly, attention is shifting toward governance-related challenges, including weak coordination, fragmented decision-making, and limited accountability across supply chain actors (WHO, 2025).

Healthcare supply chains are interconnected networks of organisations, including public health facilities, suppliers, regulators, and central procurement agencies. In these systems, resilience relies not only on internal capabilities but also on the structure and coordination of relationships among actors (WHO, 2024). Health system governance plays a role in service delivery through accountability mechanisms, stakeholder coordination, and collaborative arrangements across organisations (Khatri et al., 2025). Poor inter-organisational governance, reflected in inadequate communication, unclear roles and responsibilities, and inconsistent enforcement, can limit responsiveness and undermine the effectiveness of collaborative efforts to build resilience (Wu et al., 2023; Lugada et al., 2022; Masefield et al., 2020). As a result, persistent stockouts have been associated with governance deficiencies, including weak coordination, accountability, and enforcement mechanisms.

The Ministry of Health oversees Tanzania's public healthcare supply chain. It operates a centralised procurement and distribution system, with the Medical Stores Department (MSD) serving as the main supplier and the Prime Vendor System (PVS) supporting the availability of medicines and medical supplies. Despite this framework, the supply chain continues to face governance challenges, including procurement delays, inconsistent supplier performance, weak follow-up processes, limited communication, and coordination issues (Ministry of Health, 2024; Elias & Mushi, 2024; Kessy et al., 2024). Dyer et al. (2018) highlight that the involvement of healthcare supply chain actors creates interdependence that necessitates effective coordination, accountability, and efficient information sharing, emphasising the need for strong contractual, institutional, and relational mechanisms to foster accountability, compliance, and coordinated responses during disruptions.

Existing research has predominantly focused on collaborative practices such as information sharing, process integration, and joint decision-making, with limited empirical evidence on the governance mechanisms that regulate interactions among participating partners in the healthcare ecosystem (Friday et al., 2021). Furthermore, much of the literature adopts a firm-level perspective, overlooking the networked nature of healthcare supply chains, where resilience emerges from interdependencies among multiple actors (Ivanov & Dolgui, 2021). Despite Interest in resilience, limited attention has been paid to how contractual, institutional, and relational governance jointly shape resilience outcomes in public healthcare supply chains, particularly in resource-constrained settings.

Recently, there has been a call for a more thorough theoretical and empirical investigation of governance mechanisms in complex supply chain systems (Belloni et al., 2025; Tsolakis et al., 2023). Therefore, this study addresses this gap by examining the associations between contractual governance (CG), relational governance (RG), and institutional governance (IG) and healthcare supply chain resilience.

Literature Review

Inter-Organisational Governance in Supply Chains

Inter-organisational governance encompasses formal and informal mechanisms that organise, coordinate, and regulate interactions among supply chain actors. These mechanisms define roles,

assign decision rights, and align interdependent activities, especially in complex environments where coordination is vital for performance (Zhang & Cao, 2017; Cannon et al., 2000). It was conceptualised as the higher-order construct comprising contractual, institutional, and relational governance. Contractual governance reflects formal agreements, monitoring systems, and enforcement tools to reduce opportunistic behaviour and protect inter-organisational relationships. Relational governance is based on trust, shared norms, and mutual commitment, which promote cooperation and flexible coordination. Institutional governance reflects the broader regulatory and policy context, shaping interactions through standards and oversight structures (Ryciuk, 2020; Dyer et al., 2018). These mechanisms do not operate independently; rather, they work together to manage interdependencies among supply chain actors. While contractual and institutional mechanisms improve clarity and ensure compliance, relational governance offers flexibility and fosters cooperative responses.

Inter-Organisational Governance and Healthcare Supply Chain Resilience

Healthcare supply chain resilience (HSCR) is the ability of supply systems to maintain the availability of essential medicines and medical supplies at all times, even in the face of disruptions. It involves the capacity to anticipate, respond to, and recover from shocks while ensuring that healthcare services continue to run smoothly. In complex, highly interconnected healthcare systems, resilience is determined not only by internal operational capabilities but also by how relationships among supply chain actors are governed (Dyer & Singh, 1998).

Inter-organisational governance is recognised as essential to resilience, but the mechanisms by which it enables coordinated, adaptive responses remain unclear(Wu et al., 2023). Furthermore, public health systems continue to exhibit fragmented, poorly coordinated governance structures that hinder effective responses to disruptions(Kessy et al., 2024). In this complex and interdependent healthcare supply chain, inter-organisational governance is vital for aligning actors, coordinating activities, and fostering collaboration across organisational boundaries(Belloni et al., 2025). This underscores the need to examine how specific governance mechanisms influence resilience outcomes.

Contractual governance enhances resilience by reducing uncertainty and enforcing accountability through formal agreements, monitoring systems, and performance standards (Cao & Lumineau, 2014). These mechanisms are particularly relevant in healthcare supply chains where reliability and compliance are critical; however, excessive reliance on formal controls may limit flexibility and responsiveness in dynamic environments (Lumineau, 2017). Therefore, it is hypothesised that contractual governance is positively associated with healthcare supply chain resilience (H1).

In addition to formal contract controls, broader institutional frameworks shape how supply chain actors coordinate and respond to disruptions. Institutional governance provides regulatory and policy structures that guide interactions through standards, oversight, and formal coordination(Tsolakis et al., 2023). These mechanisms enhance transparency and system-wide alignment; however, rigid institutional processes may delay decision-making and constrain responsiveness during disruptions, particularly in resource-constrained environments. Therefore, it is hypothesised that Institutional governance is positively associated with healthcare supply chain resilience (H2).

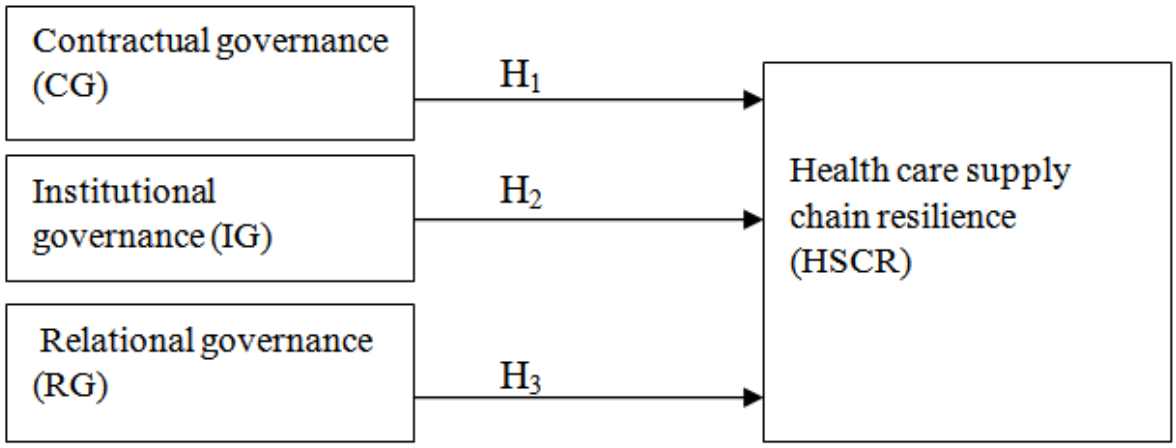
Beyond formal governance mechanisms, relational governance plays a critical role in shaping resilience outcomes. It supports resilience by fostering trust, shared norms, and open communication, enabling adaptive coordination and rapid response(Dyer & Singh, 1998). This is consistent with the relational view, which emphasises value creation through collaboration and coordinated action. However, relational governance alone may be insufficient in highly regulated systems that require formal enforcement mechanisms(Dyer et al., 2018). Therefore, it is hypothesised that relational governance is positively associated with healthcare supply chain resilience (H3).

While these governance mechanisms have often been examined individually, emerging evidence suggests that they operate in combination rather than in isolation (Lumineau et al., 2012). This underscores the importance of examining how specific governance mechanisms shape resilience outcomes, particularly in complex healthcare supply chains where coordination across multiple actors is required.

Theoretical Perspective

The relationship between inter-organisational governance and healthcare supply chain resilience is primarily grounded in the relational view, which posits that value is created through collaboration(Dyer & Singh, 1998). This perspective explains how governance mechanisms, such as contractual, relational, and institutional mechanisms, enable effective inter-organisational interaction and joint value creation (Dyer et al., 2018). In Healthcare supply chains, these relational elements facilitate information exchange, coordinated responses, and accountability, thereby strengthening resilience. From this perspective, contractual, institutional, and relational governance are expected to enhance resilience in the healthcare supply chain.

Figure 1: Conceptual Framework



Methods

Research Design

The study used an explanatory sequential mixed-methods design, comprising a quantitative and qualitative phase. In the quantitative phase, a cross-sectional survey was conducted to examine the relationships between inter-organisational governance and healthcare supply chain resilience. This was followed by a qualitative phase, in which interviews helped explain the quantitative results (Johnson & Onwuegbuzie, 2004).

Study Area

The study was conducted in Dar es Salaam, Tanzania, which hosts a high concentration of public healthcare facilities and key supply chain actors, including the Medical Stores Department (MSD) and Accredited Prime Vendors (APV)

Target Population

The study population involved actors in the healthcare supply chain. The quantitative phase targeted healthcare supply chain personnel working at the 154 selected public facilities, including hospitals, health centres, and dispensaries, across 5 districts in Dar es Salaam, Tanzania. The qualitative phase involved 12 key informants from key supply chain organisations, such as the Medical Stores

Department and Accredited Prime Vendors, given their critical roles in procuring and distributing medicines and medical supplies across facilities. The sampling frame was obtained from the Tanzania Health Facility Atlas (Ministry of Health, 2024).

Unit of Analysis

The unit of analysis was individual respondents from the healthcare supply chain staff of public healthcare facilities, including pharmacists, procurement officers, and facility in charge officers. Although the study involved 154 public healthcare facilities, statistical analysis was at the individual respondent level.

Unit of inquiry

The unit of inquiry included healthcare supply chain actors, such as personnel from public healthcare facilities for the quantitative phase, and key informants from MSD and APV for the qualitative phase. The study used a key informant approach, selecting participants based on their involvement in healthcare supply chain activities and knowledge of inter-organisational governance and supply chain resilience practices, consistent with purposive sampling in qualitative research (Cresswell, 2014; Kumar et al., 1993).

Sampling Approach

The study employed a multi-stage selection approach. Healthcare facilities were initially categorised by level of care (hospitals, health centres, and dispensaries) and then by district (Kinondoni, Ubungo, Ilala, Temeke, Kigamboni). Since their numbers were manageable, all hospitals and health centres were included through a census approach. Dispensaries were chosen using proportionate stratified sampling, followed by simple random sampling within each district. Additionally, Cochran's formula was used to determine the minimum number of individual respondents required for the quantitative survey (n=384). Key informants from MSD and Accredited Prime Vendors were selected through purposive sampling due to their specialised knowledge and involvement in healthcare supply chain activities.

Sample size

The Cochran formula was used to determine the minimum required sample size. At a 95% confidence level, with a 5% margin of error and a proportion of 0.5, the minimum sample size was 384 respondents. Respondents were selected from public healthcare facilities (hospitals, health centres, and dispensaries), with multiple eligible respondents per facility. Additionally, 12 key informants were purposively selected from key supply chain organisations (MSD and Accredited Prime Vendors). Of the planned 384 survey respondents, 365 valid questionnaires were collected and included in the analysis, yielding a response rate of 95.05%. This shortfall was mainly due to a lower-than-expected number of eligible personnel in dispensaries.

The minimum sample size (n) for the quantitative survey was determined using Cochran's formula, assuming a 95% confidence level, a 5% margin of error, and maximum variability (p=0.5), resulting in a minimum sample size of 384 respondents (Pourhoseingholi et al., 2013).

$$n_0 = (Z^2 \times p(1-p)) / e^2$$

Substituting the values:

$$n_0 = (1.96^2 \times 0.5 \times 0.5) / (0.05^2)$$

$$n_0 = (3.8416 \times 0.25) / 0.0025 = 0.9604 / 0.0025 = 384.1$$

Measurement of constructs

All constructs were assessed with multiple items adapted from prior research, rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Table 1: Definitions and Measurement Sources of Study Constructs

Construct	Operational Definition	Source
CG	Formal contracts, roles, and accountability mechanisms between supply chain partners	(Poppo & Zenger, 2002;Cao&Lumineau, 2017)
IG	Rules, regulations, oversight, and procedures guiding supply chain operations	(Wu et al.,2023; Ryciuk, 2020)
RG	Trust, commitment, communication, and shared understanding among supply chain partners.	(Dyer & Singh, 1998;Poppo & Zenger, 2002))
HSCR	Ability to prepare for, respond to, and recover from supply chain disruptions	(Friday, 2018;Ali et al., 2017)

Inter-organizational governance was modelled as a reflective, higher-order construct comprising contractual, institutional, and relational governance.

Data Collection Tools and Procedures

Quantitative data were collected from healthcare facilities using a structured questionnaire, while qualitative data were gathered through semi-structured interviews with key informants from MSD and APV. Using a sequential approach, questionnaires were distributed to respondents at healthcare facilities, including the facility in charge, pharmacists, and procurement staff. Ethical approval was obtained before distributing the questionnaires, and a pilot study was conducted with 15 respondents to refine the instrument. Qualitative data collection with key informants involved interviews held in private settings, with information recorded upon participants' consent and supplemented by field notes.

Data analysis

Quantitative analysis was performed using Partial Least Squares Structural Equation Modelling (PLS-SEM) 4. Before evaluating measurement and structural models, common-method bias (CMB) was checked using Kock's (2015) full collinearity-based variance inflation factor (VIF) method. The VIF values for contractual governance (1.711), institutional governance (1.857), and relational governance (1.537) were all below the recommended threshold of 3.3. Therefore, common-method bias was not considered a serious issue in this study.

The model quality was evaluated using Cronbach's alpha and composite reliability to assess internal consistency, average variance extracted to assess convergent validity, and the heterotrait-monotrait ratio to assess discriminant validity. During the model assessment, a structural analysis with 5,000-sample bootstrapping was conducted, including path coefficients, coefficients of determination, effect sizes, and predictive relevance. The higher-order construct of IOG was examined using the two-stage approach in SmartPLS4. Lower-order constructs (CG, IG, RG) were validated separately before using latent-variable scores to estimate the higher-order construct.

Twelve key informants were interviewed, including representatives from MSD and APV, providing comprehensive coverage of the study objectives. The interview transcripts were analysed using an objective-driven thematic approach, in which codes were based on the study objectives and governance dimensions, and then grouped into broad themes related to contractual, relational, and institutional governance, as well as healthcare supply chain resilience. Credibility and confirmability were strengthened through verbatim transcription, field notes, and triangulation of qualitative and quantitative findings.

Ethical Considerations

The study addressed health-related issues, and ethical approval was obtained from the National Institute for Medical Research (NIMR) through a letter with the reference number NIMR/HQ/R.8a/Vol.IX/5129. Participation was voluntary, and confidentiality and anonymity were maintained.

Findings

Descriptive Statistics

Table 2 shows the demographic details of the respondents. About 98.1% of respondents were aged 18-54 years. Nearly half (48.8%) held a diploma as their highest academic qualification, while 43.0% had a bachelor's degree. Approximately 58.3% of respondents had between one and six years of work experience. The main professional groups were pharmacists/pharmaceutical technicians (38.9%) and medical officers/facility in charge (31.8%). These characteristics indicate that respondents had sufficient professional experience and relevant responsibilities to provide informed assessments of governance mechanisms and the resilience of the healthcare supply chain.

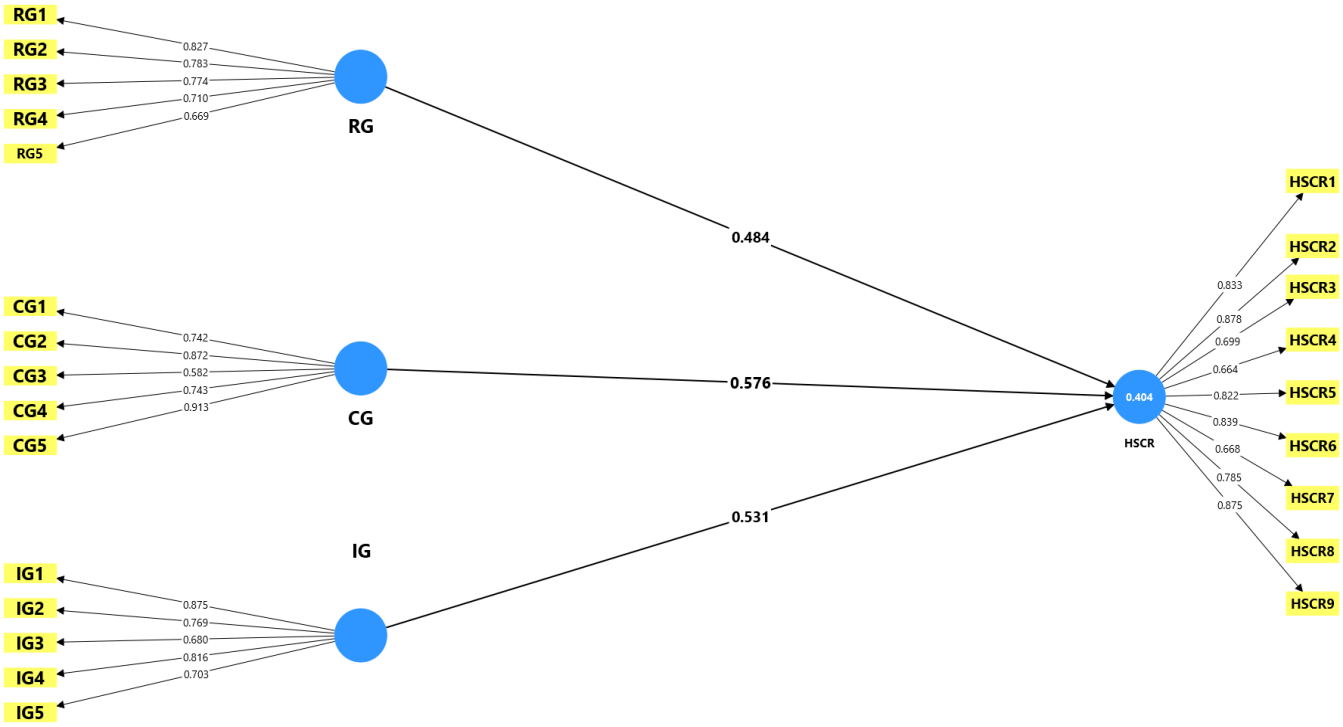
Table 2: Demographic Profile of Respondents (n=365)

Variable	Category	n	%
Age	18–34	142	38.9
	35–54	216	59.2
	54+	7	1.9
Education	Diploma	178	48.8
	Degree	157	43.0
	Master's	18	4.9
	Postgraduate	12	3.3
Facility Type	Hospital	80	21.9
	Health Centre	189	51.8
	Dispensary	96	26.3
Job Position	Pharmacist	142	38.9
	Medical Officer / In-charge	116	31.8
	Procurement Officer	87	23.8
	Others	20	5.5
Experience (Years)	<1 year	15	4.1
	1–3 years	111	30.4
	4–6 years	102	27.9
	7–10 years	66	18.1
	>10 years	71	19.5

Source: *Research Findings (2026)*

Measurement Model

The measurement model was evaluated to determine reliability and validity prior to the structural analysis. The initial measurement model included 24 indicators for relational governance (RG), contractual governance (CG), and institutional governance (IG), and 9 indicators for healthcare supply chain resilience (HSCR) (Figure 2).



Source: Research Findings (2026)

Indicators with loadings below 0.708 were considered for removal, taking into account construct reliability, convergent validity, and content coverage(Hair & Alamer, 2022)

Table 3: Summary of Removed and Retained Measurement Items by Indicator Loadings

Construct	Initial items	Deleted Items	Final Items
CG	5	CG 3	4
IG	5	IG3	4
RG	5	RG5	4
HSCR	9	HSCR3, HSCR4, HSCR7	6
Total	24	6	18

Source: Research Findings (2026)

The complete measurement instrument, including retained and deleted indicators, is provided in Appendix A.

Internal consistency was verified, with Cronbach's alpha and composite reliability values surpassing 0.70. Convergent validity was confirmed, as all AVEs exceeded 0.50, indicating that the constructs account for a significant portion of the variance in their indicators. Table 4 summarises the findings.

Table 4: Results of the Measurement Model

Construct	Indicator	Loading	Cronbach's Alpha	CR	AVE
CG	CG1	0.758	0.840	0.894	0.679
	CG2	0.868			
	CG4	0.758			
	CG5	0.903			
IG	IG1	0.878	0.807	0.873	0.634
	IG2	0.763			
	IG4	0.806			
	IG5	0.731			
RG	RG1	0.831	0.794	0.866	0.619
	RG2	0.818			
	RG3	0.769			
	RG4	0.724			
HSCR	HSCR1	0.856	0.919	0.936	0.710
	HSCR2	0.891			
	HSCR5	0.814			
	HSCR6	0.847			
	HSCR8	0.764			
	HSCR9	0.878			

Source: *Research Findings (2026)*

Discriminant validity was evaluated using the HTMT criterion, confirming that all constructs were empirically distinct. Overall, the measurement model showed adequate reliability and validity, supporting the subsequent structural analysis as shown in Table 5.

Table 5: Discriminant validity

Construct	CG	HSCR	IG	RG
CG	–			
HSCR	0.687	–		
IG	0.721	0.642	–	
RG	0.601	0.591	0.676	–

Source: *Research Findings (2026)*

Collinearity Assessment (VIF)

Collinearity was assessed using the Variance Inflation Factor (VIF) for all predictors of healthcare supply chain resilience. The VIF values for contractual, institutional, and relational governance are all below the threshold of 3.0 (see Table 6), indicating no multicollinearity.

Table 6: Assessment of Collinearity

Predictor Variable	VIF
CG	1.711
IG	1.857
RG	1.537

Source: *Research Findings (2026)*

Structural Model Results

The structural model was evaluated to examine how contractual governance (CG), institutional governance (IG), and relational governance (RG) are associated with healthcare supply chain resilience (HSCR). Figure 3 shows the structural model with standardised path coefficients, while Table 7 provides the summary of hypothesis testing results.

Figure 3: Structural Model Results

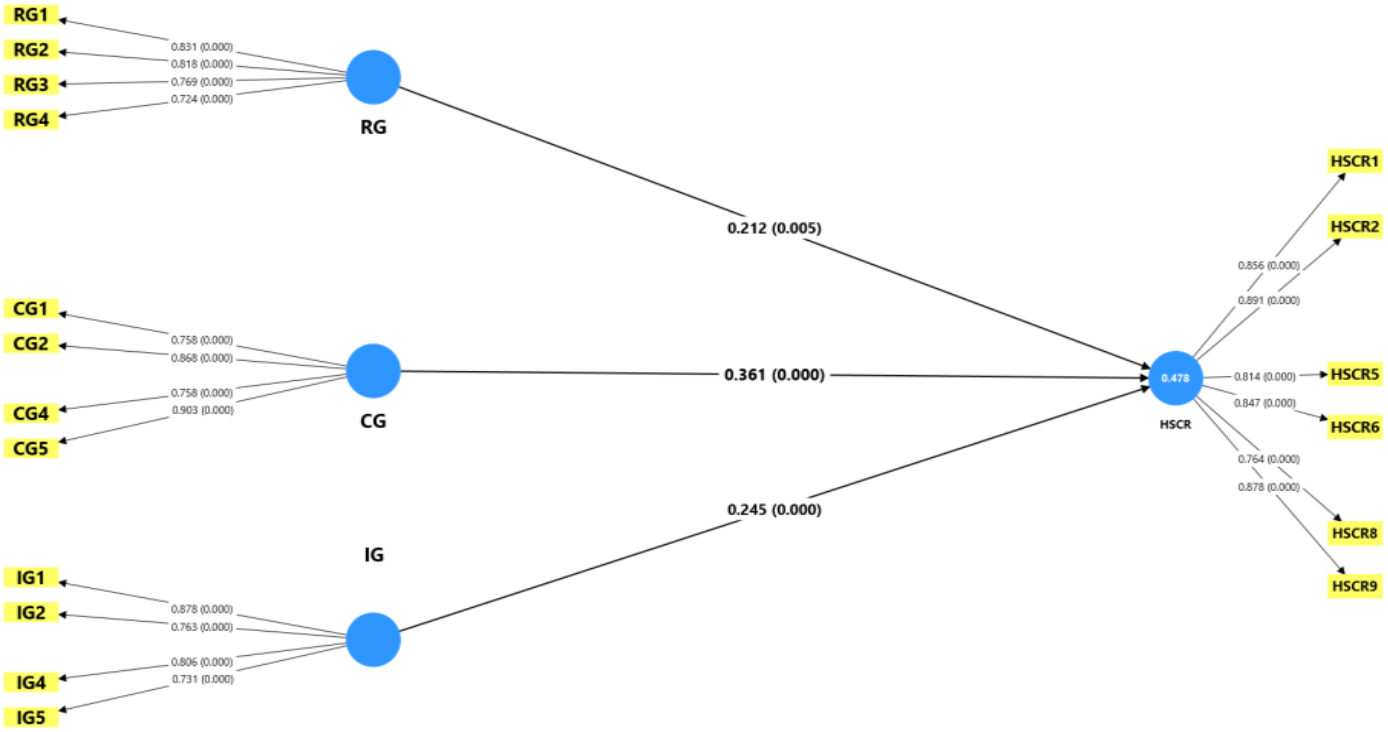


Table 7: Hypothesis Testing Results

Hypothesis	Path	B	t-value	p-value	Decision
H1	CG → HSCR	0.361	4.140	<0.001	Supported
H2	IG → HSCR	0.245	3.736	<0.001	Supported
H3	RG → HSCR	0.212	2.816	0.005	Supported

Source: *Research Findings (2026)*

The findings reveal that all hypothesised relationships are positive and statistically significant, supporting H1-H3. Contractual governance shows the strongest association with HSCR (β = 0.361, p < 0.001), followed by institutional governance (β = 0.245, p < 0.001) and relational governance (β = 0.212, p = 0.005). Qualitative evidence supports the quantitative results, highlighting contractual governance as the strongest factor associated with resilience. Respondents noted that supplier monitoring, framework agreements, and memoranda of understanding help enable quick responses during stockouts and facilitate rapid corrective actions when disruptions occur. As one respondent stated, "When suppliers delay, MSD follows up immediately and enforces contractual terms to ensure delivery." (KII-MSD Official, 2nd March, 2026).

Also, interview findings support that institutional governance is associated with healthcare supply chain resilience. One participant asserted that "The Ministry of Health has a quality assurance team that frequently assesses compliance with procedures and established guidelines among supply chain actors." (MoH-KII-03) This implies that institutional governance supports resilience by ensuring that supply chain actors consistently follow standardised practices, thereby reducing daily operational disruptions and enhancing preparedness for supply chain challenges.

Relational governance remained statistically significant, with interview findings indicating that trust, mutual understanding, and commitment support resilience. One respondent noted that despite occasional delays in government payments, MSD continues to supply medicines because both parties maintain mutual trust and a shared commitment to ensuring uninterrupted healthcare services (KII-MSD-01Official, 2nd March 2026).

Generally, these mechanisms support responsiveness and continuity of supply, demonstrating that governance mechanisms are associated with resilience.

Structural model evaluation

To evaluate the robustness of the structural model, its explanatory power, effect size, and predictive relevance were analysed.

The model's explanatory power was evaluated using the coefficient of determination (R^2). The analysis indicates that the model accounts for 47.8% of the variance in HSCR (R^2 = 0.478), showing moderate explanatory power, with contractual, relational, and institutional governance contributing to this collectively.

Table 8: Coefficient of determination R^2

Construct	R^2	Adjusted R^2
HSCR	0.478	0.474

Source: *Research Findings (2026)*

Effect size (f^2) was evaluated to determine each governance mechanism's contribution to healthcare supply chain resilience.

Table 9: Effect Size (f^2) Results

Path	f^2	Effect Size
CG → HSCR	0.146	Moderate
IG → HSCR	0.062	Small
RG → HSCR	0.056	Small

Source: Research Findings (2026)

The findings indicate that contractual governance has a moderate effect (f^2=0.146), while institutional (f^2=0.062) and relational governance have smaller effects (f^2=0.056). This suggests that although institutional and relational governance support healthcare supply chain resilience, they have less significant support than contractual governance.

Quantitative findings indicate that institutional governance provides regulatory guidance and procedural coordination, thereby indirectly supporting resilience. However, it can also slow down operational responsiveness during disruptions due to rigid approval procedures. One respondent noted, "Even when medicine is needed urgently, still, we cannot be responsive as approval and regulatory procedures can slow down the process" (KII-MSD-01 Official, 2nd March, 2026).

Furthermore, the findings clarify the comparative impact of relational governance versus contractual governance. Although respondents indicated that trust and long-term relationships enhance flexibility and collaboration, qualitative evidence suggests that they perceive informal arrangements as dependent on formal contractual agreements to ensure accountability and confidence, thereby maintaining resilience during disruption. "Even when the payments are delayed, we continue to supply because patient survival is more important. At the end, we know we will be paid because we have a formal contract and or memorandum of understanding." (KII-APV-03, 2nd February 2026). In this context, resilience is linked not only to trust-based relationships but also to enforceable agreements that uphold operational continuity during periods of uncertainty.

Predictive relevance was evaluated using Q^2 and PLS-Predict. All Q^2 prediction values are positive, indicating that the model is predictive. Additionally, most PLS-SEM prediction errors are comparable to or lower than those of the linear model, suggesting acceptable predictive performance.

Table 10: PLS-Predict Results

Indicator	Q^2_predict	PLS-SEM(MAE)	LM(MAE)
HSCR1	0.456	0.395	0.390
HSCR2	0.392	0.332	0.335
HSCR5	0.142	0.443	0.457
HSCR6	0.393	0.449	0.451
HSCR8	0.171	0.508	0.509
HSCR9	0.253	0.399	0.404

Source: *Research Findings (2026)*

Higher-Order Governance Capability

To provide additional insight into governance mechanisms as a unified capability, the study modelled inter-organisational governance as a higher-order construct encompassing contractual, institutional, and relational governance. This analysis complements the structural model results by examining inter-organisational governance as a higher-order construct comprising contractual, institutional, and relational mechanisms and assessing its relationship to healthcare supply chain resilience.

Table 11: Loadings of Higher-Order Constructs

Path	B	t-value	p-value
CG → IOG	0.854	34.468	<0.001
IG → IOG	0.865	43.158	<0.001
RG → IOG	0.799	18.420	<0.001

Source: *Research Findings (2026)*

The findings indicate that all three governance mechanisms strongly and significantly load onto the higher-order construct. Institutional governance shows the highest loading (0.865), followed by contractual governance (0.854), while relational governance has a slightly lower but still substantial loading (0.799). This aligns with qualitative findings, as one respondent suggested that healthcare supply chain operations are guided by institutional governance, which establishes a formal administrative and regulatory framework. However, during medical stockouts and emergency shortages, enforceable obligations and accountability mechanisms through contractual governance become essential (KII-MSD-02 Official, 2nd March, 2026).

Furthermore, the higher-order construct demonstrates a strong, statistically significant relationship with healthcare supply chain resilience ($\beta = 0.689$, $t = 15.399$, $p < 0.001$). The findings indicate that governance mechanisms, when considered as an integrated capability, are closely linked to resilience outcomes.

Table 12: Structural Results of Higher-Order Constructs

Path	B	t-value	p-value
IOG → HSCR	0.689	15.399	<0.001

Source: Research Findings (2026)

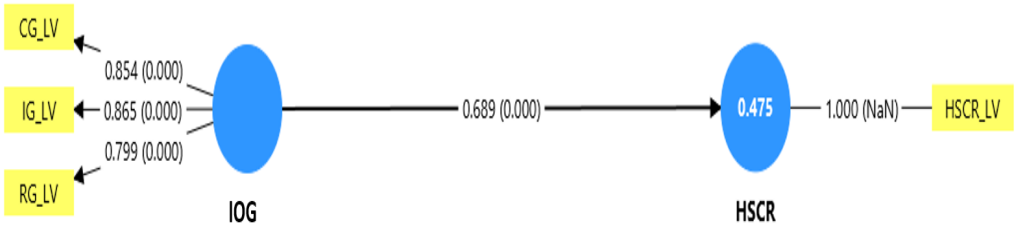


Figure 4: Structural Model Results of Higher-Order Constructs

Discussion

The findings confirmed that contractual, institutional, and relational governance are significantly associated with healthcare supply chain resilience. Contractual governance demonstrated the strongest direct association, underscoring the importance of formal agreements, accountability mechanisms, and enforceable obligations, especially for ensuring supply continuity in Tanzania's public healthcare systems. This indicates that in a highly interconnected and regulated supply chain, resilience is not only associated with collaborative efforts but also with clear responsibilities and operational controls that facilitate quick responses during disruptions. Interview respondents also supported this, explaining that suppliers continue deliveries despite delayed payments because formal contractual agreements are already in place among the parties. Extending relational view theory, the findings show that collaborative advantage in public healthcare systems may rely more on formal governance than on informal relationships alone.

Additionally, institutional governance has a noticeable yet relatively small direct association with resilience, despite its stronger role within the overall governance framework. This primarily indicates that it provides a broader regulatory and procedural framework that supports interactions among healthcare supply chain actors and promotes system-wide coordination (Tsolakis et al., 2023). Qualitative findings emphasise that the Ministry of Health consistently monitors MSD operations through the quality assurance unit to ensure compliance with established policies and regulations. However, they do not directly affect operational responses during disruptions, as qualitative evidence suggests that strict procedural requirements may limit responsiveness in such events.

Relational governance, although important, has the weakest direct effect. This indicates that trust-based mechanisms alone may not be enough to maintain resilience in highly regulated healthcare systems without formal contracts. This limited direct association aligns with Dyer et al. (2018), highlighting a reduced reliance on informal safeguards, which are more likely to support the amount of value created, especially in highly interdependent supply chains. Nonetheless, relational practices are essential for facilitating daily coordination. Respondents noted that communication, mutual understanding, and long-term relationships help sustain supply continuity, particularly during financial or operational challenges. However, such arrangements are supported by formal agreements to ensure consistency, demonstrating that relational governance works best when reinforced by formal contractual mechanisms.

Overall, the findings support the Relational View Theory by showing that governance mechanisms support resilience in healthcare supply chains. The importance of contractual governance aligns with studies indicating it plays a particularly important role in highly interdependent supply chain environments, where formal agreements, accountability measures, and clearly defined responsibilities support coordinated efforts to improve resilience.

Conclusion

The findings indicate that healthcare supply chain resilience is positively linked to contractual, institutional, and relational mechanisms. Among these, contractual governance has the strongest direct support, while institutional governance supports the regulatory backbone, and relational governance facilitates coordination and flexibility.

From a theoretical perspective, the study aligns with the relational view by showing that collaboration alone is not enough without effective governance. It also demonstrates how governance mechanisms support coordinated and flexible responses in uncertain situations. Strategically, there's a need to strengthen contractual governance by more effectively enforcing contracts, increasing oversight of supplier performance, and broadening the use of framework agreements to enable quick responses during disruptions. Additionally, institutional governance should become more responsive by simplifying regulatory procedures, which can delay crucial decisions during emergencies. Lastly, relational governance should be enhanced through better communication, trust-building, and closer coordination among supply chain partners to support daily operational flexibility.

Limitations

The study employed a cross-sectional design, which restricts the ability to establish clear causal links between inter-organisational governance mechanisms and healthcare supply chain resilience. Although noteworthy correlations were found, reverse causality cannot be entirely dismissed. Furthermore, endogeneity could be present in a cross-sectional study, as unobserved factors such as facility type and organisational capacity across facilities might affect the relationship between governance and supply chain resilience. The research was also limited to public healthcare facilities in Dar es Salaam, Tanzania, which may affect the extent to which the findings can be applied. Future studies could adopt a longitudinal approach and include relevant control variables to better support causal conclusions.

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Appendix A. Measurement Items

Construct	Operational Definition	Code	Item
Contractual Governance (CG)	Formal contracts, roles, obligations, and accountability mechanisms governing relationships among supply chain partners.	CG1	Our facility and main supplier(s) have formal agreements that clearly guide supply operations.
		CG2	The roles and responsibilities of our facility and main supplier(s) are clearly defined in written documents.
		CG4	Our facility can rely on formal procedures to address supplier non-performance.
		CG5	Performance expectations are clearly defined in contractual arrangements.
Institutional Governance (IG)	Formal policies, regulations, oversight mechanisms, and procedures guiding supply chain operations.	IG1	Our facility operates in accordance with clear national guidelines that shape supply chain practices.
		IG2	Our facility must comply with mandatory reporting requirements that affect supply operations.
		IG4	Regulatory bodies provide timely guidance to our facility during supply chain challenges.
		IG5	Institutional procedures promote transparency and reduce corruption in supplier selection.
Relational Governance (RG)	Trust, commitment, communication, and shared understanding among supply chain partners.	RG1	Our facility and our main supplier(s) maintain a high level of mutual trust.
		RG2	We believe that our main suppliers act in our best interest.
		RG3	Concerns affecting supply performance are shared openly between us and our suppliers.
		RG4	The relationship with our main supplier(s) is built on strong commitment.
Healthcare Supply Chain Resilience (HSCR)	Ability to prepare for, respond to, and recover from supply chain disruptions.	HSCR1	Our facility maintains a reserve of medical supplies to handle unexpected shortages.
		HSCR2	Our facility can access multiple suppliers if one supplier fails to deliver.
		HSCR5	Our facility can flexibly reallocate resources to manage shortages.
		HSCR6	Our main supplier(s) provide strong support during supply chain challenges.
		HSCR8	Our facility has mechanisms to learn from past disruptions.
		HSCR9	Our facility coordinates effectively with suppliers to recover from disruptions.

Note: Inter-organisational governance was modelled as a reflective, higher-order construct comprising contractual, institutional, and relational governance. Items CG3, IG3, RG5, HSCR3, HSCR4, and HSCR7 were removed during measurement model assessment due to insufficient loadings.