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Assessing Legal and Policy Gaps in India's Cybersecurity Governance of Digital Commerce

Dr. Atibha Vijaya Singh[1*] | Prof. Manvinder Singh Pahwa[2]

[1]Assistant Professor, Department of Law, Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar M.P.).
[2]Professor, Department of Commerce, Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar M.P.).

[*]Corresponding Author: atibha.v.singh@gmail.com

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ABSTRACT

India's rapidly expanding digital commerce sector has heightened concerns regarding cybersecurity and data protection. Despite recent legislative initiatives, including the Digital Personal Data Protection Act (2023) and the Information Technology Act (amendments), the effectiveness of these frameworks in mitigating cybercrime remains inadequately studied. This research investigates the effectiveness of current Indian cyber laws and data protection mechanisms in securing digital commercial environments. Adopting a mixed-methods approach, the study combines a comprehensive legal review with an empirical analysis of reported cybercrime cases and structured interviews with regulatory officials. The findings aim to identify critical gaps between legislative intent and enforcement outcomes, testing the hypothesis that deficiencies in data protection frameworks are positively correlated with the frequency of cybercrime incidents in Indian digital commerce. The study contributes to the literature by offering evidence-based insights into the alignment between existing legal instruments and emerging cyber threats, ultimately proposing policy and legislative reforms to strengthen data governance and commercial cybersecurity in India.

***Keywords**: Cyber Laws, Data Protection, Digital Commerce, Cybercrime, India, Legal Reform.*

Introduction

The digitalization of India's economy has progressed at an unprecedented pace, with digital commerce transactions expected to reach USD 350 billion by 2030 (IBEF, 2023). This exponential growth, while creating substantial economic opportunities, has simultaneously exposed vulnerabilities in cybersecurity infrastructure and data protection mechanisms (Sharma & Gupta, 2022). The proliferation of cyber threats targeting digital commercial platforms has emerged as a critical concern, with India reporting over 1.4 million cybersecurity incidents in 2022 alone, representing a 15.6% increase from the previous year (CERT-In, 2023).

India's legislative response to these challenges has evolved through several iterations, beginning with the Information Technology Act, 2000 (IT Act), followed by significant amendments in 2008 and 2021 (Duggal, 2021). Most recently, the Digital Personal Data Protection Act (DPDP Act) received Presidential assent in August 2023, marking a paradigmatic shift in India's data protection landscape (Ministry of Electronics and Information Technology, 2023). Despite these legislative developments, empirical evidence regarding their effectiveness in mitigating cyber threats within commercial environments remains limited (Basu, 2023; Rao & Verma, 2023).

The digital commerce ecosystem in India encompasses diverse stakeholders including e-commerce platforms, fintech companies, payment gateways, and digital service providers, each processing vast quantities of sensitive personal and financial data (Nair & Singh, 2022). The intersection

of commercial interests with data privacy rights creates complex regulatory challenges that existing frameworks may inadequately address (Chandrasekaran & Kumar, 2023). Furthermore, enforcement mechanisms, judicial capacity, and technical infrastructure required to operationalize these laws face significant constraints (Prasad, 2022).

This research addresses a critical gap in the literature by empirically investigating the effectiveness of current Indian cyber laws and data protection mechanisms from the perspective of professional stakeholders directly engaged with digital commerce regulation and compliance. By systematically analyzing perceptions and experiences of Chartered Accountants (CAs), Company Secretaries (CSs), and Lawyers—professionals who advise commercial entities on cybersecurity compliance—this study provides unique insights into implementation challenges and enforcement realities.

Research Objectives and Hypotheses

Research Objectives

Based on identified literature gaps, this study pursues the following objectives:

RO1: To evaluate the perceived effectiveness of current Indian cyber laws (IT Act and DPDP Act) in securing digital commerce environments from stakeholder perspectives.

RO2: To identify critical gaps between legislative intent and enforcement outcomes in India's data protection framework.

RO3: To empirically test relationships between data protection framework deficiencies and cybercrime incident frequency in digital commerce.

RO4: To analyze the moderating effects of enforcement capacity, judicial efficiency, and technical infrastructure on framework effectiveness.

RO5: To propose evidence-based policy and legislative reforms for strengthening cyber law effectiveness in India's digital commerce sector.

Research Hypotheses

Based on theoretical foundations and preliminary evidence, the following hypotheses are formulated:

H1: Deficiencies in data protection legislative frameworks are positively correlated with the frequency of cybercrime incidents in Indian digital commerce.

H1a: Legislative ambiguity significantly increases cybercrime incident frequency.

H1b: Inadequate penalty provisions significantly increase cybercrime incident frequency.

H2: Enforcement capacity deficiencies mediate the relationship between legislative framework quality and cybercrime incidents.

H3: Technical infrastructure adequacy moderates the relationship between data protection frameworks and cybercrime prevention effectiveness.

H4: Judicial efficiency significantly influences the deterrent effect of cyber laws on cybercrime incidents.

H5: Awareness levels among digital commerce entities regarding data protection obligations

Population and Sampling

The target population comprises professional stakeholders directly engaged with digital commerce cybersecurity compliance and legal advisory: Chartered Accountants, Company Secretaries, and Lawyers practicing in India. These professionals possess specialized knowledge of implementation challenges, client experiences with cyber incidents, and enforcement realities.

- **Sample Size Determination:** Based on Cochran's formula for unknown populations and considering 95% confidence level with 5% margin of error, minimum sample size was calculated as 384. To account for potential non-response and incomplete submissions, target sample size was set at 450. Final valid responses totaled 413, representing 91.8% response rate.

Sample Distribution

- Chartered Accountants: 156 (37.8%)
- Company Secretaries: 128 (31.0%)
- Lawyers: 129 (31.2%)

Respondents represented 18 Indian states, with concentration in major commercial centers including Maharashtra (23.2%), Delhi NCR (18.6%), Karnataka (14.3%), Tamil Nadu (11.4%), and Gujarat (9.2%).

Measurement employed five-point Likert scales (1=Strongly Disagree to 5=Strongly Agree) for perception items and frequency scales (1=Never to 5=Very Frequently) for incident-related items.

Data Analysis and Findings

The sample demonstrates appropriate distribution across professional categories and experience levels, ensuring diverse perspectives. Notably, 93.3% of respondents serve clients engaged in digital

Correlation Matrix

Variable	1	2	3	4	5	6	7	8
1. Legislative Clarity	1							
2. Enforcement Capacity	.624**	1						
3. Technical Infrastructure	.542**	.618**	1					
4. Judicial Efficiency	.487**	.589**	.512**	1				
5. Stakeholder Awareness	.398**	.456**	.502**	.378**	1			
6. Cybercrime Frequency	-.687**	-.712**	-.598**	-.634**	-.523**	1		
7. Framework Effectiveness	.782**	.824**	.689**	.723**	.567**	-.798**	1	
8. Penalty Adequacy	.693**	.587**	.498**	.512**	.423**	-.592**	.687**	1

Note: **p<0.01 (2-tailed)

Correlation analysis reveals several significant findings:

- **Strong negative correlation** between Cybercrime Incident Frequency and framework components, particularly Enforcement Capacity (r=-.712, p<0.01), providing preliminary support for H1.
- **Strong positive correlation** between Legislative Clarity and Framework Effectiveness (r=.782, p<0.01), suggesting legislative quality significantly influences overall effectiveness.
- **Moderate to strong intercorrelations** among framework components, indicating systemic relationships requiring multivariate analysis.
- All correlations significant at p<0.01 level, demonstrating robust bivariate relationships warranting further investigation through regression and SEM.

Hypothesis Testing through Multiple Regression

Hierarchical multiple regression tested predictive relationships between framework deficiencies and cybercrime incident frequency.

Hierarchical Regression Analysis - Predicting Cybercrime Incident Frequency

Model	Predictors	B	SE	β	t	p	R^2	ΔR^2
1	(Constant)	5.621	0.234	-	24.02	<.001	.472	.472***
	Legislative Clarity	-0.387	0.052	-.356	-7.44	<.001		
	Penalty Adequacy	-0.264	0.047	-.270	-5.62	<.001		
2	(Constant)	6.124	0.298	-	20.55	<.001	.589	.117***
	Legislative Clarity	-0.298	0.048	-.274	-6.21	<.001		
	Penalty Adequacy	-0.189	0.043	-.193	-4.40	<.001		
	Enforcement Capacity	-0.412	0.051	-.402	-8.08	<.001		
	Technical Infrastructure	-0.198	0.047	-.207	-4.21	<.001		
3	(Constant)	6.487	0.287	-	22.60	<.001	.613	.024**
	Legislative Clarity	-0.276	0.047	-.254	-5.87	<.001		
	Penalty Adequacy	-0.174	0.042	-.178	-4.14	<.001		
	Enforcement Capacity	-0.412	0.049	-.403	-8.41	<.001		
	Technical Infrastructure	-0.181	0.046	-.189	-3.93	<.001		
	Judicial Efficiency	-0.187	0.044	-.202	-4.25	<.001		
	Stakeholder Awareness	-0.142	0.049	-.134	-2.90	.004		

Note: ***p<.001, **p<.01. Dependent Variable: Cybercrime Incident Frequency

Structural Equation Model - Path Coefficients

Hypothesized Path	Standardized Coefficient	SE	CR	p	Hypothesis Support
Direct Effects					
Legislative Quality → Cybercrime Frequency	-0.287	0.048	-5.979	<.001	H1: Supported
Legislative Quality → Enforcement Capacity	0.624	0.042	14.857	<.001	-
Enforcement Capacity → Cybercrime Frequency	-0.398	0.051	-7.804	<.001	H2: Supported
Technical Infrastructure → Cybercrime Frequency	-0.213	0.046	-4.630	<.001	H3: Supported
Judicial Efficiency → Cybercrime Frequency	-0.224	0.047	-4.766	<.001	H4: Supported
Stakeholder Awareness → Cybercrime Frequency	-0.168	0.043	-3.907	<.001	H5: Supported
Indirect Effects					
Legislative Quality → Enforcement → Cybercrime	-0.248	0.038	-6.526	<.001	H2: Supported
Moderating Effects					
Tech Infrastructure × Legislative Quality	-0.142	0.052	-2.731	.006	H3: Supported

SEM Findings

- **H1 Supported:** Legislative Quality demonstrates significant negative direct effect on Cybercrime Frequency (β=-0.287, p<.001), confirming that framework deficiencies increase cybercrime incidents.
- **H2 Supported:** Enforcement Capacity partially mediates the relationship between Legislative Quality and Cybercrime Frequency. Indirect effect (β=-0.248, p<.001) indicates that 46.3% of legislative quality's total effect operates through enforcement capacity.
- **H3 Supported:** Technical Infrastructure significantly moderates the Legislative Quality-Cybercrime relationship (β=-0.142, p=.006). When technical infrastructure is adequate, legislative quality's protective effect strengthens.
- **H4 Supported:** Judicial Efficiency demonstrates significant direct negative effect on Cybercrime Frequency (β=-0.224, p<.001), indicating that efficient judicial processes enhance deterrence.
- **H5 Supported:** Stakeholder Awareness shows significant negative relationship with Cybercrime Frequency (β=-0.168, p<.001), confirming that higher awareness correlates with reduced vulnerability.

To further examine H3, moderation analysis tested whether Technical Infrastructure adequacy moderates the Legislative Quality-Cybercrime Frequency relationship.

Moderation Analysis - Technical Infrastructure

Effect	Coefficient	SE	t	p	LLCI	ULCI
Legislative Quality (LQ)	-0.412	0.053	-7.774	<.001	-0.516	-0.308
Technical Infrastructure (TI)	-0.287	0.048	-5.979	<.001	-0.381	-0.193

Client Cybercrime Incident Analysis

Respondents reported specific cybercrime incidents experienced by their clients in digital commerce. **Client Cybercrime Incident Types (Past 24 Months)**

Incident Type	Frequency	% of Respondents	Average Incidents per Affected Client
Payment fraud/card theft	287	69.5%	3.4
Phishing attacks	312	75.5%	4.7
Data breaches	198	47.9%	1.8
Ransomware	124	30.0%	1.2

Account takeover	256	62.0%	2.9
DDoS attacks	167	40.4%	2.1
Business email compromise	223	54.0%	2.3
Insider threats	145	35.1%	1.6
API vulnerabilities	189	45.8%	2.4
Supply chain attacks	98	23.7%	1.4

Phishing attacks (75.5%) and payment fraud (69.5%) emerge as most prevalent threats, consistent with broader industry data (CERT-In, 2023). Notably, 47.9% of respondents' clients experienced data breaches, highlighting significant compliance failures under IT Act Section 43A and anticipated DPDP Act provisions.

Compliance and Enforcement Experiences

Aspect	Response Category	Frequency	Percentage
Clients filed cybercrime complaints	Yes, multiple times	234	56.7%
	Yes, once	89	21.5%
	Never	90	21.8%
Complaints resulting in FIR registration	<25% of complaints	198	61.3%
	25-50%	87	26.9%
	>50%	38	11.8%
Cases reaching prosecution stage	<10% of FIRs	256	79.2%
	10-25%	54	16.7%
	>25%	13	4.0%
Cases resulting in conviction	None	289	89.4%
	1-2 cases	32	9.9%
	>2 cases	3	0.9%
Average case resolution time	<1 year	12	3.7%
	1-3 years	67	20.7%
	3-5 years	156	48.2%
	>5 years	89	27.5%
Client satisfaction with legal remedies	Very dissatisfied/Dissatisfied	324	78.5%
	Neutral	67	16.2%
	Satisfied/Very satisfied	22	5.3%

Discussion

Interpretation of Findings

This study provides comprehensive empirical evidence demonstrating significant gaps between legislative intent and enforcement outcomes in India's cyber law and data protection framework. The findings validate the central hypothesis that data protection framework deficiencies positively correlate with cybercrime incident frequency in digital commerce environments, with enforcement capacity emerging as the critical mediating variable.

- **Legislative Quality and Cybercrime Relationship:** The strong negative correlation ($r=-.687$, $p<.001$) and significant regression coefficient ($\beta=-.254$, $p<.001$) confirm that legislative framework quality substantially influences cybercrime outcomes. However, the persistence of high cybercrime frequency ($M=3.67$) despite recent legislative enhancements suggests that legislative quality alone proves insufficient without corresponding enforcement and implementation capacity (Solove & Hartzog, 2022; Bygrave, 2020).
- **Enforcement Capacity as Critical Mediator:** Enforcement capacity's mediating effect (46.3% of total legislative quality impact) aligns with international cybercrime literature emphasizing implementation over legislation (Wall, 2021; Brenner, 2020). The finding that enforcement capacity demonstrates the strongest predictive relationship with cybercrime frequency ($\beta=-.403$, $p<.001$) suggests that India's cyber law challenges primarily reflect implementation rather than legislative deficiencies. This contradicts conventional wisdom emphasizing legislative gaps and redirects policy attention toward capacity building (Kumar, 2023; Saxena, 2021).

- **Judicial Efficiency Crisis:** The finding that 81.6% of respondents perceive judicial delays as problematic, combined with reported average case resolution times exceeding 3-5 years, confirms judicial capacity as a critical vulnerability. Low conviction rates (89.4% of respondents reporting zero client convictions) severely undermine deterrence mechanisms fundamental to cyber law effectiveness (Mohan & Reddy, 2021). This finding supports calls for specialized cyber courts and fast-track procedures advocated in legal literature but not yet systematically implemented (Patel & Deshmukh, 2022).
- **Technical Infrastructure Moderation:** The significant moderating effect of technical infrastructure demonstrates that legislative quality's protective impact depends critically on technical capacity. At low infrastructure levels, even well-designed legislation fails to reduce cybercrime significantly. This finding emphasizes the socio-technical nature of cybersecurity, where legal, organizational, and technical elements must align for effectiveness (Anderson, 2020; Agarwal & Mishra, 2020).
- **DPDP Act Implementation Concerns:** Respondents' substantial concerns regarding DPDP Act implementation (93.2% concerned about enforcement capacity) reflect learned skepticism from existing framework experiences. The anticipated compliance cost burden for SMEs (88.6% concerned) suggests potential unintended consequences including compliance avoidance, reduced digital commerce participation, or increased informal sector activity (Desai & Patel, 2022). These concerns warrant immediate policy attention to prevent DPDP Act from replicating IT Act implementation challenges.

Recommendations

Based on empirical findings and discussion, the following evidence-based recommendations are proposed:

Legislative Reforms

R1: **Enact Cyber Court Establishment Act** Create dedicated legislation establishing specialized cyber courts in all High Courts and selected District Courts, with technically trained judges, streamlined evidence procedures, and mandatory 18-month case resolution timelines.

R2: **Harmonize IT Act and DPDP Act** Establish joint parliamentary committee to systematically identify and resolve conflicts between IT Act provisions and DPDP Act, particularly regarding data breach notification, compensation mechanisms, and enforcement authority overlap.

R3: **Strengthen Cross-Border Enforcement Provisions** Amend IT Act to enable direct cooperation with foreign law enforcement, evidence sharing without diplomatic channels, and recognition of foreign cybercrime judgments under specified conditions.

R4: **Introduce Graduated Penalty Framework** Replace fixed penalties with graduated frameworks considering organizational size, violation severity, remedial efforts, and repeat offense history, addressing disproportionate SME burden.

Policy and Regulatory Reforms

R5: **Establish National Cybersecurity Capacity Development Program** Launch comprehensive program enhancing technical capacity across law enforcement, judiciary, and regulatory bodies through international partnerships, training programs, and infrastructure investments.

R6: **Create SME Digital Security Support Initiative** Develop government-subsidized program providing SMEs with cybersecurity assessments, compliance toolkits, technical advisory, and financial assistance for implementing security measures.

R7: **Implement Mandatory Cybersecurity Audits** Require all digital commerce entities above specified transaction thresholds to conduct annual third-party cybersecurity audits with results submitted to Data Protection Board and CERT-In.

R8: **Develop Sector-Specific Technical Standards** Issue detailed technical standards for each digital commerce sector translating legal obligations into specific security controls, authentication requirements, and incident response procedures.

R9: **Establish Fast-Track Breach Resolution Mechanism** Create alternative dispute resolution mechanism for data breach cases, enabling faster victim compensation without lengthy litigation, while maintaining option for judicial remedy.

Institutional Reforms

R10: **Expand Cybercrime Investigation Infrastructure** Increase cybercrime cell personnel by 300%, equip all state cells with advanced digital forensics tools, and establish regional cyber forensic laboratories with international-standard capabilities.

R11: **Accelerate Data Protection Board Operationalization** Fast-track Data Protection Board establishment, ensure adequate budget allocation, recruit technical experts alongside legal professionals, and establish transparent operational procedures within six months.

R12: **Create Public-Private Cybersecurity Partnership** Formalize collaboration mechanisms between government enforcement agencies and private sector cybersecurity firms enabling threat intelligence sharing, joint investigations, and capacity building.

Awareness and Capacity Building

R13: **Launch National Digital Commerce Security Awareness Campaign** Implement comprehensive public awareness initiative educating businesses and consumers about cyber threats, data protection rights, and security best practices through multiple channels.

R14: **Integrate Cybersecurity in Professional Education** Mandate cybersecurity and data protection modules in CA, CS, and law curricula, ensuring future professionals possess foundational technical literacy for advising digital commerce clients.

R15: **Establish Continuous Professional Development Requirements** Require legal and financial professionals advising digital commerce clients to complete specified hours of annual continuing education in cyber law and cybersecurity.

Conclusion

This research provides comprehensive empirical evidence demonstrating that while India has developed increasingly sophisticated cyber law and data protection frameworks culminating in the Digital Personal Data Protection Act 2023, significant implementation gaps constrain framework effectiveness in securing digital commerce environments. Through systematic analysis of perspectives from 413 professional stakeholders—Chartered Accountants, Company Secretaries, and Lawyers—directly engaged with cybersecurity compliance and enforcement, this study reveals critical disconnects between legislative intent and enforcement outcomes.

The findings conclusively support the central hypothesis that data protection framework deficiencies positively correlate with cybercrime incident frequency, with the regression model explaining 61.3% of variance in cybercrime incidents. However, the research demonstrates that enforcement capacity, rather than legislative design, represents the critical determinant of framework effectiveness, mediating 46.3% of legislative quality's total impact. Technical infrastructure and judicial efficiency emerge as additional critical factors, with technical infrastructure moderating legislative effectiveness and judicial delays severely undermining deterrence mechanisms.

Particularly concerning are findings that 89.4% of professional stakeholders have never witnessed client cybercrime cases resulting in conviction, average case resolution times exceed 3-5 years, and only 11.8% of cybercrime complaints progress beyond FIR registration to prosecution. These enforcement realities create an environment where cyber laws exist comprehensively on paper but function inadequately in practice, generating minimal deterrent effect and leaving digital commerce entities vulnerable to persistent threats.

Looking forward, the recently enacted DPDP Act faces significant implementation challenges, with 93.2% of respondents expressing high concern regarding Data Protection Board enforcement capacity and 88.6% concerned about inadequate SME guidance. Without addressing systemic enforcement, judicial, and capacity deficiencies identified in this research, the DPDP Act risks replicating existing IT Act implementation challenges rather than transforming India's data protection landscape.

The study contributes to scholarship by providing first comprehensive empirical evidence regarding cyber law implementation effectiveness from professional stakeholder perspectives, establishing enforcement capacity as the critical mediating variable in framework effectiveness, demonstrating technical infrastructure's moderating role, and revealing the substantial theory-practice gap in Indian data protection. For policy and practice, findings redirect attention from legislative reform toward implementation capacity, judicial specialization, technical infrastructure development, and stakeholder awareness—areas requiring urgent intervention to realize legislative intent.

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