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THEME OF मनुष्यवती भूमिरर्थः

Kautilya's Tantrayukti

अशीतिशततमं प्रकरणम्-तंत्रयुक्तय:

मनुष्याणां वृत्तिरर्थः, मनुष्यवती भूमिरित्यर्थः ।१। तस्या : पृथिव्या लाभपालनोपायः शास्त्रमर्थशास्त्रमिती ।२।

तदद्वात्रिंशद्युक्तिमुक्तम् – अधिकरणम् , विधानम्, योगः , पदार्थः, हेत्वर्थः , उद्देशः, निर्देशः, उपदेशः, अपदेशः, अतिदेशः, प्रदेशः, उपमानम्, अर्थापत्तिः, संशयः, प्रसङ्गः, विपर्ययः, वाक्यशेषः, अनुमतम्, व्याख्यानम्, निर्वचनम्, निदर्शनम्, अपवर्गः, स्वसंज्ञा, पूर्वपक्षः, उत्तरपक्षः एकान्तः, अनागतावेक्षणम्, अतिक्रान्तावेक्षणम्, नियोगः, विकल्पः, समुच्चयः, ऊह्यम् इति ।३।

यमर्थमधिकृत्योच्यते तदधिकरणम् ।४। 'पृथिव्या लामे पालने च यावन्त्यर्थशास्त्राणी पूर्वाचार्ये: प्रस्थापितानी प्रायस्तानि संहृत्यैकमिदमर्थशास्त्रम् कृतम्' (१.१.१) इति ।५।

–कौटिलीयेअर्थशास्त्रे तंत्रयुक्तिः - षड्ग्चादशमधिकरणम्

English Translation

1. The source of the livelihood of men is wealth. In other words, the earth inhabited by men.
2. The science which is the means of the attainment and protection of that earth is the Science of Politics.
3. That contains thirty-two devices of treatment: topic, statement (of contents), employment (of sentences), meaning of words, reason for (establishing) something mentions, explanation, advice, reference, application, Indication, analogy implication, doubt (similar) situation, contrary (corollary), completion of a sentence, agreement. emphasizing, derivation (of a word), Illustration, exception, one's own technical term, the prima facie view, the correct view, Invariable rule, reference to a future statement, reference to a past statement, restriction, option, combination, and what is understood.
4. The object. with respect to which a statement is made, is the topic.
5. For instance: "This single (treatise on the) Science of Politics is composed mostly by bringing together (the teachings of) as many treatises on the Science of Politics as have been composed by the ancient teachers for the acquisition and protection of the earth."

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ABOUT AJNIFM

The Arun Jaitley National Institute of Financial Management (AJ-NIFM) is a Center of Excellence specializing in capacity building of government officials in the fields of Public Policy, Public Finance, Financial Markets, Financial Management, and other related areas for promoting the highest standards of professional competence and practice.

AJ-NIFM was set up in 1993 as a registered society under the Ministry of Finance, Government of India. To begin with, it was mandated to train the officers recruited by the Union Public Service Commission (UPSC) through the Civil Services Examination and allocated to the various services responsible for managing senior and top management positions dealing with accounts and finance in the Government of India. In due course of time, AJ-NIFM has become a premier resource center to meet the training needs of the Central Government for their senior and middle-level officers. AJ-NIFM also caters to the State Government, Defense establishments, Autonomous Bodies, and other Financial Institutions for their capacity building and research requirements.

AJ-NIFM plays a pivotal role in governance and administrative reforms by providing a platform for interaction, exchange of ideas, and experience among officers from various organized services, state governments, and personnel of civil and defense establishments.

Apart from capacity building, AJ-NIFM is also engaged in research studies in the areas of financial markets, public finance, financial management, public procurement, and other issues related to public finance, public policy, and delivery systems. The outcomes of such research studies are published and disseminated through Research Papers, Journals, and Books.

AJNIFM also undertakes various consultancy projects relating to its domain viz., monitoring and evaluation of various government schemes, third party evaluations, writing of policy documents, manuals, etc.

The Union Finance Minister of the Government of India is the President of the AJ-NIFM Society. The Secretary (Expenditure) of, the Government of India is the Chairman of the Board of Governors (BoG). The Director, AJ-NIFM is responsible for the administration and academic programs of the Institute. AJ-NIFM has a distinct advantage of an amalgamation of faculty from academics, industry experts, and Government.

AJNIFM has five functional verticals:

- Capacity Building Programmes
- Long Term Degree / Diploma awarding programmes
- Research & Publications
- Consultancies
- Innovation.

These functions are delivered by three Schools:

1. School of Public Finance (SPF)
2. School of Financial Markets (SFM)
3. School of Management Studies (SMS)

A. TRAINING PROGRAMMES AT AJNIFM

The approach of AJNIFM is to impart multifaceted training in various aspects of financial management, budgeting, accounting, auditing, public procurement, and

information technology keeping in view the fast-changing economic, commercial and technological environment. The focus is on practical applications, including the use of IT.

1. PROFESSIONAL TRAINING COURSE (PTC):
AJNIFM provides professional training to the Officer Trainees of organized Central Finance & Accounts Services which are responsible for the management of Finance, Accounts, Costing, and Audit functions in the Government of India. The duration of the Professional Training Course is 26 weeks, divided into two modules of 13 weeks each with a total of 36 credits.

2. **MASTER OF BUSINESS ADMINISTRATION (FINANCE):**
MBA (F) is a two-year full-time residential program. The program is recognized by Jawaharlal Nehru University, New Delhi. The program is open for government officials as well as fresh graduates desirous of a career in the financial sector. The MBA (Finance) program has been designed to develop trained professionals in the financial sector capable of occupying positions of responsibility in regulatory bodies, market intermediaries, banks, mutual funds, asset management companies, stock exchanges, commodity exchanges, and similar organizations in private and government sectors. The curriculum also consists of attachments at Mumbai as well as Singapore wherein the participants avail an opportunity to interact with the professionals functioning at the apex level in the financial sectors such as RBI, SEBI, NCDEX, MCX, FIMMDA.

3. MASTER OF BUSINESS ADMINISTRATION (FINANCIAL MANAGEMENT):
MBA (FM) is a two-year full-time program. This program is also recognized by Jawaharlal Nehru University, Delhi. The program is open to the officers at middle and senior levels, working with central and state government including defense services, public sector undertakings, and autonomous organizations/ bodies. The program is designed to enable the senior officers/ executives of the government to meet contemporary challenges in Financial Management including Public Financial Management.

4. POST GRADUATE PROGRAMME (GOVERNMENT ACCOUNTING & INTERNAL AUDIT):
The Post Graduate Programme in Government Accounting & Internal Audit Programme is a one-year program designed to upgrade the technical skills of officers of the office of Controller General of Accounts and other organized accounting services of the various government departments in the areas of accounting, internal audit, information technology, general management, etc. and improve their soft skills.

5. CAPACITY BUILDING PROGRAMMES / MANAGEMENT DEVELOPMENT PROGRAMMES (MDPS):
AJ-NIFM conducts many capacities building short-duration Management Development Programmes (MDPs) / Executive Development Programmes (EDPs) in various areas of public finance viz expenditure management, revenue management, debt management, budgeting, public financial administration, financial management, accounting, internal audit, procurement, GST, IT, HR, etc.

The officers of Indian Economic Service (IES), Indian Statistical Service (ISS), Indian Telecom Service (ITS), officials of various central government departments, state government services & departments, PSUs, municipal corporations, autonomous institutes, and bodies participate in these MDPs/EDPs.

AJ-NIFM also conducts a few programs under the ITEC initiative of the Ministry of External Affairs with the participation of officials from many developing countries.

Besides, AJ-NIFM also organizes a few mid-career training programs (MCTPs) for officers of participating services with international attachments.

B. General Information

1. Campus

The Institute is located on a plot of land measuring over 40 acres on Pali Road, Faridabad, Haryana. The Institute building is beautifully landscaped, with a unique architectural design. Its sprawling lush green lawns, luxurious green cover around with perennial shrubs, flowers, and trees make the campus an ideal place for serious studies as well as recreation amid nature.

2. Accommodation

The Institute has two hostels namely Ganga and Yamuna, each having 182 & 96 rooms respectively. The officer trainees are accommodated in Yamuna Hostel.

3. AJ-NIFM Library

AJ-NIFM Library is committed to providing the widest possible access to information and this commitment is reflected in the range of services provided by it. Its website https://library.nifm.ac.in/ is linked to various online databases that are available from any device within the institute network. The library works tirelessly to fulfill its mission to address the interests and needs of the institute, students, and participating members by providing and maintaining access to a collection of materials and electronic resources that addresses the interest and needs of the institute/library members.

AJ-NIFM Library is fully automated and has a collection of over 39,000 books on Finance, Management, Economics, Public Policy, Financial Management, Accounting, Computer, Taxation, etc. In addition, the AJ-NIFM library has an invaluable collection of books on literature, fiction, etc., both in English and Hindi.

The library holds a rich collection of electronic resources which include different types of the full-text online database(s) related to Social and Management Science covering more than 5000 Journals/Periodicals and E-books on different subjects. AJ-NIFM library also subscribes to Company and Industrial Database, and Socio-economic database for their users. The library is also providing different types of services viz circulation, reading facilities, mail alert service, reference and information service, database search service, document delivery, interlibrary loan, photocopying, orientation programs, Online Public Access Catalogue (OPAC), Current Awareness Services (CAS), and Research Assistance Service.

AJ-NIFM Library is a member of DELNET (Developing Library Network). It provides access to more than 3.5 crore records comprising books, E-Journals, E-books, etc. to facilitate their users/researchers.

3.1 RESOURCES

3.1.1 PRINT

Print	Resources
Books	39000
Bound volume of periodicals	2747
Current subscribed journals	54
Non-book Materials	3248
Newspapers	23
Magazines	25

3.1.2 E-RESOURCES

E-Books	
McGraw Hill	https://www.expresslibrary.mheducation.com/bookshelf
Kopy Kitab	http://ajnifm.kopykitab.com
Pearson	http://elibrary.in.pearson.com/
Sage Publishing	https://etext.sagepub.in/etext
Full Text Database	
J-Gate Social & Mgt. Sc.	https://jgateplus.com
EBSCO: Business Source Elite	http://search.ebscohost.com
JSTOR	http://www.jstor.org/
EPW	https://www.epw.in/
Sage Journals (17 Journals)	https://journals.sagepub.com/
Statistical Database	
CMIE Prowess IQ (CMIE)	http://prowessiq.cmie.com/
Economic Outlook (CMIE)	https://economicoutlook.cmie.com/
IndiaStat (Single User)	www.indiastat.com
Bibliographical Database	
DELNET	http://164.100.247.26/
ISID Research Reference	http://103.82.220.134/Login
Library Website	
On-line Public Access Catalogue (OPAC)	https://library.nifm.ac.in/

3.1.3 LIBRARY TIMINGS:

Monday to Friday	09:00 am to 07:00 pm
Saturday	10.00 am to 02.00 pm
Sunday and Gazette Holidays	Closed

4. COMPUTER FACILITIES

4.1 IT INFRASTRUCTURE:

- **Computer Labs:** The institute has three *"State of the Art"* Computer Labs. The computer Lab-1 and Lab-2 have a seating capacity of 55 and 62 persons

respectively which are used for conducting online/hands-on classes for Long Term Courses, Management Development Programme, and other short duration programs. The third computer lab is a small computer lab with a seating capacity of 19 being used for research and practice purposes. All the labs have good quality Multimedia projectors for conducting practical classes. There is a heavy-duty network printer installed in each lab.

- **Server Room:** There is a dedicated Server Room wherein all the servers have been installed together on different shelves in a closed server rack and are managed through a KVM switch. To protect the network by filtering traffic and blocking outsiders from gaining unauthorized access to the user data, a Fortigate 300C firewall is mounted in an open rack which is further connected to all the manageable L3 & L2 network switches in the same rack. From these switches, the connectivity has been extended to all the buildings through the fiber cable.

- **Desktops and Printers:** There are a total of 247 personal computers available in the institute, out of which 136 desktops are installed in three computer labs. The newly renovated Computer Lab-1 has the latest Lenovo M910Z All-in-one desktops whereas Lab-2 and Lab-3 have Lenovo M93p desktops. All the faculty and other staff members of the institute are issued desktops for carrying out their office work.

  The institute has 59 laser printers available in IT inventory comprising multi-function (monochrome and color) printers, heavy-duty network, and normal-duty standalone printers. All the faculty members and some dept. have been issued multi-function printers.

- **Internet Connectivity:** We are connected to the National Knowledge Network (NKN), a state-of-the-art multi-gigabit pan-India network, meant for providing a unified high-speed network backbone for all knowledge-related institutions in the country. This has recently been enhanced to a bandwidth of 1Gbps. Additionally, the institute has another internet connectivity of 20 Mbps from M/s BSNL to meet the redundancy in internet services.

  The institute has a robust LAN infrastructure that brings all the buildings (Admin building, Ganga Bhawan Hostel, Yamuna Bhawan Hostel, Executive hostel, and the Residential Quarters) together through manageable switches which are further connected to NKN through the firewall to cater uninterrupted internet connectivity to the users. Internet connectivity has been made available in every room of Ganga and Yamuna Hostels through LAN.

- **Wi-Fi Connectivity:** In addition to the wired net connectivity, a few locations like Lecture Halls for Long Term Programs, Faculty Rooms, Library, and Yamuna Hostel (1st and 2nd Floor) are Wi-Fi enabled.

- **Software:** The institute has advanced statistical and analytical software like SPSS, and IDEA to strengthen its research and consultancy program. In addition to this, a yearly subscription for Cisco WebEx Meeting / Google Class Room Hosts has been procured for all the long-term courses and MDP programs for conducting online classes because of the pandemic outbreak.
  - Anti-Virus (QuickHeal Seqrite EPTS)

- IDEA V11 Audit Software
- Tableau Desktop Professional Software
- SPSS 25.0
- Tally.Net subscription ERP 9.0
- MS Office 2013
- JAWS for Windows talking
- Prowess (Server-based)
- Cisco WebEx hosts all the programs (Long Term and Short Term)

- **Computer Lab-1 (**55 users' capacity)

Lenovo M910Z All-in-one desktop	Intel Core i5-7500, 8GB RAM,3.4 GHz, 1 TB HDD, keyboard, USB Optical Mouse, 8X DVD-RW, Windows 10 prof.
Printer	HP 3015dn

- **Computer Lab-2** (62 users' capacity)

Lenovo M93p Desktop	Intel i5, 3.2 GHz with 6MB Cache, 4GB DDR3 RAM, 500GB HDD, 18.5" TFT Monitor,104 keys keyboard, USB Optical mouse,6 USB ports, audio ports, 8X DVD Drive, Network card, Windows 8 Pro with Media& Documentation
Printer	HP 3015dn

- **Computer Lab-3** (19 users' capacity)

Lenovo M93p Desktop	Intel i5, 3.2 GHz with 6MB Cache, 4GB DDR3 RAM, 500GB HDD, 18.5" TFT Monitor,104 keys keyboard, USB Optical mouse,6 USB ports, audio ports, 8X DVD Drive, Network card, Windows 8 Pro with Media & Documentation
Printer	HP P1606dn

The comprehensive information about the institute can be found on the institute's website at **https://www.nifm.ac.in**.

5. SPORTS FACILITIES

- **Indoor games** - The Institute has a fully functional Indoor Sports Complex which includes Billiards, Table Tennis, Squash, Badminton, and Other Recreational Facilities.

- **Gymnasium facility -** available in the sports complex which includes equipment like Treadmill, Cross Elliptical, Cycle, Twister, Four Station Gym Machine, Weights, Dumble, etc.

- **Outdoor games** - Courts for Tennis, Volley Ball, and Basket Ball Besides Cricket and Football Ground.

ABOUT JOURNAL

The NIFM Journal of Public Financial Management (NJPFM) is the first Bi-annual (January-June & July-December) peer-reviewed research journal published by the Arun Jaitley National Institute of Financial Management (an Institution of Ministry of Finance, Government of India), Faridabad to provide a platform to academicians, researchers, policymakers for their research work in the field of *Public Finance & Public Policy, Economics, Banking, Governance, Public Procurement, Finance, Accounting, and General Management.* NJPFM is expected to enjoy a high readership among a cross-section of the intelligentsia.

NJPFM is expected to enjoy the highest readership. The areas of interest include but are not limited to the topics *cited supra.* From the day of its inception, the followings are the status of publication:

Sl.No.	Volume	Issue No.	Date	Date of Publication
1	I	1	January – June 2009	16 January 2009
2	I	2	July – December 2009	07 July 2009
3	II	1	January – June 2010	07 January 2010
4	II	2	July – December 2010	07 July 2010
5	III	1	January – June 2011	07 January 2011
6	III	2	July – December 2011	07 July 2011
7	IV	1	January – June 2012	07 January 2012
8	IV	2	July – December 2012	07 July 2012
9	V	1	January – June 2013	07 January 2013
10	V	2	July – December 2013	Not Published
11	VI	1	January – June 2014	Not Published
12	VI	2	July – December 2014	Not Published
13	VII	1	January –June 2015	07 August 2015
14	VII	2	July – December 2015	Not Published
15	VIII	1	January – June 2016	Not Published
16	VIII	2	July – December 2016	Not Published
17	IX	1	January – June 2017	Not Published
18	IX	2	July – December 2017	Not Published
19	X	1	January – June 2018	Not Published
20	X	2	July – December 2018	Not Published
21	XI	1	January – June 2019	Not Published
22	XI	2	July – December 2019	Not Published
23	XII	1	January – June 2020	Not Published
24	XII	2	July – December 2020	Not Published
23	XIII	1	January – June 2021	Not Published
24	XIII	2	July – December 2021	Not Published

25	XIV	1	January – June 2022	07 April 2022
26	Special Issue		November 2022	07 November 2022
27	XIV	2	July – December 2022	29 December 2022
28	XV	1	January – June 2023	7 January 2023
29	Special Issue		November 2023	07 November 2022
30	XV	2	July – December 2023	Not Published
31	XVI	1	January – June 2024	Not Published
32	Special Issue		February 2024	29 February 2024
33	XVI	2	July – December 2024	Not Published

It is also expected that the *NIFM Journal of Public Financial Management* would be an appropriate platform for the faculty of NIFM to express and share their relationship with the rest of the world and in bargain invite the academic resources to strengthen NIFM's status as a true *Centre of Excellence* in Public Financial Management.

The NJPFM vision is to be reviewed, abstracted and indexed by the Econ Lit, Journal of Economic Literature [JEL] (of American Economic Association), Mathematical Reviews (of MathSciNet), Newjour, JournalSeek, Getcited, EBSCO database, Thomson Gale Database, and Indian Economics Association.

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EDITORIAL

Editorial
Advancing Public Procurement and Governance Through Research and Innovation

BRAJESH KUMAR

The **NIFM Journal of Public Financial Management (Special Issue, February 2025)** presents a compelling selection of research articles that collectively advance our understanding of public procurement, dispute resolution, and the integration of artificial intelligence in contract management. The journal serves as a crucial platform for policymakers, academicians, and practitioners to explore contemporary challenges and innovative solutions in the domain of public financial management. The role of public procurement in economic governance is becoming increasingly significant as governments worldwide focus on efficiency, transparency, and sustainability in resource allocation. As public financial management continues to evolve, integrating modern technological solutions, regulatory reforms, and data-driven decision-making processes is imperative. This special issue aims to shed light on these critical aspects and provide a forum for discussions that shape future policies and practices.

Strengthening Sustainable Public Procurement

Public procurement plays a pivotal role in shaping sustainable development policies, particularly in emerging economies like India. The article "**Leveraging Sustainable Public Procurement to Drive Sustainable Development in India**" highlights the importance of embedding sustainability considerations into procurement frameworks. The authors emphasize how strategic procurement policies can align with environmental, social, and economic goals, thus ensuring long-term benefits for society. Their work calls for a multi-stakeholder approach where governmental institutions, suppliers, and civil society collaborate to drive

sustainable procurement forward.

Sustainable public procurement (SPP) extends beyond simply purchasing eco-friendly products; it involves an integrated approach that considers the entire lifecycle of goods and services. This includes assessing suppliers' environmental impact, promoting ethical labor practices, and ensuring fair competition. Governments are uniquely positioned to influence market behavior by prioritizing sustainability in their procurement policies, thereby fostering green innovation and sustainable economic growth.

In India, public procurement constitutes a significant portion of the GDP, making it a powerful tool for driving sustainability. However, its implementation faces challenges, including regulatory bottlenecks, lack of awareness among stakeholders, and the need for capacity-building initiatives. The authors propose policy recommendations, including mandatory sustainability criteria in tenders, incentives for eco-friendly suppliers, and robust monitoring mechanisms to ensure compliance. They also emphasize the role of digital platforms in improving procurement transparency and accountability.

Case studies from different Indian states illustrate successful models of SPP. For instance, Kerala's Green Protocol in procurement prioritizes environmentally friendly practices, while Maharashtra's procurement policies include specific sustainability guidelines. These examples serve as blueprints for nationwide adoption, showcasing how targeted policy interventions can create tangible environmental and social benefits.

Additionally, international best practices offer valuable insights. The European Union's Green Public Procurement (GPP) framework and the United Nations Sustainable Public Procurement (SPP) Program provide guidelines that can be adapted to the Indian context. The authors suggest learning from these models and integrating global standards with local needs to develop a holistic approach to SPP.

Dispute Resolution in Public Procurement: A Path Forward

Procurement-related disputes have historically posed significant challenges to timely project execution. The article "**Dispute Resolution through Arbitration in Public Procurement: An Overview**" provides an in-depth examination of arbitration mechanisms as an alternative to lengthy litigation processes. The authors analyze various legal frameworks, including the Arbitration and Conciliation Act, and assess its effectiveness in resolving disputes efficiently. By comparing global best practices, the study provides valuable insights into improving India's procurement arbitration framework.

Public procurement contracts often involve multiple stakeholders, including government agencies, contractors, suppliers, and financial institutions. Given the complexity of these contracts and the substantial financial implications, disputes are inevitable. Common causes of disputes include delays in project execution, cost overruns, non-compliance with contractual obligations, and ambiguities in contract interpretation. The traditional method of resolving procurement disputes through litigation is often cumbersome, costly, and time-consuming, leading to project delays and increased public expenditure.

The article emphasizes that arbitration offers a viable alternative to litigation, providing a structured yet flexible dispute resolution mechanism. Arbitration allows for quicker resolution of disputes, reduces the burden on courts, and ensures that contractual obligations are fulfilled without prolonged legal battles. However, the effectiveness of arbitration depends on the robustness of the legal framework governing it. The authors provide a comparative analysis of arbitration frameworks in countries such as the United States, the United Kingdom, and Singapore, offering key lessons that can be adapted to the Indian context.

The study also highlights the role of institutional arbitration in procurement disputes. Institutions such as the Singapore International Arbitration Centre (SIAC) and the London Court of International Arbitration (LCIA) have set high standards in dispute resolution. By adopting similar models, India can enhance the efficiency and credibility of its arbitration processes. The authors

advocate for greater reliance on institutional arbitration bodies, specialized arbitrators with expertise in procurement law, and standardized contract clauses that preemptively address potential disputes.

Further, the article discusses the need for policy reforms to strengthen arbitration mechanisms in India. While the Arbitration and Conciliation Act provides a legal foundation for arbitration, procedural inefficiencies and lack of awareness among stakeholders often hinder its effectiveness. The authors suggest streamlining arbitration procedures, promoting alternative dispute resolution (ADR) training for procurement officials, and incorporating arbitration-friendly clauses in government contracts to encourage out-of-court settlements.

Another critical aspect discussed is the importance of technology in dispute resolution. Digital arbitration platforms, AI-driven contract management systems, and blockchain-based documentation can significantly enhance transparency and efficiency in resolving procurement disputes. The authors propose integrating technology-driven dispute resolution mechanisms into India's procurement ecosystem to expedite resolution processes and ensure real-time contract monitoring.

The article also highlights notable case studies where effective arbitration mechanisms have led to successful dispute resolution in public procurement. One such example is the use of expedited arbitration in resolving contract disputes related to major infrastructure projects. By analyzing these case studies, the authors demonstrate how arbitration can be effectively leveraged to mitigate risks and enhance project execution efficiency.

Ultimately, the study concludes that strengthening arbitration mechanisms in public procurement can lead to more efficient dispute resolution, reduced financial losses, and improved project outcomes. The authors urge policymakers, legal practitioners, and procurement officials to work collaboratively in fostering a more arbitration-friendly environment in India. By embracing global best practices, investing in institutional arbitration, and

leveraging technology, India can create a more resilient and responsive procurement dispute resolution framework.

AI and Predictive Analytics in Public Procurement

Artificial intelligence has the potential to transform public procurement by enhancing efficiency and predictive capabilities. The article "**Developing a Delivery Prediction Model Using AI for Contracts Awarded by GeM**" presents a groundbreaking study on how AI-driven models can predict delivery times for government contracts. Using Long Short-Term Memory (LSTM-GRU) and CatBoost models, the research demonstrates how predictive analytics can improve contract management by minimizing delivery delays. The study highlights AI's potential in optimizing procurement processes and suggests future directions for refining predictive accuracy.

Public procurement is a multifaceted process involving various stakeholders, including government agencies, suppliers, and contractors. The complexity of procurement contracts often leads to inefficiencies, delays, and budget overruns. AI-driven predictive analytics offers a solution by enabling procurement officials to anticipate challenges and make data-driven decisions. Predictive analytics can enhance contract management by identifying risk factors that contribute to delays, allowing proactive mitigation strategies to be implemented.

The study examines how AI models, particularly LSTM-GRU and CatBoost, can be leveraged to predict delivery timelines with high accuracy. The Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) networks are deep learning models that excel at capturing sequential patterns in data, making them well-suited for time-series forecasting. CatBoost, a gradient-boosting algorithm, efficiently handles categorical variables and delivers superior predictive performance. By analyzing historical contract data from the Government e-Marketplace (GeM), the researchers trained these models to predict vendor performance and delivery outcomes.

The findings of the study indicate that predictive analytics can significantly reduce uncertainties in procurement planning. By

accurately forecasting delivery timelines, procurement agencies can enhance supplier accountability and reduce project disruptions. Additionally, AI-driven models facilitate optimal resource allocation by ensuring that procurement schedules align with operational requirements.

To further improve predictive accuracy, the authors propose integrating additional features such as supplier reputation scores, real-time tracking data, and external market conditions. These enhancements can refine AI models, allowing them to adapt dynamically to evolving procurement landscapes. The study also highlights the role of explainable AI (XAI) in increasing stakeholder confidence by providing transparent insights into model predictions.

One of the key takeaways from the study is the importance of digital transformation in public procurement. Governments worldwide are investing in AI-powered procurement platforms to streamline operations and improve efficiency. The European Union's AI-driven procurement framework and the United States' predictive analytics initiatives provide valuable benchmarks for India to consider. By adopting global best practices and leveraging indigenous AI capabilities, India can enhance procurement efficiency while ensuring compliance with regulatory standards.

Furthermore, the study discusses challenges associated with implementing AI in procurement. Data quality and availability remain significant hurdles, as incomplete or biased datasets can affect model performance. The authors emphasize the need for standardized data collection protocols and robust validation mechanisms to ensure reliable AI-driven predictions. Additionally, capacity-building initiatives for procurement officials can facilitate the adoption of AI tools, enabling seamless integration into existing procurement workflows.

The study also underscores the ethical considerations surrounding AI deployment in public procurement. Transparency, fairness, and accountability are critical to preventing algorithmic biases and ensuring equitable outcomes. The authors recommend implementing AI governance frameworks to monitor predictive models and

mitigate risks associated with automation. By fostering collaboration between policymakers, data scientists, and procurement professionals, governments can establish ethical AI guidelines that align with public interest.

Case studies included in the article illustrate successful applications of AI in procurement. For instance, AI-driven models in the United Kingdom's National Health Service (NHS) procurement system have improved efficiency by optimizing supplier selection and contract execution. Similarly, Singapore's Smart Procurement initiative utilizes predictive analytics to enhance procurement transparency and reduce fraud risks. These real-world examples demonstrate how AI can revolutionize procurement processes, leading to cost savings and improved service delivery.

In conclusion, the research highlights the transformative potential of AI and predictive analytics in public procurement. By leveraging advanced machine learning techniques, governments can enhance procurement planning, mitigate risks, and improve contract execution efficiency. The authors advocate for continued investment in AI-driven solutions, emphasizing the need for policy support, technological infrastructure, and workforce training. As AI technology continues to evolve, its integration into public procurement will play a crucial role in shaping the future of efficient, transparent, and accountable governance.

Rethinking Liquidated Damages in Public Contracts

The legal interpretation and enforcement of liquidated damages (LDs) clauses in procurement contracts remain a contested issue. The article "**Liquidated Damages in Public Procurement Contracts and the Need to Prove Loss**" critically examines the legal dichotomy between penalties and LDs in contract enforcement. Drawing from both Indian and common law precedents, the study argues for a more pragmatic approach, aligning with recent UK Supreme Court judgments that emphasize legitimate performance interests over strict proof of loss. This discourse is particularly relevant for policymakers and legal practitioners working on

contract enforcement frameworks.

Liquidated damages serve as a financial safeguard against contract breaches, ensuring that public projects remain on schedule and within budget. However, their enforcement is often challenged in courts, where parties argue about the necessity to prove actual loss. In many jurisdictions, including India, courts have leaned towards requiring evidence of loss before awarding LDs, despite the contractual agreement specifying predetermined damages. This has led to prolonged litigation, increased uncertainty for contracting parties, and inefficiencies in public procurement processes.

The study examines how different legal frameworks treat LDs, contrasting the Indian approach with that of common law countries such as the United Kingdom and the United States. The authors analyze recent UK Supreme Court rulings that shift the focus from proving actual loss to protecting the legitimate performance interest of the non-breaching party. This shift aligns with the practical realities of public procurement, where proving precise financial loss can be complex and burdensome.

One of the key recommendations from the study is the need for Indian contract law to evolve in a manner that balances fairness with efficiency. By adopting a performance-based approach rather than a strict proof-of-loss requirement, procurement authorities can ensure greater compliance and reduce legal ambiguities. The authors suggest policy reforms that could streamline LD enforcement, such as including clearer contract clauses defining performance-based compensation and integrating alternative dispute resolution mechanisms to resolve LD disputes more efficiently.

The study also highlights the impact of LDs on vendor behavior. When LDs are enforced rigidly, suppliers may inflate bid prices to account for potential penalties, increasing overall procurement costs. Conversely, if LD enforcement is weak or inconsistent, vendors may not feel compelled to meet delivery schedules, leading to project delays. Striking the right balance in LD enforcement is crucial for fostering a competitive and

efficient public procurement ecosystem.

Additionally, the study examines the role of contract design in mitigating LD disputes. A well-drafted contract with detailed performance metrics, milestone-based penalties, and clear dispute resolution provisions can minimize conflicts and enhance contract enforcement. By learning from global best practices, India can refine its public procurement frameworks to make LD enforcement more effective and predictable.

Case studies in the article illustrate real-world scenarios where LD enforcement has led to successful project completion and instances where rigid application has resulted in costly legal battles. By analyzing these examples, the authors provide valuable insights into how procurement officials and policymakers can design better contract enforcement strategies.

Ultimately, the research underscores the need for a nuanced approach to liquidated damages—one that recognizes the importance of enforcing contractual obligations while maintaining flexibility to accommodate project-specific realities. By refining LD enforcement mechanisms, public procurement in India can become more transparent, efficient, and resilient to legal challenges.

Enhancing Procurement Data Governance

Data governance is a cornerstone of transparent and efficient procurement. The article "**Procurement Data Governance System: A Model for Ensuring Congruity & Propriety in Public Procurements**" underscores the need for robust data governance mechanisms. The authors advocate for standardized data frameworks, improved audit trails, and enhanced accountability measures to curb inefficiencies and corruption in procurement processes. The research offers a blueprint for integrating technology-driven governance solutions in public procurement systems.

Effective data governance in procurement requires a structured approach to data collection, processing, and analysis. Without robust governance mechanisms, procurement data is susceptible to inconsistencies, errors, and manipulation, leading to inefficiencies and

potential fraud. The article highlights how a well-defined data governance framework can enhance procurement transparency, improve decision-making, and ensure compliance with regulatory requirements.

One of the key aspects of procurement data governance is the standardization of data formats and reporting structures. Disparate data collection practices across government agencies create challenges in consolidating procurement records, leading to gaps in accountability. The authors propose the adoption of standardized procurement data models that facilitate interoperability across various departments and procurement systems. By ensuring that procurement data adheres to a consistent structure, government agencies can enhance visibility and oversight.

Another critical element of procurement data governance is the implementation of advanced audit trails. A transparent procurement system requires a mechanism that tracks data modifications, providing a comprehensive record of procurement activities. Audit trails help in identifying discrepancies, detecting fraudulent activities, and ensuring that procurement decisions adhere to established protocols. The study emphasizes that integrating blockchain technology can enhance audit transparency by creating immutable records of procurement transactions.

The research also underscores the importance of leveraging artificial intelligence and machine learning in data governance. AI-driven analytics can identify patterns of inefficiencies, detect anomalies, and generate insights for improving procurement strategies. By incorporating predictive analytics, government agencies can anticipate procurement challenges, optimize resource allocation, and mitigate risks. The article suggests that deploying AI-powered compliance monitoring tools can further strengthen procurement integrity.

Additionally, the authors discuss the significance of real-time procurement dashboards that offer dynamic visualization of procurement data. Dashboards enable decision-makers to access key procurement metrics, track expenditures, and assess

vendor performance in real-time. The adoption of interactive procurement dashboards can enhance operational efficiency and provide stakeholders with actionable insights for optimizing procurement strategies.

The study also highlights global best practices in procurement data governance. Countries such as the United States and the United Kingdom have implemented open data initiatives that provide public access to procurement records, fostering transparency and accountability. By adopting similar frameworks, India can enhance public trust in procurement processes and encourage citizen participation in monitoring procurement activities.

Furthermore, the authors advocate for the establishment of centralized procurement data repositories. A centralized data repository can serve as a single source of truth, eliminating redundancy and ensuring that procurement records are accurate and up-to-date. The study suggests that integrating cloud-based procurement platforms can enhance data accessibility and security, reducing the risks associated with data silos.

Ultimately, the research emphasizes that procurement data governance is not solely a technological issue but also a policy imperative. Strengthening legal and regulatory frameworks to enforce data governance standards is crucial for ensuring procurement integrity. The authors recommend capacity-building initiatives to train procurement officials in data governance best practices and promote a data-driven culture within public procurement agencies.

Public Procurement, Marketing, and Entrepreneurship: A Strategic Perspective

The article "**Public Procurement, Marketing, and Entrepreneurship**" by **Vivek Suneja** challenges the conventional perception of procurement as a purely administrative function and presents it as a strategic activity with direct implications for market efficiency, entrepreneurship, and economic governance. The paper argues that procurement must be understood within the broader context of market-making and

transaction cost economics. The study explores how procurement decisions are inherently entrepreneurial, requiring discretion, judgment, and risk assessment, much like any other market-making function.

A key contribution of this article is the linkage it establishes between procurement, marketing, and entrepreneurship. It highlights how procurement managers engage in decision-making under uncertainty, akin to entrepreneurs who create and manage markets. The study critiques the traditional fragmentation of management functions, arguing that an integrated approach—where procurement is recognized as a strategic tool for fostering innovation and market efficiency—is essential. The paper also sheds light on the ethical dimensions of procurement, emphasizing the need for transparency and accountability to prevent inefficiencies and corruption.

The article presents a compelling argument for re-envisioning procurement as a dynamic and strategic function that requires specialized training and cross-functional expertise. It calls for procurement managers to be recognized as key market facilitators who not only secure the best value for money but also drive organizational innovation and economic efficiency.

Environmentally Sustainable Public Procurement in Hydroelectric Power Projects

Sustainability in public procurement is a growing priority, and the article "**Environmentally Sustainable Public Procurement in Construction of Hydroelectric Power Projects**" by **P.K. Rawat and Anand Kumar** offers an in-depth analysis of how green procurement practices can be integrated into infrastructure projects. The paper discusses key strategies for minimizing environmental impacts through procurement policies that emphasize renewable energy, sustainable materials, and ecological conservation.

A significant contribution of this research is its focus on the role of procurement in addressing climate change. The study identifies several government initiatives, including the Government e-Marketplace (GeM), Central Public Procurement Portal,

and adherence to standards such as ISO 14001, as crucial enablers of sustainable procurement. However, it also highlights critical challenges, such as limited awareness, availability of green products, and the need for a more structured policy framework to promote sustainable procurement in large-scale infrastructure projects.

The article provides valuable insights into how sustainability criteria can be embedded in public procurement contracts, covering aspects such as tendering processes, material selection, and waste management. It highlights how lifecycle cost analysis, stakeholder engagement, and compliance with environmental regulations can enhance long-term project resilience. The paper also discusses NHPC's efforts in implementing sustainable procurement practices, aligning its operations with India's climate commitments under the Paris Agreement.

A notable aspect of this research is its discussion of the circular economy in procurement. By emphasizing reuse, recycling, and responsible resource consumption, the study presents a roadmap for transitioning to procurement models that minimize environmental impact while maximizing economic and social benefits. The findings underscore the need for institutional support, capacity building, and industry collaboration to scale up green procurement in India's infrastructure sector.

Conclusion: Charting the Future of Public Procurement

The February 2025 special issue of the **NIFM Journal of Public Financial Management** reflects the growing intersection of law, technology, and sustainability in public procurement. As governments worldwide embrace digital transformation, adopting AI-driven decision-making, enhancing dispute resolution frameworks, and strengthening procurement governance will be essential for future advancements. This compilation of research provides policymakers, academics, and practitioners with critical insights that can shape the next generation of procurement policies and practices.

Future advancements in public procurement will

require a more data-centric approach, leveraging analytics and machine learning to drive decision-making.

Governments must also develop stronger legal frameworks that support digital transformation while ensuring transparency and accountability. As seen in the articles featured in this issue, public procurement must evolve beyond conventional practices and adopt modern technological tools to mitigate inefficiencies, detect fraud, and optimize resource allocation.

The integration of artificial intelligence, predictive analytics, and blockchain technology in procurement processes will be instrumental in addressing procurement challenges. AI-driven solutions can help forecast demand, automate contract management, and streamline procurement planning. Blockchain, on the other hand, can enhance transparency by creating immutable records of procurement transactions, reducing the risk of corruption and ensuring compliance with established procurement guidelines.

To fully capitalize on the benefits of technological innovation, capacity-building initiatives must be implemented. Government procurement officials need to be equipped with the necessary digital skills to effectively utilize AI and data analytics. This can be achieved through targeted training programs, workshops, and collaborations with academic institutions specializing in public financial management and technology-driven governance.

Public-private partnerships (PPPs) also hold great potential in advancing procurement efficiency. The private sector's expertise in technological innovation and process optimization can complement government efforts in modernizing procurement practices. Collaborative efforts between governments, research institutions, and private enterprises can drive the implementation of best practices, ensuring that public procurement systems remain adaptive and resilient.

In addition to technological advancements, sustainability considerations must remain at the forefront of procurement policies. Governments should mandate the inclusion of environmental, social, and governance (ESG) criteria in procurement decisions. By

prioritizing sustainability, procurement systems can contribute to long-term economic resilience while promoting responsible business practices.

The articles featured in this special issue collectively underscore the evolving role of public procurement as a strategic, entrepreneurial, and sustainability-driven function. As governments and organizations worldwide navigate complex economic and environmental challenges, procurement is increasingly recognized as a powerful policy tool for driving market efficiency, fostering innovation, and promoting sustainability.

Looking ahead, policymakers must also focus on legal reforms that support modernized procurement processes. Streamlined dispute resolution mechanisms, simplified contract enforcement frameworks, and AI-powered compliance monitoring can reduce inefficiencies and enhance procurement governance. As procurement ecosystems become increasingly digitized, regulatory frameworks must evolve to address emerging risks while fostering an environment that encourages innovation and accountability.

Ultimately, the insights presented in this issue of the **NIFM Journal of Public Financial Management** serve as a foundation for future research and policymaking in public procurement. By embracing technology, strengthening legal frameworks, and prioritizing sustainability, governments can build procurement systems that are transparent, efficient, and resilient to evolving challenges.

We extend our gratitude to the contributing authors for their rigorous scholarship and to our reviewers for their valuable feedback. We hope this issue stimulates further research and dialogue in this critical area of public financial management.

Editor-in-Chief
NIFM Journal of Public Financial Management
Special Issue – February 2025

Commentary
Innovations and Sustainability in Public Procurement

RAJIV LOCHAN BHARADWAJ

As the **Special Issue Editor** of the **NIFM Journal of Public Financial Management (February 2025 edition),** I am pleased to present a diverse collection of research articles that contribute to the evolving discourse on public procurement, dispute resolution, artificial intelligence in contract management, and sustainability. This issue serves as a crucial knowledge repository for policymakers, academicians, and practitioners navigating the complexities of modern public financial management. The global shift toward efficiency, transparency, and sustainability in procurement is evident, and the research presented in this volume underscores the critical role procurement plays in shaping economic governance and innovation.

The article "**Leveraging Sustainable Public Procurement to Drive Sustainable Development in India**" makes a significant contribution to discussions on how procurement can serve as a catalyst for sustainability. The authors argue that procurement must integrate environmental, social, and economic considerations to achieve long-term developmental goals. While the research successfully establishes the theoretical importance of sustainable procurement, it also highlights key challenges, such as fragmented policies, enforcement gaps, and resistance from conventional procurement stakeholders. One of the strongest aspects of this paper is its call for a multi-stakeholder approach, urging collaboration among government agencies, suppliers, and civil society. However, the study could have further strengthened its argument by providing more empirical case studies demonstrating successful sustainability initiatives in procurement within India. Nevertheless, it remains a

valuable resource for policymakers seeking actionable strategies to implement green procurement.

Disputes in procurement contracts remain a critical concern, often leading to costly delays and inefficiencies. The article "**Dispute Resolution through Arbitration in Public Procurement: An Overview**" explores arbitration as an alternative mechanism to traditional litigation, advocating for a faster and more cost-effective approach. By comparing arbitration frameworks in countries such as the UK, Singapore, and the US, the author provides a global perspective on best practices. The research is particularly commendable for its legal analysis of the Arbitration and Conciliation Act, offering practical recommendations for strengthening India's arbitration framework. Factors such as bureaucratic inertia and the need for institutional support warrant further investigation. Despite this, the article provides a crucial foundation for improving dispute resolution in procurement governance.

The rapid advancement of artificial intelligence is transforming procurement practices, and the article "**Developing a Delivery Prediction Model Using AI for Contracts Awarded by GeM**" demonstrates how AI-driven models can enhance procurement efficiency. The authors employ machine learning techniques, including Long Short-Term Memory (LSTM-GRU) and CatBoost, to predict delivery timelines and mitigate procurement delays. The methodological rigor of the paper is commendable, as it uses extensive datasets from the Government e-Marketplace (GeM) to train predictive models. The findings highlight the potential of AI in contract management, vendor accountability, and procurement optimization. However, while the study provides a strong analytical foundation, it could have further explored additional factors influencing procurement delays, such as human interventions and bureaucratic inefficiencies. The feasibility of large-scale AI implementation within India's public sector also remains a challenge. Nevertheless, this research is a pioneering effort in integrating AI into procurement management,

setting the stage for future technological advancements in the field.

Liquidated damages (LDs) serve as a contractual safeguard against breaches, ensuring compliance with project timelines and deliverables. The article "**Liquidated Damages in Public Procurement Contracts and the Need to Prove Loss**" critically examines the complexities of LD enforcement, distinguishing between penalties and enforceable damages. The study provides an insightful legal analysis by referencing common law precedents and recent UK Supreme Court rulings, which emphasize performance interests over strict proof of loss. This perspective challenges traditional approaches that necessitate quantifiable proof of financial harm, advocating instead for a more pragmatic enforcement model. While the article offers a well-structured legal argument, it could have been further strengthened with empirical evidence from case studies illustrating the real-world impact of alternative LD enforcement models. Nonetheless, this research provides a strong foundation for policymakers and legal professionals looking to refine contract enforcement mechanisms within procurement frameworks.

The article "**Procurement Data Governance System: A Model for Ensuring Congruity & Propriety in Public Procurements**" addresses an often-overlooked aspect of procurement—data governance. The research argues for a standardized framework to enhance transparency, accountability, and operational efficiency. The proposed model integrates technological advancements such as AI-driven compliance monitoring, real-time audit trails, and standardized reporting structures. A notable strength of the study is its comprehensive approach, linking procurement governance with emerging digital solutions. However, while the theoretical framework is well-articulated, the paper would have benefited from empirical validation through pilot studies or case-based evidence. Additionally, the challenges of implementing a centralized procurement data governance system in India's diverse and fragmented procurement ecosystem remain a critical area for further exploration.

Nonetheless, the research presents a valuable roadmap for advancing data-driven procurement governance.

In "**Public Procurement, Marketing, and Entrepreneurship,**" author Vivek Suneja provides a novel perspective on procurement as a strategic economic function rather than a mere administrative task. The article argues that procurement decisions shape markets, influence transaction costs, and foster entrepreneurial activity. This interdisciplinary approach situates procurement within the broader context of market efficiency and economic governance. The paper's strength lies in its ability to reframe procurement as an entrepreneurial decision-making process involving risk assessment, strategic foresight, and ethical considerations. However, while the study successfully critiques the traditional fragmentation of management functions, it could have incorporated more empirical data to illustrate how procurement practices directly impact market development and business innovation. Overall, this research challenges conventional procurement paradigms and offers valuable insights for policymakers seeking to integrate procurement with broader economic policies.

Sustainability in public procurement is a growing priority, and the article "**Environmentally Sustainable Public Procurement in Construction of Hydroelectric Power Projects**" offers an in-depth analysis of green procurement practices in large-scale infrastructure projects. The study explores strategies for reducing environmental impacts through responsible procurement choices, such as adopting renewable materials, optimizing energy efficiency, and implementing waste management protocols. The article also examines regulatory frameworks, lifecycle cost analysis, and the role of stakeholder engagement in promoting sustainability. A major strength of this research is its alignment with India's climate commitments under the Paris Agreement. However, the paper could have further elaborated on the challenges of scaling green procurement in hydroelectric projects, particularly regarding cost implications and supplier readiness. Nevertheless, this

study provides a critical roadmap for integrating sustainability into public procurement policies.

Shaping the Future of Public Procurement

The research presented in this issue underscores the evolving role of procurement as a powerful tool for economic governance, innovation, and sustainability. Moving forward, policymakers and procurement professionals must adopt a more integrated approach, where procurement is recognized as a strategic enabler of market efficiency, technological advancement, and environmental responsibility.

Key themes emerging from this issue include:

1. **Procurement as a Strategic Lever:** Beyond administrative functions, procurement decisions shape markets, influence entrepreneurship, and drive economic efficiency.
2. **Sustainable Procurement as a Policy Imperative:** Green procurement practices, particularly in large infrastructure projects, must be prioritized to align with global climate commitments.
3. **Leveraging Technology for Procurement Efficiency:** AI-driven models, predictive analytics, and data governance frameworks will play an increasingly central role in modernizing procurement systems.
4. **Legal and Regulatory Reforms:** Strengthening dispute resolution mechanisms, reevaluating liquidated damages, and enhancing procurement compliance frameworks will be essential for improving contract governance.

As the Special Issue Editor, I extend my sincere appreciation to all contributing authors for their rigorous research and to our reviewers for their invaluable insights. It is our hope that this issue stimulates further dialogue and innovation in the evolving field of public procurement.

Special Issue Editor
NIFM Journal of Public Financial Management

ARTICLES

Developing a delivery prediction model using AI for contracts awarded by GeM

AMIT VISHWAKARMA[1]
MADHU RANJAN KUMAR[2]

ABSTRACT

The Government e-marketplace (GeM) is a crucial platform for various government entities in India to procure goods and services. Accurate prediction of delivery times is essential for enhancing the efficiency of contract management and ensuring timely delivery. This study aims to develop an AI-based model to predict the likely delivery time of vendors receiving orders from GeM. The data was divided into training and test datasets using contract data from the fiscal year 2019-2020. The years 2020-2021 and 2021-2022 were excluded due to the impact of the COVID-19 pandemic on delivery timelines. Two models, LSTM-GRU and CatBoost, were developed and compared. The LSTM-GRU model leverages the strengths of Long Short-Term Memory and Gated Recurrent Unit networks, while the CatBoost model is an ensemble method that handles categorical data efficiently. The models were evaluated on the seen data (2019-2020) and the unseen data (2023-2024), with CatBoost outperforming LSTM-GRU in both scenarios. The results demonstrate the potential of CatBoost for practical applications in predicting delivery times in government procurement processes. This research highlights the need for advanced AI techniques to improve procurement efficiency and suggests future directions for enhancing prediction accuracy.

Keywords: Government e-Marketplace (GeM), Delivery Time Prediction, Artificial Intelligence (AI), Contract Management, Vendor Delivery, LSTM-GRU Model, CatBoost Model, Predictive Modeling, Procurement Efficiency, Machine Learning, Government Procurement, Time Series Analysis, Recurrent Neural Networks (RNN), Categorical Data Handling, AI in Government Services

JEL Classification: C45, C53, L86, L91, O32, O38, R42

1. *Introduction*

THE GOVERNMENT E-MARKETPLACE is an innovative initiative by the Government of

[1] Post-doctoral Student
[2] Visiting Professor IIM Mumbai

India, established to facilitate online procurement of goods and services by various government departments, organizations, and public sector undertakings. Launched in 2016, GeM aims to enhance transparency, efficiency, and speed in public procurement processes, offering a one-stop online platform for government buyers and suppliers. By leveraging technology, GeM ensures that procurement procedures are streamlined, cost-effective, and secure, thus promoting a more efficient allocation of resources and improving the overall governance of public procurement. Timely delivery of goods and services is critical to the procurement process. Delivery delays can disrupt government operations, lead to inefficiencies, and incur additional costs. Consequently, accurate prediction of delivery times is essential for effective contract management and planning. Predictive models can help procurement officers anticipate potential delays, make informed decisions, and take proactive measures to ensure timely delivery. This enhances operational efficiency and builds trust between government entities and suppliers.

In recent years, advancements in artificial intelligence (AI) and machine learning (ML) have provided powerful tools for predictive analytics. AI models, particularly those designed for time-series forecasting, have shown great promise in various domains, including supply chain management, inventory control, and demand forecasting. These models can learn complex patterns from historical data, enabling accurate predictions and insightful decision-making. This study aims to develop an AI-based model to predict the likely delivery time of vendors receiving orders from GeM. This research utilizes contract data from the fiscal year 2019-2020, dividing it into training and test datasets to build and validate the model. The fiscal years 2020-2021 and 2021-2022 are excluded from the study due to the significant disruptions caused by the COVID-19 pandemic, which profoundly impacted delivery timelines globally.

This study explores two AI models: the Long Short-Term Memory (LSTM) (Lindemann et al., 2021) and Gated Recurrent Unit (GRU) networks and the CatBoost model (Prokhorenkova et al., n.d.). LSTM and GRU are recurrent neural networks (RNNs) known for their ability to handle sequential data and capture temporal dependencies, making them suitable for time-series forecasting. The LSTM-GRU hybrid model aims to leverage the strengths of both architectures to improve prediction accuracy. On the other hand, CatBoost, a gradient-boosting algorithm, is chosen for its robustness in handling categorical features and preventing overfitting,

which are common challenges in predictive modeling. The performance of these models is evaluated using Mean Squared Error (MSE) and Root Mean Squared Error (RMSE) metrics on both seen data (2019-2020) and unseen data (2023-2024). The comparison of predicted delivery times with actual delivery times for the years 2023-2024 provides insights into the generalization capability and practical applicability of the models.

This study contributes to public procurement by introducing advanced AI techniques for delivery time prediction. The findings highlight AI models' potential to enhance procurement processes' efficiency on platforms like GeM. Government entities can improve planning, reduce delays, and optimize resource allocation by accurately predicting delivery times. The results also underscore the importance of continuous model improvement and adaptation to evolving procurement environments. In summary, this paper aims to demonstrate the application of AI in predicting delivery times for contracts awarded by GeM. This study's methodology, results, and discussions provide a comprehensive overview of the potential benefits and challenges of using AI for delivery time prediction in government procurement. The rest of the paper is organized as follows. Section 2 discusses the methodology used in the paper, section 3 discusses implementation and results, and the last part discusses the conclusion and future works.

Table 1:
BACKGROUND WORK

Author(s)	Approach	Key Features	Advantages	Disadvantages
(Tas, 2024)	SVM	High-dimensional space effectiveness, a clear margin of separation	Robust to overfitting	Limited in capturing temporal patterns effectively
(Zhang et al., 2019)	Random Forests	Ensemble method, multiple decision trees	Improves prediction accuracy, reduces overfitting	Computationally intensive, complex model structure
(Lindemann et al., 2021)	LSTM	Memory cell gates control information flow, capture long-term dependencies	Effective for sequential data, prevents vanishing gradient problem	Requires large datasets for training, computationally intensive

(Nosouhian et al., 2021)	GRU	Simplified LSTM, fewer gates, captures temporal dependencies	Less computational power needed, competitive performance to LSTM	It can still be computationally intensive and may require large datasets
(T. Chen & Guestrin, 2016)	XGBoost	Scalable and efficient gradient boosting	High accuracy, efficient computation	Sensitive to parameter tuning, potential overfitting
(Prokhorenkova et al., n.d.)	CatBoost	Gradient boosting handles categorical features efficiently, and ordered boosting	High prediction accuracy, robust handling of categorical data, prevents overfitting	Complex to implement, computationally intensive
(Hickok, 2022)	AI in Public Procurement	AI models for price prediction, fraud detection, and optimization strategies	Improves efficiency and transparency, adapts to regulatory frameworks, and diverse application potential	Limited studies specific to public procurement delivery time prediction
(Wang et al., 2024)	DNN	Multiple layers of neurons capture complex patterns in data	High accuracy, can model complex relationships	Requires large datasets, computationally intensive
(Nosouhian et al., 2021)	LSTM-DRU Hybrid	Combines LSTM and GRU, captures long-term dependencies, reduces the computational load	Benefits from both LSTM and GRU strengths, efficient computation	Still computationally intensive, it requires careful tuning
(Y. Chen et al., 2024)	RNN	Maintains temporal state, captures sequential dependencies	Effective for time-series data, captures temporal dependencies	Vanishing gradient problem, computationally intensive
(Zeng et al., 2021)	Federated Learning	Collaborative learning without sharing data improves model accuracy while preserving privacy	Enhances model accuracy and privacy, applicable in distributed settings	Requires secure communication protocols, computationally intensive

(Y. Chen et al., 2024)	GNN	Captures relationships in graph-structured data, effective for spatial-temporal data	Effective for spatial-temporal relationships, robust performance	Requires large datasets, computationally intensive
(Rabuzin & Modruša n, 2019)	RL	Learns optimal policies through trial and error, adapts to dynamic environments	Effective for dynamic and complex environments, learns optimal strategies	Computationally intensive, requires large datasets for effective learning
(Bai et al., 2024)	Hybrid AI models	Combines multiple AI techniques, leverages strengths of different models	High prediction accuracy, robust performance	Complex to implement, computationally intensive

2. Methodology

The methodology section outlines the comprehensive approach to developing and evaluating the delivery prediction model using AI techniques. This includes a detailed data description, preprocessing steps, model selection, architecture, training procedures, and evaluation metrics.

2.1 Data Description

The dataset used in this study originates from the GeM and comprises detailed contract data for the fiscal year 2019-2020. The dataset includes the following key features:

- Order Date: The date on which the order was placed.
- Expected Delivery Date: The order is expected to be delivered.
- Order Quantity: The quantity of items ordered.
- Order Value: The total monetary value of the order.
- Vendor Information: Includes identifiers and characteristics of the vendors fulfilling the orders.
- Categorical Features: Various categorical attributes such as purchase mode, MSME verification status, startup verification status, and more.

Due to the significant disruptions caused by the COVID-19 pandemic, data from the fiscal years 2020-2021 and 2021-2022 were excluded from the study. The fiscal year 2023-2024 dataset was used as unseen data to validate the model's predictive performance on future contracts.

2.2 Data Pre-processing

Data preprocessing is essential to transform raw data into a suitable format for machine learning models. The following steps were

taken to pre-process the GeM contract data:

- Handling Missing Values: Missing values were imputed or removed to ensure the dataset was complete and consistent.
- Feature Engineering: Additional features were engineered to provide more predictive power. For example, the price per unit was calculated by dividing the order value by the order quantity.
- Calculating the Target Variable: The target variable, "Time taken to deliver," was derived as the difference (in days) between the expected delivery date and the order date.
- Encoding Categorical Features: Categorical features were converted into numerical format using Label Encoding. This step is crucial for algorithms that require numerical input.
- Dropping Irrelevant Columns: Columns that did not contribute to the prediction task were dropped to simplify the model and improve performance.

The processed dataset was then split into training and test sets. The training set consisted of data from the fiscal year 2019-2020, while the test set included data from the fiscal year 2023-2024.

2.3 Model Selection and Architecture

Two advanced machine learning models were selected for this study: the LSTM-GRU hybrid model and the CatBoost algorithm. Each model was chosen based on its strengths in handling specific data types and predictive tasks.

2.3.1 LSTM-GRU Model:

The LSTM-GRU hybrid model effectively captures temporal patterns in sequential data, making it well-suited for time-series forecasting. Its architecture leverages the strengths of LSTM and GRU networks, allowing it to handle long-term dependencies and reduce computational complexity.

Despite its strengths, the LSTM-GRU model requires substantial computational resources and longer training times. Its performance, although robust, is slightly outperformed by the CatBoost model in terms of RMSE and MAPE on both seen and unseen data.

2.3.2 CatBoost Model:

The CatBoost model handles categorical features natively, which a significant advantage is given the nature of the GeM dataset. Its ability to prevent overfitting through ordered boosting and permutation-driven methods contributes to its superior performance.

CatBoost's relatively faster training times and efficient handling of large datasets make it

highly suitable for practical applications in public procurement. The model outperforms the LSTM-GRU hybrid in accuracy and generalization capability, as evidenced by the evaluation metrics on unseen data.

2.3.3 LSTM-GRU Hybrid Model:
Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) networks are types of recurrent neural networks (RNNs) that are particularly effective for sequential data and time series prediction. The hybrid model leverages the strengths of both LSTM and GRU layers:

- Input Layer: Takes the input feature vectors.
- LSTM Layer: Captures long-term dependencies in the sequential data, helpful in understanding the temporal patterns in delivery times.
- Dropout Layer: Regularization technique to prevent overfitting by randomly dropping neurons during training.
- GRU Layer: Simplifies the LSTM architecture while maintaining its effectiveness, reducing computational complexity.
- Dense Layer: The final layer to produce the output prediction.

2.3.4 CatBoost Algorithm:
CatBoost, developed by Yandex, is a gradient-boosting algorithm that handles categorical features efficiently and prevents overfitting. Critical characteristics of CatBoost include:

- Native Handling of Categorical Features: Eliminates the need for extensive preprocessing of categorical data.
- Ordered Boosting and Permutation-Driven Methods: Prevents target leakage and improves model robustness.
- Efficient Training: Suitable for large datasets with fast training times and high performance.

2.4 Model Training
LSTM-GRU: The LSTM-GRU model was trained using the following settings:

- Loss Function: Mean Squared Error (MSE) to measure the average squared difference between predicted and actual values.
- Optimizer: Adam optimizer combines the advantages of adaptive learning rate and momentum.
- Early Stopping: Monitored validation loss and stopped training if no improvement was observed for a specified number of epochs, preventing overfitting.

The training process involved iterating over the training data, adjusting weights, and minimizing the loss function to improve predictive accuracy.

CatBoost Model: The CatBoost model was trained with the following parameters:

- Iterations: 1000 iterations to balance training time and model accuracy.
- Learning Rate: Tuned to optimize the Root Mean Squared Error (RMSE) while maintaining efficient convergence.
- Tree Depth: Set to 10 to capture complex interactions between features without overfitting.

Both models were evaluated on the test set to ensure their generalization ability to new, unseen data.

2.5 Model Evaluation

The performance of the models was evaluated using the following metrics:

- Root Mean Squared Error: Measures the standard deviation of the residuals (prediction errors), providing insight into the model's accuracy.
- Mean Absolute Percentage Error: Measures the accuracy of the predictions as a percentage, offering a clear understanding of prediction performance relative to actual values.
- LSTM-GRU Model Evaluation: The LSTM-GRU model's performance was assessed on both the training and test sets, with RMSE and MAPE providing a comprehensive view of its predictive capabilities.
- CatBoost Model Evaluation: The CatBoost model was similarly evaluated using RMSE and MAPE metrics, ensuring a consistent comparison with the LSTM-GRU model.

By comparing the performance metrics of both models, insights were gained into their strengths and applicability for predicting delivery times for GeM contracts. The evaluation results highlighted the models' accuracy, robustness, and potential for real-world implementation in public procurement processes.

2.6 Data Pipeline Implementation

A data pipeline was implemented to ensure the reproducibility and scalability of the model. This pipeline automates the entire process, from data ingestion to model training and evaluation. The steps in the data pipeline include:

- Data Ingestion: Loading the raw data from the source, in this case, the GeM contracts for the fiscal years 2019-2020 and 2023-2024.
- Data Preprocessing: Applying all the preprocessing steps discussed earlier, including handling missing values, feature engineering, encoding categorical features, and splitting the dataset into training and test sets.
- Model Training: Training the LSTM-GRU and CatBoost

models on the preprocessed training data.
- Model Evaluation: Evaluating the trained models on the test data and calculating the performance metrics (RMSE and MAPE).
- Model Deployment: Preparing the models for deployment, including saving the trained models and setting up an inference system to make predictions on new data.

The data pipeline ensures that the entire process is streamlined and can be easily replicated for future datasets, making the solution scalable and adaptable to changes in the data or requirements.

3. Experimental Results

This section presents the results of the experiments using the LSTM-GRU hybrid model and the CatBoost algorithm. The performance of these models is evaluated using the training and test datasets, focusing on key metrics such as RMSE and MAPE.

3.1 Training and Validation Loss

The training process of the LSTM-GRU model was monitored using the training and validation loss curves. These curves provide insights into how well the model is learning and whether it is overfitting or under fitting the data. The training and validation loss curves show how the loss decreases over epochs, indicating the model's learning progress. Ideally, both curves should converge to a low value, indicating good generalization to unseen data.

3.2 Model Performance on Test Data

The performance of the LSTM-GRU and CatBoost models on the test data from the fiscal year 2023-2024 was evaluated using RMSE and MAPE.

Table 2:
MODEL PERFORMANCE COMPARISON: LSTM-GRU AND CATBOOST ON SEEN AND UNSEEN DATA

LSTM-GRU MODEL – SEEN DATA	REAL	PREDICTED
PO NUMBER 886268	28	28.143280
886269	30	30.013857
886270	45	44.882179
886371	30	30.013857
886272	28	28.052204
CATBOOST MODEL - SEEN DATA	**REAL**	**PREDICTED**
PO NUMBER 886268	28	28.037263
886269	30	30.002314
886270	45	44.979726

886271	30	30.002314
886272	28	27.999533
LSTM-GRU Model - Unseen Data	Real	Predicted
PO number 1048560	45	25.762684
1048561	45	25.290096
1048562	45	27.070150
1048563	45	24.071442
1048564	60	29.927147
CatBoost Model - Unseen Data	Real	Predicted
PO number 800919	45	23.189065
801628	45	30.150227
802204	45	33.940810
802206	45	22.962601
802273	60	24.577017

3.3 Model Comparison

The above summary brings out that the difference between real and predicted delivery period for seen data are comparable, this difference is high for unseen data. This necessitates further discussion

Therefore the LSTM-GRU and CatBoost models were compared based on the RMSE and MAPE metrics. The results are summarized in the following table:

Table 3:

Model Performance Comparison: RMSE and MAPE on Test and Unseen Data

Model	RMSE on Test Data	MAPE on Test Data (%)	RMSE on Unseen Data	MAPE on Unseen Data (%)
LSTM-GRU	0.5033	0.2879	38.1179	50.8159
CatBoost	0.4496	0.0693	37.7102	50.7129

The results indicate that the models cannot predict delivery times with reasonable accuracy on unseen data. The same is shown in another manner below:

Table 4:

"Model Performance: MSE and RMSE on Seen and Unseen Datasets

Model	Dataset	MSE	RMSE

LSTM-GRU	Seen	0.212727	0.461223
LSTM-GRU	Unseen	1369.084399	37.001141
CatBoost	Seen	0.157959	0.397440
CatBoost	Unseen	1420.799608	37.693496

4. Interpretation of Results

CatBoost is well-suited for tabular data and can effectively handle large datasets. Accordingly, on this data set which has categorical data as well, the MSE and RMSE by CatBoost method are lower. A possible reason why the MSE on unseen dataset is high is because the test data was trained on 19-20 data and the unseen data of 2023-24 was used for prediction. It is logical to conclude that ideally 22-23 data should have been used for training (which however was not done due to Corona distortions) or better still, preceding three quarter data could be used to predict the delivery performance in the fourth quarter. In future when continuous data from 22-23 onwards would be available, this research can be replicated.

5. Implications for Public Procurement

The analysis provides valuable insights into the strengths and applicability of different AI techniques for delivery time prediction in public procurement processes. The results highlight the potential of these models to improve efficiency and accuracy in predicting delivery times, ultimately benefiting the stakeholders involved in the GeM platform. The experimental results demonstrate that the LSTM-GRU and CatBoost models effectively predict delivery times for GeM contracts. The choice of model can be guided by the application's specific requirements, such as the need to handle temporal dependencies or categorical features efficiently.

The findings of this study have several implications for public procurement processes:

- Enhanced Efficiency: Accurate delivery time predictions enable procurement officers to anticipate delays, make informed decisions, and take proactive measures to ensure timely delivery. This reduces operational inefficiencies and potential cost overruns.
- Improved Planning: Government entities can improve resource allocation and planning by integrating AI models into procurement workflows. Predictive insights allow for better management of

supply chains and vendor performance.
- Building Trust: Reliable predictions foster trust between government entities and suppliers. Vendors can be held accountable for their delivery commitments, leading to more transparent and efficient procurement processes.

6. Limitations

While the study demonstrates the effectiveness of AI models in predicting delivery times, several limitations and areas for future research should be considered:

- Data Limitations: The exclusion of data from fiscal years 2020-2021 and 2021-2022 due to the COVID-19 pandemic may limit the comprehensiveness of the model. Future studies should explore methods to incorporate such anomalous data effectively.
- Model Interpretability: While LSTM-GRU and CatBoost models provide high accuracy, their interpretability can be challenging. Future work could focus on developing more interpretable models or enhancing the explainability of existing models.
- Scalability: Deploying these models in real-world scenarios requires scalable data pipelines. Future research could investigate more robust and scalable architectures for larger datasets and real-time predictions.
- Integration with Procurement Systems: Implementing these models within existing procurement systems could provide real-time predictions and actionable insights. Future work should explore integrating AI models into procurement software and platforms.
- Additional Features: Additional features such as vendor past performance, geographical factors, and seasonal variations could improve prediction accuracy.

7. Conclusion And Future Work

This study successfully developed AI-based models to predict delivery times for contracts awarded by the GeM, utilizing historical contract data from the fiscal year 2019-2020. The comparative analysis between the LSTM-GRU hybrid model and the CatBoost algorithm demonstrated that CatBoost outperformed in accuracy and generalization capability, making it more suitable for practical applications in public procurement. The results underscore the effectiveness of leveraging advanced AI techniques to enhance procurement efficiency, reduce delays, and optimize resource allocation, ultimately contributing to more transparent and efficient procurement processes.

Future research should incorporate non anomalous data from periods like the 2022-23 onwards to enhance model robustness and comprehensiveness. Additionally, efforts should be made to improve model interpretability, enabling stakeholders to gain insights into the factors influencing delivery times. Developing scalable architectures and integrating these models into existing procurement systems will ensure real-time predictions and actionable insights. Furthermore, exploring additional features such as vendor performance history, geographical factors, and seasonal variations could further improve prediction accuracy. Continuous model improvement and adaptation to evolving procurement environments will be crucial for maintaining high prediction accuracy over time.

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Liquidated Damages in Public Procurement Contracts and the Need to Prove Loss

V ARUN KUMAR[1]

ABSTRACT

Public Procurement Contracts are meant for the benefit for the general public and the society at large. Breach of such contracts by the contractor causes harm and loss to the society which is not amenable to quantification in terms of money. Clauses pertaining to Liquidated Damages (LDs) and Penalties are common in modern commercial contracts, including Public Procurement contracts. In Common Law jurisdictions, LDs are interpreted to be based on an estimate of actual losses, while penalties are interpreted to be designed to penalize non-performance. Courts are more likely to enforce LD clauses if they are a reasonable estimate of potential loss. However, they might not enforce penalties, viewing them as punitive rather than compensatory. This notion of LD vs Penalty dichotomy is not present in the Indian Contract Act. Despite this, courts in India have relied upon Common Law jurisprudence to insist on proof of loss for a party to be able to claim LDs. A recent decision of the UK Supreme Court has reformulated the test for penalties, and has shifted the focus from loss suffered to the legitimate interest of a party in the performance of a contract. This paper traces the origins of the LD-penalty dichotomy in Common Law jurisdictions as well as in India, examines the current state of the law and argues that the legislative intent in India has always been, but not recognised by Indian courts, the legitimate performance interest test now propounded by the UKSC.

Keywords: Public Procurement Contracts, Liquidated Damages (LDs), Penalties, Contract Law, Common Law Jurisprudence, Indian Contract Act, Breach of Contract, Compensation vs. Punishment, UK Supreme Court Decision, Performance Interest, Legal Interpretation, Contract Enforcement, Commercial Contracts

JEL Classification: K12, K22, K40, D86, O17

1. Introduction

PUBLIC PROCUREMENT CONTRACTS routinely incorporate Liquidated Damages (LD) and Penalty Clauses as remedies for breach of contract. These clauses have historically been a

1 IRSS, GM (PSU) CRIS, arun_ir@rediffmail.com

controversial and complex area of contract law, in India as well as across other Common Law jurisdictions. Until recently, the crucial distinction between LD and penalties was based on Lord Dunedin's statements in Dunlop:[2] a "penalty is a payment of money stipulated in-terrorem of the offending party; while the essence of LDs is a genuine pre-estimate of damage". The task of distinguishing between penalties and LDs has been crucial in Common Law and the complexity of this distinction has resulted in endless litigation. Recently the U.K. Supreme Court (UKSC) comprehensively reviewed the rule against penalties after almost a century since Dunlop in Cavendish.[3] The Court reformulated the test and the focus has now shifted from genuine pre-estimate of loss to the legitimate interest of a party in the performance of a contract.

The Indian legislature tried to do away with the penalties rule and enacted a simple rule in Section 74 of the Indian Contract Act, 1872 (the Act), that in the event of breach of a contract containing provision for agreed damages, the innocent party is entitled to "reasonable compensation" not exceeding the stipulated sum irrespective of any proof of loss or damage and without having regard to whether the stipulation was by way of penalty or LD. Despite this simple rule, meant to deviate from the common law, the courts of India appear to have misinterpreted the law and re-introduced the LD–penalty dichotomy besides insisting on proof of loss under S.74.

The thesis of this article is that the courts in India appear to have erred in applying the genuine pre-estimate of loss test from Dunlop while interpreting S.74 and that the application of the legitimate interest test now recognised by Cavendish is closer to the legislative intent behind the section. Public Procurement Contracts are a class of contracts where this holds true more than anywhere else.

2. The Common Law Rule Against Penalties

LDs are stipulations in the contract regarding appropriate compensation for breach and are meant to replace damages for actual loss. Such clauses, if valid, help avoid costly and lengthy litigation proceedings to prove actual loss caused by breach and are favoured by courts when losses are difficult to quantify. Penalty clauses, on the other hand, because of their penal character, are not enforceable in courts. Common law considers it to be

2 DunlopPneumaticTyre v NewGarage (1915) AC 79 (HL).

3 CavendishSquareHolding v Talal Makdessi; ParkingEyeLtd v Beavis (2015) UKSC 67.

against public policy for private parties to punish or oppress each other for breach of contract, or providing contractual provisions acting in-terrorism.

This rule against penalties originated more than three hundred years ago in England, with the earliest reported case being from 1720.[4] Its origins lay in the fifteenth century penal bonds, which would be discharged if the obligations were performed; otherwise the payment terms under them could be enforced.[5] The courts of equity used to intervene by recognizing their penal character as well as the primary purpose of acting as a security for performance, and if damages at common law were paid by the defaulting party, the enforcement of the bonds was restrained.[6] The rule against penalties has been stated to be "an ancient, haphazardly constructed edifice which has not weathered well".[7] More than a century ago, the House of Lords in *Dunlop* summarised the law and Lord Dunedin culled out a number of principles from existing authorities to help distinguish LDs and penalties. He laid down four principles, the fourth of which suggested four tests for distinguishing penalties and LDs, "which if applicable to the case under consideration may prove helpful, or even conclusive". The case was taken to have authoritatively restated the law, so much so that over a period of time Lord Dunedin's propositions acquired the status of a quasi-statutory code.

The rule against penalties has traditionally been acknowledged by judges as being difficult to deal with. Over a period of time, courts started adopting a liberal approach to agreed damages, probably driven by commercial considerations. In an aggressive pro freedom of contract stand, the following comments of the Supreme Court of Canada in Elsey v JG Collins Insurance[8] were endorsed by the Privy Council in Philips Hong Kong v AG of Hong Kong:[9]

- The power to strike down a penalty clause is a blatant interference with freedom of contract and is designed for the sole purpose of providing relief against oppression for the party having to pay the stipulated sum. It has no place where there is no oppression.

However, the formulation of a genuine pre-estimate of loss refused to go away, and Chitty on Contracts reiterated that "the correct question is not whether one

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4 Peachy v Duke of Somerset (1720) 1 Strange 447.
5 AWB Simpson, 'The Penal Bond with Conditional Defeasance', (1966)82LQR392.
6 Sloman v Walter (1783) 1 Bro CC 418.
7 Cavendish (n2).
8 (1978) 2 SCR 916 (Canada).
9 (1993) 61 BLR 49.

party secured the clause by the use of unequal bargaining power or oppression, but whether or not the clause is a genuine pre-estimate of loss".[10] In Alfred McAlpine, Jackson J held that "courts are predisposed, where possible, to uphold contractual terms which fix the level of damages for breach. This predisposition is even stronger in the case of commercial contracts freely entered into between parties of comparable bargaining power".[11] He also observed that among all the authorities cited in the case, he could find only four cases where a provision had been "struck down" as a penalty. In Azimut-Benetti,[12] an LD clause entitling a boat builder to claim 20% of the contract price for buyer's default was held to be enforceable. The court held that if the primary objective of the clause was not deterrence and was commercially justifiable, it should be enforced. However, even post Cavendish, there have been successful claims under the revised test. In First Personnel Services,[13] an interest claim of 2% per month was considered excessive compared to normal commercial rates and held to be a penalty despite commercial parties having negotiated the agreement.

The law on LDs did not undergo any major overhaul until 2015 and the basic principles remained well established. If there was a genuine attempt to pre-estimate a potential loss, the courts were unlikely to judge it to be a penalty. However, where the amount of LD had no co-relation to the loss that could possibly result from that breach, the courts would declare it to be an unenforceable penalty. The stipulated sum did not have to be very similar in amount to the actual losses, but could not be unconscionable and extravagant. The assessment of whether a stipulated figure was a penalty or a genuine pre-estimate was to be carried with regard to the time when the contract was entered into, not when the breach occurred.

The UKSC's 2015 decision in Cavendish, coming a century after Dunlop, subjected the rule against penalties to detailed scrutiny and restated the law making it easier to enforce these clauses, and supposedly setting the jurisdiction on more realistic and principled grounds than previously.[14] The court considered both abolition[15] as well as extension[16] of the rule, but

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10 Joseph Chitty, Chitty on Contracts, (Sweet & Maxwell, 2012) 26-172.
11 (2005) EWHC 281 (TCC), Para 48.
12 (2010) EWHC 2234.
13 (2016) EWHC 3220(Ch).
14 Cavendish (n2) (39).
15 Cavendish (n2): A number of reasons were discussed, ultimately concluding that the court did not "consider that judicial abolition would be a proper course for this court to take."
16 ibid: The court refused to follow the recent Australian decision in Andrews v ANZB Group expanding the jurisdiction beyond clauses operating on breach.

ultimately decided against both. However, without expressly saying as such, the court has gone very close to abolishing the rule by recognizing that deterrence may be a legitimate purpose of a contractual term, and also by freeing the rule from its earlier exclusive benchmark comparator of LD.[17] Further, in formulating a broad "substance over form" approach to breaches, there may have been some move in the direction of expanding the rule. An agreed damages clause operating on breach was identified as a secondary obligation, which was triggered on the default against a primary obligation in a contract. Instead of being based on a genuine pre-estimate of loss, the common law test for determining a valid LD clause was reformulated to turn upon "whether the impugned provision is a secondary obligation which imposes a detriment on the contract-breaker out of all proportion to any legitimate interest of the innocent party in the enforcement of the primary obligation". The innocent party's proper interest should be in the performance of the contract and not in punishing the defaulter.

In the reformulated rule, Lord Atkinson's pragmatic approach in Dunlop concerned with the breadth of interests that may be legitimately sought to be protected has been adopted rather than Lord Dunedin's formulaic approach, one which is still being followed by the Indian courts. The decision in a way provides a potential answer to some of the problems faced in the Indian context for Public Procurement Contracts. However, the traditional approach may not be totally redundant,[18] as it may still deliver acceptable results in a large number of relatively simple cases.[19]

3. Liquidated Damages in India

Contract law is codified in India based on the English Law of Contract. India was probably the first country where such an attempt was made[20] (Even today, England does not have a Contract Act of its own). The Indian Act has been appreciated by Pollock as "the most instructive example of what can be done to consolidate and simplify English case-law".[21] The Indian Act has stood the test of time and is functional till today without any major amendments. It was recommended to be used as a template for developing their

17 William Day, 'A Pyrrhic Victory for the Doctrine against Penalties' (2016) JBL 115.
18 Paul Davies, JC Smith's Law of Contract (OUP 2018)422.
19 Cavendish(n2) [25].
20 D Ibbetson, A Historical Introduction to the Law of Obligations, (New York: OUP 2001) 227.
21 F. Pollock, Principles of Contract at Law and in Equity (Stevens & Sons, London, 1876), p viii.

Contract Code by the Jersey Law Commission.[22]

The statute proceeds on a presumed equality of bargaining power between the parties and intervenes only to rectify specified species of inequality or want of free will which affects freedom to contract such as infancy, lunacy, fraud, undue influence and misrepresentation.[23]

S.73 of the Act provides for compensation in the form of unliquidated damages for immediate and direct loss or damage caused by breach of contract, while S.74 applies to contracts with a predetermined damages clauses. There are no separate provisions in the Act dealing with forfeiture of earnest money or security money. The courts, however, have decided such cases of forfeiture under S.74.[24] The text of S.74 is reproduced below for better appreciation:

When a contract has been broken, if a sum is named in the contract as the amount to be paid in case of such breach, or if the contract contains any other stipulation by way of penalty, the party complaining of the breach is entitled, whether or not actual damage or loss is proved to have been caused thereby, to receive from the party who has broken the contract reasonable compensation not exceeding the amount so named or, as the case may be, the penalty stipulated for. (Explanations and Illustrations omitted)

To quote the Scottish Law Commission, "Until recently most Common law jurisdictions followed the approach stated by Lord Dunedin in Dunlop, or similar rules. India provided the one major (and rather remarkable) long-standing exception to that general position. Under the Indian Contract Act 1872 no distinction is made between LDs and penalties; instead, penalties are enforceable but subject to a power of the courts to make instead an award of damages not exceeding the amount stipulated, i.e. in effect to reduce the amount of the penalty".[25] Courts cannot award a sum greater than the stipulated amount.[26] The 13th Law Commission of India, while proposing substantial reforms in many sections of the Act, did not recommend any changes in Sections 73 and 74.[27] Since the law does not distinguish LDs and penalties, an LD clause in

22 Jersey Law Commission, 'Report on the Law of Contract' (Topic Report No. 10, 2004).
23 Rajagopala Ayyangar, 'The Freedom of Contract', (1961)3JILI 125.
24 IJ Saxena, 'Commercial Law' in Joseph Minattur, Indian Legal System (Indian Law Institute, New Delhi 2006).
25 Scottish Law Commission, 'Discussion paper on Penalty Clauses' (No. 162), p21.
26 Arun Subhash, 'Proving Actual Loss under S.74 of the Contract Act, 1872', (2018) PL 84.
27 Law Commission of India, 'Thirteenth Report on The Indian Contract Act' p48.

a contract need not specify that LDs are not in the nature of a penalty.[28]

Sir Frederick Pollock and Mr Dinshaw Mulla observed in 1909 that "this section boldly cuts the most troublesome knot in the common law doctrine of damages".[29] Stokes observed that the section "completely did away with the English LD-penalty dichotomy.[30] 'Reasonable compensation', according to the Indian Supreme Court,[31] is to be assessed by comparing with the standard measure of damages for breach of contract laid down in S.73 which in essence is the rule in Hadley v Baxendale.[32]

Despite the apparently simple nature of the stipulation in S.74, the courts in India have generally not been able to apply the principle either consistently or with clarity. There is some confusion over assessment of damages ex-ante or ex-post, but Indian courts have generally followed the former English principle.[33] The use of the term "reasonable compensation" in the statute is probably the genesis of a lot of confusion, since it has been held by Indian courts to be equal, or at least close to, the standard common law measure of damages encapsulated in S.73. If it is only reasonable compensation (as laid down in S.73) that is recoverable (under S.74) as opposed to the entire sum laid down as LD, then the difference between liquidated and unliquidated damages is virtually erased. It is questionable whether it was indeed the legislative intent to do so – and a positive answer appears to be contra-intuitive. If there was to be no significant difference between the two, except perhaps for the fact that LDs impose an upper limit on the potential claims, why go the extent of drafting an entire and separate clause for the same, when a simple proviso would have equally served the purpose? The courts' approach limits the utility of LD clauses and the certainty they offer, because the circumstances in which the clauses can be given even partial effect is limited.[34]

4. The Approach of the Courts

28 BVR Sarma, 'Adjudication of Claim for Damages Under Indian Contract Act' <http://docs.manupatra.in/newsline/articles/Upload/30C28D5D-262B-4A4A-AE17-C4D86F92BCE0.pdf> accessed 23-08-2019.

29 F Pollock and D Mulla, The Indian Contract Act: Commentary (2nd ed, Sweet & Maxwell London 1909) 322.

30 Whitley Stokes, Anglo Indian Codes, (London 1888) 506.

31 Fateh Chand v Balkishan Dass [1964] 1 SCR 515 (SC) [10].

32 Hadley v Baxendale (1854)9Exch 341.

33 Jagannadha Rao, 'LDs and Penalties: Ex-Ante or Ex-Post Methodology', (2103) 1 SCC J-1.

34 Doug Jones, 'Penalties Doctrine in International Construction Contracting', Soc.ofConst.Law (NZ)2016.

Despite the Act coming into force in 1872, initially the courts in India seemed to be relying on Common Law rule against penalties disregarding the departure from it in S.74. In Natesa Aiyar v Appavu Padayachi,[35] a case dealing with the return of a deposit, Wailis J held that "Courts of Equity do not regard a stipulation for the forfeiture of a deposit as a stipulation for penalty from which Equity will relieve." In Manian Patter vs Madras Railway,[36] the court was again dealing with a case of forfeiture of a deposit, and in a brief judgment held that "the rule as to penalties has been uniformly held not to be applicable to cases of forfeiture of deposits for the breach of stipulations even where some of them are but trifling, while others are not such".

The earliest case of importance covering S.74 authoritatively is probably Bhai Panna Singh v Bhai Arjan Singh[37] wherein Lord Atkin held that "the effect of S.74 is to disentitle the plaintiffs to recover simpliciter the sum stipulated whether penalty or liquidated damages. The plaintiffs must prove the damages they have suffered". This compelling statement was relied upon by subsequent judges to insist on proof of loss even in case of agreed damages despite the statute not mandating it.

Fateh Chand v Balkishan Das,[38] dealing with a forfeiture of an advance, went a step ahead and held that compensation for breach of contract (even under S.74) could only be awarded "to make good the loss or damage which naturally arose in the course of things or which the parties knew when they made the contract, to be likely to result from the breach". The court also held that the words in the section "whether or not actual damage or loss is proved" meant only that the requirement of proof was dispensed with, but actual loss should have been caused, without which there could be no compensation.

Maula Bux v UOI[39], a contract of public procurement, dealt with forfeiture of security money for performance of a supply contract with the Government. The High Court held that where a reasonable sum is deposited by way of security for performance of a contract, S.74 would have no application. The Court further observed that the contracted items "had to be procured in case of breach of contract everyday with great inconvenience," and in the circumstances the Court "could take judicial notice of the fact that 1947-48 was the period when the prices were rising and it would not have been easy to procure the supplies at the rates contracted for". The Court concluded that the

35 (1910) 20 MLJ 230.
36 (1906) 16 MLJ 37.
37 AIR 1929 PC 129.
38 (1964) 1 SCR 515.
39 (1969) 2 SCC 554.

amount forfeited was not unreasonable "taking into consideration the amount of inconvenience and the difficulties and the rising rate of prices."

The Supreme Court did not agree and held that S.74 would apply where forfeiture is of the nature of a penalty. In holding so, the court acknowledged that there was authority, "no doubt coloured by the view which was taken in English cases, that S.74 had no application to cases of deposit for due performance of a contract which is stipulated to be forfeited for breach". The court cited the cases Natesa Aiyer and Manian Patter discussed earlier and held that this view was no longer good law in light of the ratio in Fateh Chand. The court held:

- In case of breach of some contracts it may be impossible for the Court to assess compensation arising from breach, while in other cases compensation can be calculated in accordance with established rules. WhVere the Court is unable to assess the compensation, the sum named by the parties if it be regarded as a genuine pre-estimate may be taken into consideration as the measure of reasonable compensation, but not if the sum named is in the nature of a penalty. Where loss in terms of money can be determined, the party claiming compensation must prove the loss suffered.

Since the Government could have led evidence of the rates at which alternate purchases were made as well as other incidental charges after the failure of the plaintiff to supply, which was not done, their claim was disallowed. In UOI v Rampur Distilleries,[40] another case of public procurement, the respondent supplied sub-standard quality of liquor to the government leading to cancellation of the contract and forfeiture of security deposit. The Supreme Court, following Maula Bux, held:

- It is important that the breach of contract caused no loss to the appellants. The stipulated quantity of sum was subsequently supplied to the appellants by the respondents themselves at the same rate. The appellants, in fact, made no attempt to establish that they had suffered any loss or damage on account of the breach committed by the respondents. They are therefore not entitled to forfeit the security deposit.

ONGC v Saw Pipes[41], a leading public procurement case, has become a landmark because of its authoritative pronouncements on challenge to arbitral awards and on the need to prove losses under

40 AIR 1973 SC 1098

41 AIR 2003 SC 2629.

S.74. Saw Pipes challenged the deduction of LD from their bills by ONGC in arbitration. The tribunal, after considering various decisions of the Supreme Court arrived at the conclusion that it was for ONGC to establish that they had suffered loss due to delay in supplies. ONGC could not establish the losses since the delay by Saw Pipes was not the only reason behind the delay in the final commissioning of the equipment, i.e. even if Saw Pipes had delivered on time, the project would have got delayed. This was challenged by ONGC on the ground that since LD had been provided for in the contract, it was not necessary to establish losses. One of the factors in favour of ONGC, the Court observed, was that when Saw Pipes requested extension of time for delivery, time was extended under intimation to them that LD would be applicable. This was not contested by Saw Pipes at that stage and they supplied the goods which indicated that they were then agreeable to pay the LD. The Court referred to Maula Bux and stated that proof of actual loss or damage is not required in every case of breach of contract and a court can award reasonable compensation even if no actual damage is proved to have been suffered due to the breach. It may be impossible for the court to assess compensation arising from breach in case of some contracts. The court observed as follows:

- Take for illustration construction of a road or a bridge. If there is delay in completing the construction of road or bridge within stipulated time, then it would be difficult to prove how much loss is suffered by the Society / State.

The above statement is an authoritative pronouncement on the lack of any need to prove or quantify losses suffered in case of public procurement contracts, provided losses have indeed been suffered and are difficult to quantify. The court laid down some important principles in this case, two of which are:

- In every case of breach of contract, the aggrieved is not required to prove actual loss or damage suffered by him before he can claim a decree. The Court is competent to award reasonable compensation in case of breach even if no actual damage is proved to have been suffered in consequences of the breach of a contract.

- In some contracts, it would be impossible for the Court to assess the compensation arising from breach and if the compensation contemplated is not by way of penalty or unreasonable, Court can award the same if it is genuine pre-estimate by the parties as the measure of reasonable compensation.

Another recent decision of importance in the series of cases

pertaining to public authorities is the Supreme Court case of Kailash Nath v DDA,[42] which involved sale of land and forfeiture of earnest money. In this case, after the default of the party in balance payment, DDA forfeited the earnest money and conducted re-auction of the property which was sold for a much higher rate leading to evidence of no loss being suffered as a consequence of the default. The court reviewed previous authorities and reiterated that in absence of loss no compensation can be given which would lead to a windfall. S.74 was taken to mean, as in previous cases, that where actual loss can be proved, it must be done and only in cases where loss is difficult to estimate and the liquidated amount is a genuine pre-estimate, will the requirement of proof be waived.

Another very significant Supreme Court decision applying the principle laid down in Saw Pipes pertaining to public procurement contracts was delivered in the case of Construction and Design Services vs DDA[43]. In this case a contract was awarded to the appellant by the DDA for constructing a sewerage pumping station, which was terminated due to slow progress of work. Compensation was sought to be recovered by DDA (@10% of contract value) which was challenged by the contractor primarily on the ground that no loss was suffered by DDA. The Supreme Court held that the sewerage pumping station was of public utility to maintain and preserve clean environment, absence of which could result in environmental degradation by stagnation of water in low lying areas. Delay also resulted in loss of interest on blocked capital. In these circumstances, loss could be assumed, even without proof and burden was on the appellant who committed breach to show that no loss was caused by delay or that the amount stipulated as damages for breach of contract was in the nature of penalty. Even if technically the time was not of essence, it could not be presumed that delay was of no consequence. Thus, the court held, even if there is no specific evidence of loss suffered by DDA, the project being a public utility project, the claim that the delay itself can be taken to have resulted in loss in the form of environmental degradation and loss of interest on the capital was not without any basis. The court found that once it is held that even in absence of specific evidence, the public authority could be held to have suffered loss on account of breach of contract, and it is entitled to compensation to the extent of loss suffered, it is for the appellant to show that stipulated damages are by way of penalty.

The law as it stands today, may be summarized as follows: (a) A

42 (2015) 4 SCC 394.

43 (2015) 14 SCC 263

party must prove actual losses the usual way notwithstanding the presence of an LD clause in the contract, and, (b) exceptionally, where it is difficult to assess losses but some actual loss has been incurred and the stipulation approximates its genuine pre-estimate, the need of proof may be dispensed with and full LD may be awarded. This particularly holds true in the case of contracts of public utilities.

The confusion prevailing in the courts regarding the true intent of S.74 is evident from three judgments discussed below. In Sahara India Vs MC Agrawal[44] the court while dealing with a challenge to award of mesne profits at double the market rent held, somewhat surprisingly, that "the penalty/damages at double the market rate would be ex-facie violative of provision of S.74 of the Act being in-terrorem. Since Fateh Chand, it has been held that where on account of breach of contract damages can be proved, then, there cannot be any validity of a clause which gives LDs". There are two fallacies in the logic of the court. Firstly, the way the section is worded there can be no 'violation' of the provisions. Secondly, the fact that losses on account of a breach of contract can be established does not lead to invalidation of the LD clause; it only necessitates the plaintiff to establish that some losses have occurred. The concepts of 'violation' of the section and 'invalidity' of an LD clause seem to be a legacy of the common law notion of the unenforceable nature of penalties.

In another case, the Supreme Court, in a rather remarkable claim, held in the case of UOI v Raman Iron Foundry[45] as follows:

- Now, it is true that the damages which are claimed are LDs under Clause 14, but so far as the law in India is concerned, there is no qualitative difference in the nature of the claim whether it be for LDs or for unliquidated damages.

- It therefore makes no difference in the present case that the claim of the appellant is for LDs. It stands on the same footing as a claim for unliquidated damages.

The sweeping claim has in one stroke rendered the entire S.74 virtually redundant and otiose – if the claim of the court is correct then all the section does is to establish a cap on recoverable damages which in every case have to be proved as provided in S.73.

- An earlier case of Chunilal Mehta v Century Spinning[46] is a study in contrasts. The Supreme Court held that:

44 RFA No. 458/2011 Delhi HC.
45 (1974) 2 SCC 231.
46 AIR 1962 SC 1314.

- Again the right to claim LDs is enforceable under S.74 of the Act and where such a right is found to exist no question of ascertaining damages really arises.

- By providing for compensation in express terms the right to claim damages under the general law is necessarily excluded and, therefore, in the face of that clause it is not open to the appellant to contend that that right is left unaffected.

It is evident that there is no uniformity of interpretation of Ss 73 & 74 by the courts and significant confusion prevails even today.

5. The question of "A genuine pre-estimate of losses"

Since Dunlop, Indian courts have also enforced LD clauses when the damages payable represented a genuine pre-estimate of loss resulting from a breach of contract, and refused to enforce them when no losses were suffered by the innocent party.

A standard LD clause in India in a public procurement contract for procurement of goods (as well as for works) would provide for a recovery of an amount of 2 percent per month or 0.5% per week of delay in supplies subject to an overall cap of 10% (or, in some cases, 5%) of contract value. The provisions would reach the cap of 10% with the passage of 5 months after the stipulated date of completion of contract, beyond which no additional damages would be recoverable. The puzzling thing about the above provisos is that they are generally included in all contracts irrespective of value. The contracts for procurement of goods may vary in value from say, Rupees One Lakh in one case to Rupees One Crore in another, with both contracts containing the similarly worded LD clause. The natural question that arises is how 2% per month or 0.5% per week can be a "genuine pre-estimate" of damages in such wide ranging public contracts, which may even be geographically scattered all across the country with varied working conditions.

There is another reason why the LD in public procurement contracts cannot even be close to being a genuine pre-estimate of losses. The nature of items being procured may vary from Cloth to Paint to Computers to Electrical Sub Stations to Gas Turbines to Locomotives and Coaches. It would be foolhardy to even suggest that for all these types of items and in every circumstance of breach, 2% per month can tantamount to a genuine pre-estimate of a potential loss. Public procurement contracts in particular, generally entail numerous unquantifiable benefits to the public at large and it is virtually impossible to quantify

losses due to breach of such contracts. It is therefore very difficult to reconcile the concept of LDs with the notion of a "genuine pre-estimate of damages". There is however not much debate on this issue and the Dunlop test has been accepted without question by academics as well as practitioners.

6. *The need to Prove Loss*

The courts in India have agreed that no LD is payable in a no loss situation. However, there is a great deal of confusion on how a no loss situation is to be established. In ONGC, the Supreme Court held as under:

- These sections further contemplate that if parties knew when they made the contract that a particular loss is likely to result from such breach, they can agree for payment of such compensation. In such a case, there may not be any necessity of leading evidence for proving damages, unless the Court arrives at the conclusion that no loss is likely to occur because of such breach. (Emphasis added)

What the court left unanswered was how the court is expected to arrive at a conclusion that no loss has been caused by the breach.

The principle followed by Indian courts appears to be borrowed from English contract law's default as well as mandatory rule that even in cases of agreed damages it is not possible to recover more than the standard common law measure of damages.[47] Clever drafting could probably avoid the rule, but more importantly, also by including and quantifying losses which would not otherwise be admissible[48] under the remoteness rule in Hadley v Baxendale. Parties might even agree to stipulate damages by valuing other losses at "idiosyncratic personal levels rather than at market levels"[49]. It might however be claimed that the second limb of Hadley (loss being within contemplation of the parties), as well as the "assumption of responsibility" test of Lord Hoffman in The Achilleas[50] might allow the remoteness rule to be bypassed in agreed damages clauses.

7. *Legislative History*

Legislative history, often neglected, gives valuable insight into problematic questions in Indian contract law.[51] The Contract Law Bill was proposed by the Law Commissioners and some modifications were made in it by

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47 Sarah Worthington, 'Penalty Clauses'(n17).

48 Robophone (1966) 1 WLR 1428 1447-48.

49 Astley v Weldon (1801) 2 B&P 346.

50 (2008) UKHL 48.

51 Niranjan, 'Specific and Agreed Remedies' (N49) 59.

the Select Committee in India.[52] In a bid to avoid the litigation which stems under English Law from the distinction between LDs and penalties, the Law Commissioners proposed a literal enforcement of a provision requiring payment of a specified sum on breach. The final Sections 73 and 74 were contained in a single S.53 in the proposed legislation. They proposed as follows:[53]

- In framing (the provisions of the Indian Contract Act) we have deemed it expedient to depart, more or less, from the English law in several particulars; of which we proceed to specify the most important.
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- In order to avoid the litigation which arises under the English law on the subject of the distinction between penalty and LDs, where the contract contains a stipulation that a specified sum shall be paid in case of its breach, we propose that the rule of law shall have no regard to that distinction, but simply require payment of the specified sum.

7.1 Compensation

- Party rightfully terminating contract, entitled to compensation. A person who rightfully puts an end to an engagement is entitled to compensation for any damage he has sustained.

- Payment of sum specified to be paid in case of breach. When a contract has been broken, if a sum is named in the contract itself as the amount to be paid in case of such breach, the amount so named shall be paid accordingly;

- Payment of Compensation but if no sum has been named in the contract itself, the party who suffers by such breach is entitled to receive from the party who has broken the contract, compensation for loss or damage caused to him thereby. Provided that it has naturally arisen in the usual course of things from such breach, or that it was in the knowledge of the parties at the time they made the contract, that such loss or damage would probably result from the breach of it.

- Such compensation is not to be given for any remote and indirect loss or damage sustained by reason of the breach.

- Explanation.—In estimating the loss, the means which existed of remedying the inconvenience caused by the non-performance

52 Atul Patra, 'Historical Background of the Indian Contract Act', (1962) JILI, Vol. 4.

53 Indian Law Commissioners, Second Report, East India (Contract Law), House of Commons Papers, 1868.

of the engagement, must be taken into account.

The hard stipulation in the first part of S.53 appears to have been influenced by the will theory which in turn inspired the French Civil Code. The Law Commissioners were open to looking towards Civil Law for inspiration.[54] The French Code Civil (1804) in its original version had a simple stipulation: "When the agreement provides that the party who fails to perform shall pay a certain sum on account of damages, no larger or smaller sum can be awarded to the other party"[55], i.e. the general law on damages was displaced by the contractual provision, and the court was required to enforce the agreement, with no power of modification. The compensatory principle in this case was thus overridden by the will of the parties.[56] There are several other examples of the influence of the Will theory as well as the French Code on the draft Bill. In the draft, the definition of a contract was proposed as "an agreement between parties whereby a party engages to do a thing or engages not to do a thing" which was a close reflection of the corresponding provision in section 1101 in the French Civil Code. Similarly, S.10 of the Act defining contracts is considered to be the best expression of the Will Theory that can be found outside mainland Europe.[57]

The reaction to the draft bill was neither wholly favourable nor consistent.[58] While some judges felt they were given too much discretion, others felt they were left with too little.[59] The proposal to eliminate the distinction between LDs and penalties turned out to be very contentious. Although it simplified matters, "it would afford greater facilities to the grasping money lender to impose upon the ignorant borrower", according a Judge.[60] An administrator argued that "the people of this country need to be protected against the results of their own rashness in entering into over-reaching contracts."[61] It was also variously described as "regrettable", a "retrograde step" and one that caused "great apprehensions".[62] A contrary position supportive of the measure was put forth by another judge as follows:[63]

- The penalty of a contract is, in my opinion, always intended, in fact, as a device to ensure the

54 'Statement of Objects and Reasons', 9 July 1867, Copies of Papers Showing the Present Position of the Question of a Contract Law for India (1867–68) [239]
55 Code Civil des Francais 1804, Art 1152.
56 Lucinda Miller, 'Penalty Clauses in England and France: A Comparative Study' (2004) ICLQ Vol.53 69 (86).
57 Devenney J and Kenny M, 'The Transformation of European Private Law' (Cambridge 2013) 183.
58 ibid 186.
59 Communication Ref: IOR/L/PJ/5/15.
60 ibid.
61 ibid.
62 ibid.
63 ibid.

> punctual and exact performance of a contract; and whether it be in the nature of a punishment, or only by way of fixing definitely beforehand by mutual consent the amount of damage consequent on a breach appears to me to be wholly immaterial, so long as both parties with their eyes open have consented.

The select committee observed as follows:[64]

- The next innovating proposition of the Commissioners concerns the subject of the distinction between penalty and LDs. They do not endeavour to untie the knot, but simply cut it. They abolish the distinction in toto, and propose that where a contract contains a stipulation that a specified sum shall be paid in case of a breach, the rule of law shall have no regard to the distinction, but simply require payment of the specified sum. We are strongly against the change involved in this Section.

- But we think it quite possible to untie this knot without cutting it. The framers of the New York Civil Code have attempted to do so not unsuccessfully. They make void every agreement by which the amount of damage to be paid, or other compensation to be made for a breach of an obligation, is determined in anticipation thereof, unless when, from the nature of the case, it would be impracticable or extremely difficult to fix the actual damage.

The disagreement between the Law Commissioners and the Indian Legislature on various points snowballed to such an extent that the Law Commissioners resigned in 1870.[65] Based on the feedback received on the draft bill, the finally approved law stipulated provision of 'reasonable compensation' within the limits of the agreed sum. The Act in effect combined both approaches by allowing the parties to stipulate the level of damages in advance without needing to resort to the actual loss but restricting recovery to a proportionate amount.[66]

The amendment proposed was not meant to infringe on the principle that a contract must be performed, but at the same time giving to the courts some power of mitigating the practical operation of the contracts which were one sided in character. Seen from this perspective, the principle underlying the section would primarily be to consider the merit

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64 'Art VII - The Indian Contract Law' Calcutta Review Vol XLVI, 1868, p485.

65 C. Ilbert, 'Indian Codification' (1889) 5 Law Quarterly Review 347, 351–2.

66 H.S. Cunningham and H.H. Shepherd, The Indian Contract Act(Thacker 1878), p. xlviii.

of the bargain while mitigating the effect of an unconscionable or extravagant stipulated sum. The examination of merit of the bargain is more likely to entail examination of the legitimate interest of a party in obtaining performance of the contract rather than carrying out a post facto analysis of the actual loss suffered.

Since originally the section mentioned only 'sum named in the contract' (without reference to LD or penalty, probably to avoid reference to English law), it was not applicable to a large category of cases. To cover such cases, the section was amended in 1899 to include reference to "any other stipulation by way of penalty" in addition to the already existing "sum named in the contract". Some academics claim that it is this amendment which confused the courts into believing that the English law distinction between LDs and penalties was indeed applicable in Indian law as well.[67] Sutherland in his 1879 commentary[68] on the Indian Contract Act has observed that while the Indian Law Commissioners wanted all penalties to be treated as LDs, the enacted act turned all LDs into penalties.[69]

As we have seen, the need to prove loss insisted by the courts leads to the result that, except for a few cases, there is no difference between Sections 73 and 74. This could not have been the legislative intent behind having a separate S.74. The misinterpretation is readily evident when we consider the headings of the two sections: heading to S.73 reads – "Compensation for loss or damage caused by breach of contract", while that for S.74 reads – "Compensation for breach of contract where penalty stipulated for". It is striking to note that the heading for the latter section does not talk about loss or damage caused at all, while it is explicitly mentioned in the former section. Further, even within the texts of the two sections, there is significant contrast – S.73 talks of compensation for naturally arising loss in the usual course of things and inadmissibility of remote and indirect loss, while S.74 specifically talks of the entitlement of the innocent party of the stipulated sum (or a scaled down amount) "whether or not actual damage or loss is proved to have been caused". This seems to indicate that S.74 was meant to operate independently of S.73 and was not meant to have any relevance to actual loss or damage. Despite such a clear distinction, courts have held that while considering compensation under S.74, the previous section has to be

67 Shivprasad Swaminathan, 'De-inventing the Wheel: LDs, Penalties and the Indian Contract Act', (2018) CJCL Vol.6No.1 103.

68 D Sutherland, Indian Contract and Specific Relief Act (Thacker 1879) 109.

69 Jagannadha Rao, 'LDs and Penalties', (n52).

mandatorily taken into account and no compensation can be awarded for any remote loss even under S.74. They have held that "reasonable compensation" in S.74 would carry the same meaning as the standard common law measure of damages, i.e., compensation for loss or damage.

In coming to this conclusion, courts have advanced two arguments. First is to be found in Fateh Chand where it was held by the court that the section did not do away with the fact of loss, but only dispensed with the proof thereof. This would mean that loss or damage must have been caused by the breach only then the question of compensation would arise under S.74. This conclusion of the court does not appear convincing. Courts can establish the fact of loss only by taking into account its proof and as such there is no practical difference between saying 'loss is caused' and 'loss is proved to have been caused'.[70] The section would compensate the injured party even if no loss ordinarily recoverable under common law principles was caused, but the courts seem to think otherwise. The second justification is to be found in Kailash Nath, where the court observed that both S.73 and S.75, which precede and succeed S.74, seek to compensate for damage or loss caused by breach of contract and therefore S.74 must also do so as well. However the same argument can be used to come to the opposite conclusion. S.74 talks only of "reasonable compensation" and not of "reasonable compensation for loss or damage" which the other two sections do, leading to the conclusion that there is a deliberate exclusion of any need for loss or damage from S.74.

The sequencing of Section 73 and 74 may also be relevant. In the draft bill, as we have already seen, there was a single section in the form of clause 53 which envisaged that the need for compensating loss caused by breach would arise only if there was no sum stipulated within the contract.[71] The starting point was the scenario of there being a stipulated sum payable on breach specified within the contract, and loss or damage would have to be compensated only if this was not so. The original draft clearly indicated that in case of stipulated sums there was no relevance of actual loss or damage caused by breach. However, in the final act the clause was split into two sections and the sequence was reversed. S.73 first dealt with compensation for loss and damage from breach while S.74 dealt with the case of sum being stipulated for breach. This splitting and change of sequence does however in no

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70 Swaminathan, 'De-inventing the Wheel' (n101).

71 Indian Law Commissioners, Second Report, 'East India (Contract Law)' House of Commons Papers, 1868.

way change the fact that the two sections were to operate independently and it is erroneous to consider S.74 to be a subset of S.73.

It is illuminating to consider the illustrations as proposed in the draft Act and compare them with those included in the final Act.

7.2 Illustration a

As Proposed

- A enters into an engagement by contract, that in case he fails to pay B 500 rupees on a certain day, he shall immediately become liable to pay him 1000 rupees. A fails to pay B 500 rupees on the day named. A has become liable to pay B 1000 rupees.

As Enacted

- A contracts with B to pay B Rs. 1,000 if he fails to pay B Rs. 500 on a given day. A fails to pay B Rs. 500 on that day. B is entitled to recover from A such compensation, not exceeding Rs. 1,000, as the Court considers reasonable.

7.3 Illustration b.

As Proposed

- A enters into an engagement by contract, that if he practices as a surgeon in the town of Z, he shall pay B 5000 rupees. A commits breach of the engagement. The sum of 5000 rupees is actually payable by A to B.

As Enacted

- A contracts with B that, if A practises as a sVurgeon within Calcutta, he will pay B Rs. 5,000. A practises as a surgeon in Calcutta. B is entitled to such compensation; not exceeding Rs. 5,000 as the court considers reasonable.

The illustrations as proposed in the draft indicate categorically the original legislative intent to enforce the bargain of the parties literally without regard to the loss or damage actually flowing from the breach. The subsequent enactment only introduces a sliding scale concept of damages where the court is required to decide a reasonable compensation. It does not do away with the non-correlation between actual loss / damage suffered and the (reasonable) compensation payable. The first illustration obviously falls fouls of Lord Dunedin's test in Dunlop. A stipulation to pay Rs 1000 on default of payment of Rs 500 immediately appears to be unjustified to a common lawyer. Even the amended example does not appear to help in the sense that how is a court to ascertain a reasonable figure for payment in default of an obligation to pay Rs 500. Another illustration may offer a hint to the probable answer.

7.4 S.73, Illustration n

A contracts to pay a sum of money to B on a day specified. A does not pay the money on that day, B, in

consequence of not receiving the money on that day, is unable to pay his debts, and is totally ruined. A is not liable to make good to B anything except the principal sum he contracted to pay, together with interest up to the day of payment.

This illustration to S.73 appears to lay down the remoteness rule that consequential inability to pay debts and getting ruined is too remote a consequence of the breach of contract. It can also be explained as a consequence of the Lord Hoffman's assumption of responsibility test in the Achilleas. The contract breaker has presumably not assumed responsibility for the intended use the innocent party had of the money to be received. What options does an innocent party have to get around such a situation? S.74 offers a solution whereby if consequences of not receiving a contracted sum on time are likely to be particularly severe, there is no reason why the parties may not agree to payment of a higher sum on breach. This may act both in terrorem as against the defaulting party as well as to protect the legitimate interest of the innocent party in receiving the money in time to save from potential ruin. In such a case, it would not be improper for a court to award the full amount stipulated as LDs. This is an explanation under which a loss which is not recoverable under S.73 is rendered recoverable under S.74. There is an alternative explanation under which even S.73 might cover losses dealt under S.74. Since LDs and penalties are consensually included in the contract, the losses which they are supposed to cover may be deemed to be within the reasonable contemplation of the parties, thereby falling within the second limb of the rule in Hadley v Baxendale. Similarly, it can be argued that once the agreed sums are incorporated in a contract, the parties can be taken to have assumed the responsibility to bear the consequences. This immediately brings to mind the notorious taxi driver example, and the question whether a casual intimation to a taxi driver during a Rs 100 ride to the airport would make him liable for Rs 100,00,000 in lost profits or even a Rs 10000 air ticket for a missed flight if he negligently delays reaching the airport. Under S.73, he would not be so, for despite the knowledge, the losses would be considered too remote and in any case knowledge cannot be equated to assumption of responsibility. However, what if there was a written contract between the taxi company and the passenger that the company would be liable for LD quantified at the current price of an air ticket say Rs 10000? In such a scenario, in all likelihood the company would factor in the risk of a possible failure to reach the airport in time, and as a consequence would increase the fare significantly. It can be hypothesized that if the normal fare to airport were to be Rs 100, the fare charged with an LD

clause might be as high as Rs 500. This again leads to the conclusion that contracts with agreed damages clauses normally factor in the risks of default and adjust prices accordingly and not allowing damages as agreed will lead to punishment for the innocent party. In public procurement contracts, tenders are invited with detailed stipulations pertaining to eligibility criteria in the form of turnover and relevant project experience. The bidders are generally well advised legally by their own in-house legal team in a majority of high value contracts. Such clauses therefore should normally be upheld when contracts are signed between well advised parties of comparable bargaining power, which high value public procurement contracts invariably tend to be.

7.5 Lessons from Cavendish

The law of contracts generally respects freedom of parties, but when the need arises, it does not hesitate to accord protection to weak parties from excessively unfair bargains. "Reasonable compensation" in S.74 is an example of the effort to strike such a balance. How was reasonable compensation to be determined? The courts in India resorted to the rules laid down by Lord Dunedin in Dunlop which led them to focus on genuine pre-estimate of losses while interpreting the section. Indeed, Dunlop was decided in 1915, many years after the Indian Contract Act was enacted with a categorical statement by the law commissioners that the section on LDs and penalties was meant to deviate from the English Common Law. A literal transplantation of the Dunlop rules was therefore never appropriate in the Indian context. With the distinction between LDs and penalties being eliminated in Indian Law, the extravagance or unconscionability of the stipulated sum with reference to the greatest possible loss that could possibly be suffered by the injured party could not even be indicative let alone be conclusive of the reasonableness of the stipulated sum.

Cavendish has brought in a new regime which the Indian courts need to adopt and follow. The earlier test of unreasonability borrowed from common law required the greatest provable loss that could conceivably flow from the breach to be the benchmark for establishing extravagance and unconscionability in the offending clause. Parties' contractual objectives going beyond recovery of compensatory damages and their consent to extravagance made no difference to the situation. Subsequently, courts desiring to relax the Dunlop criteria developed certain exceptions deviating from the compensatory norm, most significant of them being the existence of acceptable 'commercial[72] justification'. These deviations have now become part of

72 Lordsvale Finance v Bank of Zambia (1996) QB 752.

the rule under English Law, with the new test recognizing that parties may have legitimate interest in seeking performance, not merely in compensation for non-performance. As performance cannot be forced, the reasonable alternative is to provide deterrents to breach or incentives to perform. Deterrence is acceptable under the reformulated test, while it was not so earlier. That deterrence can be the sole objective is well established by the decision in ParkingEye. The court has expressed hope (Lord Sumption) that normally parties were unlikely to have legitimate interest in deterrence or performance beyond recovery of compensation for breach, but this may be true only of limited cases like sale of goods commonly available in the market. In the complex economic transactions that are commonplace in today's world, and in public procurement contracts where public interest is involved, legitimate interest in performance may routinely exceed recovery of compensation.

8. The Problem of Legitimate Interest

The reformulated test for penalties in Cavendish is supposed to eliminate many of the problems associated with the penalties rule. The problem with the revised test is establishing unconscionability, exorbitance or disproportionality with respect to the legitimate interest sought to be protected. Earlier, compensatory damages provided a relatively easy benchmark which is no longer available, leaving judges to their own judgment and discretion. ParkingEye was a relatively easy case in this regard due to the availability figures relating to fees charged by other parking centers, legally suggested scales and regular use of the center by the people confirming reasonability of the charges. Similar benchmarking might be available in a limited number of other cases, but there are likely to be a large number of cases where this convenience may not be available. Cavendish is a typical example where there was no standard measure to test the reasonability of the clauses. Parties are allowed considerable latitude under the new test, and in difficult cases courts are expected to rely on the wisdom of parties themselves. This was acknowledged by the court in Cavendish when it stated that there were no juridical standards to assess the worth of the business to Cavendish with the risk of default by Makdessi. In fact, it was accepted that the contract could have been differently structured, which was a "matter for negotiation, not forensic assessment". Where experienced commercial parties bargain on equal terms with expert legal advice, courts expect them to recognize the proper commercial

interests of each other.[73] Cavendish has acknowledged that matters should be left to the judgment of the contracting parties, who are likely to be the best judges of their own interests, legitimate or commercial.

The UKSC has relied on Dunlop and did not do away with the concept of penalty – it only replaced one test (Lord Dunedin's) with another (resembling Lord Atkinson's).[74] As the UKSC has now done, the Indian courts could have done better if they had focused on Lord Atkinson's test of 'legitimate interest' for evaluating reasonableness of stipulated sums, which would probably have been closer to the real intent behind 'reasonable compensation' under S.74 by considering the totality of circumstances. He talked about the "obvious interest" Dunlop had in maintaining the price agreement, and if similar interests are considered to be protected by S.74, then the 'reasonable compensation' may be a larger figure than the compensation for loss or damage allowed by S.73. Compensation may even be justified in no loss situations for public procurement contracts. There are some limitations built into S.73 which mean that there may have been a loss but no compensation is given in relation to it either because it was not caused by the breach or would be considered too remote to be recoverable but they might be recoverable under S.74.[75] It might be in the legitimate interest of the parties to include such losses and would be permissible under the new test. Indeed, in the specific case of public authorities, it will be always in the legitimate interest of the general public to enforce the terms of the public procurement contracts.

9. *Conclusion*

The traditional Dunlop approach to penalties seeks to answer whether the agreed amount is out of all proportion to loss foreseeable or suffered. The important question, however, is whether the losses to be considered would be those recoverable at common law or any loss in general. While the traditional approach would allow only the former, the latter approach has been adopted in Cavendish.[76] Legitimate interest in some cases might be served by ordinary compensation, but in many cases it may not, and may be largely of a commercial character. The protectionist approach of the courts has its roots in tradition and public policy, and may still be justified in cases of unequal bargaining power of parties. However, in modern commercial transactions as well as high value public procurement cases

73 Cavendish, (n2) (75).
74 Shivprasad Swaminathan, 'Centennial Refurbishment of Dunlop's Emporium' (2016) CLWR Vol.45 250.
75 Adrian Briggs, Andrew Burrows, The Law of Contract in Myanmar (Oxford 2017) 203.
76 Doug Jones, 'Penalties Doctrine' (n53).

generally sophisticated parties of comparable bargaining power are involved drafting complex contracts, reducing the need for such approach. The Cavendish approach in shifting the focus from genuine pre-estimation of losses to recognition of legitimate interests in enforcing contracts should work as a lesson for Indian courts. The Indian courts should build on these decisions and adopt these principles domestically. Reasonable compensation awarded on a sliding scale is capable of protecting a wide range of legitimate interests sought to be served by primary obligations in contracts, much more than the ordinary measure of damages recognised till now. The tests of reasonableness and legitimate interests can be guided by the principles adopted by the US courts as well as many civil and mixed law and jurisdictions. In any case, legislative history of the drafting of S.74 suggests that the interests meant to be protected under the section were meant to be much wider in scope than damages recoverable at common law, provision for which was already made under S.73. This means that the Indian courts should have drawn inspiration from Lord Atkinson's legitimate interest test in Dunlop much before Cavendish and led the path in developing the law. To conclude, Indian courts should jettison the genuine pre-estimate of losses test from Dunlop and adopt the legitimate interest test from Cavendish for a more realistic and reasonable approach to interpretation of S.74, at the very least for public procurement contracts where public interest is involved.

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Procurement Data Governance System: A Model for Ensuring Congruity & Propriety in Public Procurements

ANKUSH SHARMA[1] AND ARUN VERMA[2] AND M SRINIVAS[3] AND ANGEL RAJAN SINGH[4]

ABSTRACT

Public procurement is a critical function in ensuring the operational efficiency of government institutions, particularly in the healthcare sector, where timely and transparent procurement impacts the quality of patient care. This study evaluates the impact of implementing the 'Procurement Digital Library' – A Procurement Data Governance System (PDGS) – at All India Institute of Medical Sciences (AIIMS), New Delhi. By leveraging the power of data centralization & analytics, PDGS aims to streamline procurement, enhance accountability, and ensure compliance with procurement guidelines. It enables congruity & propriety in decentralized procurements by providing real-time organizational data for rate reasonability, price estimation, rate contract management, internal auditing, preventive vigilance, trend analysis, etc. The study highlights the significant cost savings, improved pricing consistency, and efficient resource allocation achieved post PDGS implementation. The findings underscore the potential of digital solutions in transforming public procurement, offering a scalable model for other public sector institutions. This paper advocates for integrating technology into procurement processes to achieve transparency, efficiency, and fiscal responsibility.

Key Words: Public Procurement, Procurement Digital Library, Procurement Data Governance System, PDGS, Healthcare Procurement, e-Procurement, Data Centralization, Public Financial Management.

JEL Classification: H57, H61, H83, I18, L86, O33

[1] All India Institute of Medical Sciences, New Delhi - 110029
[2] All India Institute of Medical Sciences, New Delhi - 110029
[3] All India Institute of Medical Sciences, New Delhi - 110029
[4] All India Institute of Medical Sciences, New Delhi – 110029, angelrajansingh@aiims.edu (corresponding author)

1. *Introduction*

PUBLIC PROCUREMENT PLAYS an essential role in enabling government institutions to acquire goods, services, and works necessary for fulfilling their mandates effectively and efficiently. In the healthcare sector, especially in large public hospitals, efficient procurement processes ensure that essential medical supplies, equipment, and services are readily available, directly impacting the quality of patient care. However, the procurement process in many public sector institutions, particularly in developing countries, faces significant challenges, such as administrative inefficiencies, lack of transparency, limited competition, and susceptibility to corruption. These issues are particularly pronounced in healthcare settings, where diverse and complex procurement requirements increase the scope for procedural inconsistencies and inefficiencies.

India has initiated several procurement reforms in recent years aimed at enhancing transparency, accountability, and efficiency in public sector procurement. The introduction of the General Financial Rules (GFR) 2017 by the Ministry of Finance represented a substantial step in standardizing procurement protocols across sectors. Additionally, the adoption of digital technologies, such as e-procurement platforms, has been encouraged to modernize procurement practices, improve oversight, and limit human error in processes. Despite these advancements, significant gaps remain, particularly concerning integration and accessibility of procurement data, supplier transparency, and standardized decision-making.

1.1 Overview of AIIMS Procurement Structure

The All India Institute of Medical Sciences (AIIMS) New Delhi operates as an autonomous institution, managing a substantial annual budget of approximately ₹4500 crore.[5] The procurement structure at AIIMS is organized with clearly defined financial powers at each level to ensure efficient and transparent operations. The Director AIIMS holds the highest financial authority with an original expenditure sanctioning power of ₹20 Cr, overseeing all major procurement & engineering related activities. The Deans - responsible for Academics, Research, and Examinations - exercise full powers up to ₹5 Cr within their respective domains to facilitate academic and operational activities. The Medical Superintendent and Chiefs of Centres each have delegated financial powers up to ₹5 Cr, enabling them to handle procurement responsibilities for their respective areas. Heads of Departments (except those in Centres) have a delegated financial power of ₹10 Lakhs for managing departmental-level procurements.

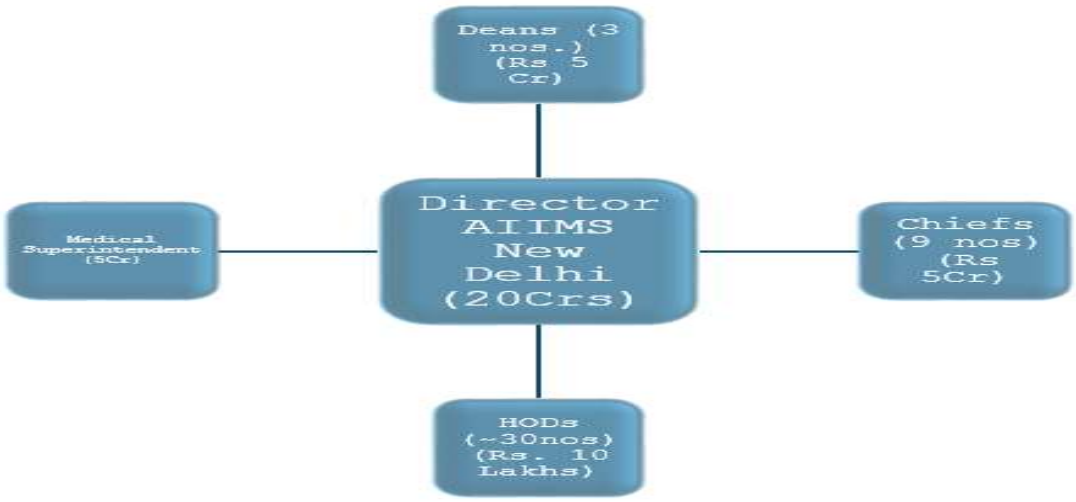

Figure 1: Organizational Structure and Budget Allocation of AIIMS New Delhi

This structured delegation of financial powers ensures accountability and smooth functioning across all levels of AIIMS in sync with the requirements of seamless patient care. However, this decentralized structure leads to a situation wherein supply orders are generated by over 100 different procuring verticals within AIIMS. Furthermore, the geographic expansion of the AIIMS New Delhi campus across different neighbouring states adds to the challenge of ensuring consistent pricing, transparency, and rate reasonability across all procuring verticals.

1.2 Challenges in Ensuring Transparency and Rate Reasonability

The procurement process at AIIMS faces persistent challenges in maintaining transparency and achieving rate reasonability due to its highly decentralized structure. With over 100 independent verticals handling procurement, ensuring uniform pricing and seamless access to procurement data becomes exceedingly challenging. Departments often operate in silos, relying on separate files and fragmented systems. This disjointed approach restricts interdepartmental visibility into critical details, such as pricing benchmarks, vendor evaluations, and procedural justifications, resulting in inefficiencies and price inconsistencies for items of similar specifications.

The existing e-Office system, while facilitating digital file management, is limited by rights and privilege constraints that hinder comprehensive access to notings and related documentation. Also, there is no extensive search functionality to widely search in the contents of

various procurement files. These limitations restrict collaborative decision-making for future procurements. Despite efforts like standardization and cost-monitoring protocols, the absence of a centralized tracking mechanism undermines financial efficiency and compliance with procurement guidelines.

Government of India's General Financial Rules (GFR) emphasize the importance of fundamental principles fundamental principles of transparency, fairness, competition, economy, efficiency and accountability for all public procurements. However, the lack of a unified procurement mechanism at AIIMS sometimes lead to disparities in prices for identical or similar items, arising from varying vendor selection, vendor dependence for price referencing, or access to pricing benchmarks. These inconsistencies highlighted the urgent need for a more integrated approach to procurement data management.

While centralizing all procurements might seem like a straightforward solution, it has not been found practical due to variations in specifications across departments and the need for timely procurement to prevent stockouts that could impact patient care. Further, with implementation of GeM, dynamic pricing mechanism has encouraged just in time procurement by various verticals instead of long-term rate contracts. In such scenarios, the debate between centralizing procurement activities versus centralizing procurement data presents an intriguing paradigm for enhancing efficiency without compromising operational flexibility.

2. A Brief Review of Existing Literature

Digital transformation in public procurement is increasingly recognized as essential for enhancing transparency, accountability, and efficiency across government sectors. This literature review synthesizes recent findings on the challenges and benefits associated with digital procurement systems, particularly focusing on healthcare institutions where complex procurement needs demand structured, transparent processes. Studies indicate that digital solutions can streamline procurement by centralizing data, fostering competition, and reducing redundant purchases across decentralized departments, as seen in healthcare and other public sectors.

Digital procurement systems offer significant anti-corruption benefits by improving transparency. For instance, Mackey and Cuomo (2020) discuss how e-procurement enhances accountability by systematically documenting procurement transactions and reducing opportunities for fraud, especially in pharmaceuticals. They note that while digitalization supports transparency, its adoption remains limited due to resource and

regulatory challenges in healthcare systems.

In Europe, digital innovation in public procurement has also shown potential for optimizing public resource use. A review by Sagar and Venkatesh (2019) reveals that European Union (EU) countries have made strides in e-procurement, using digital tools to standardize procedures, reduce costs, and enhance competitive bidding. They highlight that transitioning to fully digital systems improves accessibility and minimizes administrative burdens, enabling efficient public spending and better governance outcomes.

However, the digital shift also presents challenges, especially in low- and middle-income countries where resources for e-procurement are limited. Adjei-Bamfo et al. (2020) address this gap, arguing that a comprehensive readiness framework is crucial for e-procurement adoption. Their framework considers socio-technical and institutional factors, offering a pathway for governments to adopt e-procurement in complex environments, as illustrated in their Ghana case study.

Further, research by Mavidis and Folinas (2022) explores how advancements in e-procurement from 3.0 to 4.0 can drive transparency and accountability by integrating technologies such as artificial intelligence and blockchain. These technologies not only increase efficiency in procurement but also support data integrity and enhance decision-making through predictive analytics.

Lastly, the World Bank's recent review on public procurement interventions highlights how e-procurement can yield substantial savings by fostering open access and competition in public contracts. Fazekas and Blum (2021) note that effective digital procurement systems promote cost savings of 5-10% in well-implemented systems, underscoring the financial benefits of transparency and reduced administrative costs in public sector procurement.

3. Procurement Data Governance System (PDGS)

After multiple deliberations, it was decided to centralize procurement data rather than procurement processes to ensure congruity and propriety in procurements across different verticals. This led to the conceptualization of the 'Procurement Digital Library'– A Procurement Data Governance System (PDGS). This system is a centralized cloud hosted software platform designed to address these challenges and help the procuring verticals in:

- Price Referencing to access procurement data, enabling departments to compare and

benchmark prices for similar items across various transactions, ensuring fair and consistent pricing
- Rate Reasonability aids in validating prices against market standards and institutional norms, reducing instances of overpricing
- Price Estimation tools leverage historical and market data to forecast realistic pricing for future procurement, facilitating budget planning and negotiation
- Internal Auditing provides a robust framework for reviewing procurement activities, ensuring compliance with financial regulations and institutional policies
- Preventive Vigilance by flagging anomalies, such as un-reasonably high prices, persistent procurement from known vendors, un-authorized modes of procurement, etc. thereby also offering valuable insights into vendor reliability and engagement across departments
- Trend Analysis, the PDGS offers insights into procurement patterns, such as pricing trends, vendor reliability, and demand fluctuations

To ensure the effective implementation of the PDGS, all procuring verticals were mandated to input the following key details for every procurement into the system prior to issuing supply orders and while processing payments:

- Item wise details (including item name, description, quantity, unit price, tax details and item specifications for enabling cross referencing by other users)
- Vendor details including vendor GST, PAN & Account Number Details
- Mode of Purchase – GeM / Rate Contract / Global Tender, etc.
- E-Office tracking number & copy of approvals from competent authorities and copy of supply order generated from GeM or manually
- Invoice copy including part invoices if any

To facilitate integration with the financial management system, supply orders were progressively generated through the PDGS, and payment processing, including the creation of Public Financial Management System (PFMS) payment files, was also managed via PDGS. To ensure effective monitoring and validation, user privileges were assigned based on procurement verticals, and a Maker-Checker or 4-Eyes authorization system was incorporated into all roles within the PDGS. This system resulted in populating a centralized database of diverse hospital and healthcare procurements accessible to authorized users across departments and enabled tracking of payments and part payments associated with procurement activities, thereby enhancing transparency and efficiency.

One of the key foundational features of the PDGS is its function as a mandatory referencing solution for establishing price estimation and price reasonability for procurements across all verticals at AIIMS, New Delhi. All procurement activities now require referencing the PDGS for determining price reasonability and estimating prices for similar items. Tracking and accountability were also bolstered through the introduction of a Unique Procurement Code (UPC) assigned to every procurement. This UPC allows for seamless tracking and search ability, especially in cases of complaints or inquiries. The UPC also ensures that part payments associated with a specific order do not exceed the total order value, maintaining financial discipline and transparency. Additionally, a Unique Vendor Code, linked to vendors' PAN or GSTN, facilitates vendor analytics across all procurement verticals, enabling better vendor performance tracking and management.

In summary, PDGS has leveraged data centralization to drive transparency, efficiency, and consistency in procurement practices. This centralized database has empowered decision-makers with real-time information, facilitating informed purchasing decisions, optimizing resource allocation, and enhancing accountability across all levels of the organization. In a decentralized procurement model like that of AIIMS, the PDGS has tried to strike a balance between maintaining operational independence & procurement autonomy in sync with the needs of seamless patient care.

4. Materials And Methods

This study was conducted at the All India Institute of Medical Sciences (AIIMS), New Delhi, to evaluate the impact of implementing an electronic procurement data governance system on procurement consistency & efficiency. This setting offered an opportunity to examine how data centralization could address challenges in ensuring congruity & propriety in procurement in matrix organizations with delegated procurement systems.

The study adopted a retrospective and descriptive design, focusing on procurement data from two distinct eight-month periods ('Period-1': January 2022 to August 2022, representing the initial stages of implementation of the Procurement Data Governance System (PDGS), and 'Period-2': September 2022 to April 2023, after the system was stabilized). The period-1 captured the initial stages of the implementation of PDGS, reflecting the transitional phase as the system was integrated into existing procurement workflows. The period-2 represented procurement data after the PDGS had been fully stabilized and the users had

understood the intent of the system, thereby offering better compliance to fully study the impact of the system.

This bi-phased approach provided a comprehensive evaluation of the PDGS's impact, allowing the study to examine changes in pricing consistency, vendor engagement, and overall procurement efficiency as the system matured. Data for the study was sourced directly from the PDGS. By focusing on these two key periods, the study aimed to identify patterns in procurement activities, evaluate pricing trends, and assess improvements in transparency and operational efficiency brought about by the PDGS. This approach offered a clear understanding of the system's effectiveness in addressing the institution's procurement challenges.

Data collection involved extracting detailed procurement records from the PDGS database, including purchase orders, vendor details, item specifications, costs, payment records, and timelines. The analysis categorized data by department, vendor, item category, and financial year to ensure thorough coverage. Unique Procurement Codes (UPC) and Unique Vendor Codes (UVC) generated by the PDGS allowed the study to trace procurement histories, monitor vendor consistency, and evaluate pricing trends for items with similar specifications.

A range of analytical methods were deployed. Descriptive statistics highlighted procurement trends and patterns, while comparative analysis evaluated changes in pricing, volume, and vendor compliance during the two periods. Trend analysis was used to measure improvements in procurement efficiency over the two comparative periods.

Despite its significant findings, this study may have several limitations and potential sources of bias. First, the analysis is restricted to procurement data from AIIMS, New Delhi, which may limit the generalizability of the results to other institutions with different organizational structures or procurement practices. Additionally, potential bias could arise from variations in procurement priorities and departmental adherence to standard practices during the study period. Lastly, external factors such as market price fluctuations and supply chain disruptions were not fully accounted for, which could have influenced procurement costs independently of the PDGS's implementation. Addressing these limitations in future studies would provide a more comprehensive understanding of the system's impact.

Ethical considerations were thoroughly addressed by anonymizing all data to ensure confidentiality and obtaining necessary permissions from AIIMS authorities. These measures

ensured that the study adhered to institutional and ethical guidelines while maintaining the integrity of the analysis.

5. *Results And Analysis*

The data of items chosen by randomization from a select surgical consumables group for the purpose of this study was extracted from the PDGS database which has been enumerated in table-1 for further insights as illustrated below:

Table 1:
PDGS Data of Select Items for the Two Periods

Group Name	Time	Lowest Price (Rs.)	Highest Price (Rs.)	Total Qty Puchased	Total Cost (Rs.)	Average Unit Cost (Rs.)	Cost Saving as Compared to Period-I (Rs.)	Over Priced as Compared to Period-2 (Rs.)	National Cost with Period 2 as Benchmark (Rs.)
3 Layer Mask with Nose Clip	Jan 2022 to Aug 2022	1.20	5.00	2,206,000	3,938,220	1.79	-	1558442.125	2,379,778
Examination Gloves		1.97	5.96	4,882,000	11,993,206	2.46	-	3857867.951	8,135,338
Nitrile Gloves (Sterile)		11.44	21.13	200,750	2,809,930	14.00	-	382653.72	2,427,276
Nitrile Gloves (Sterile)		5.77	16.80	82,700	534,588	6.46	-	8983.555556	525,604
Surgical Gloves (Powder Free)		12.65	40.00	4,084,100	89,306,525	21.87	-	15899832.47	73,406,693
Disposable Non-Woven Isolation Gown		31.75	68.00	127,700	4,889,629	38.29	-	636476.7132	4,253,152
Disposable Non-Woven Surgeon Gown		71.00	267.00	500,200	73,495,600	146.93	-	1920255.721	71,575,344
3 Layer Mask with	Sep 2022	0.69	2.28	2,450,000.000	2,642,999.00	1.08	1,730,817.41	-	2,642,999

Nose Clip								
Examination Gloves	1.52	4.00	9,125,000	15,205,850	1.67	7,210,783.50	-	15,205,850
Nitrile Gloves (Sterile)	11.98	12.20	100,000	1,209,104	12.09	190,612.06	-	1,209,104
Nitrile Gloves (Sterile)	6.10	8.40	90,000	572,000	6.36	9,776.54	-	572,000
Surgical Gloves (Powder Free)	9.39	23.96	3,169,000	65,047,090	17.97	14,089,149.07	-	65,047,090
Disposable Non-Woven Isolation Gown	32.00	68.00	287,300	9,568,760	33.31	1,431,948.00	-	9,568,760
Disposable Non-Woven Surgeon Gown	80.00	259.99	356,400	50,998,503	143.09	1,368,210.99	-	50,998,506

As per the table-1, The lowest price, highest price, and average unit cost were analyzed for items such as masks, gloves, and other supplies. The price volatility (difference between highest and lowest prices) was calculated for each item, revealing which items experienced significant price fluctuations. The total quantity purchased, and total cost were compared over the two periods. A calculation of the cost savings or overruns for the next period provided actionable insights into budget efficiency. Observations on whether items were overpriced compared to the next period were noted. Metrics such as price volatility, cost, and quantity were compared for better procurement efficiency understanding. Quantitative shifts (% differences) in average costs, total quantities, and volatility were also examined.

It was noted that the average unit costs decreased notably across items, resulting in substantial financial savings. Savings were calculated by multiplying the reduction in average unit costs by the total quantities purchased, as summarized in the table-1. To validate the statistical significance of the observed cost reductions, a paired t-test was conducted. The t-statistic of 3.21 and a p-value of 0.018 indicated that the reduction in average unit costs was statistically significant at a common significance level of 0.05. This demonstrates that the improvements were not due to chance, highlighting the impact of

the PDGS in driving cost efficiency across procurement activities

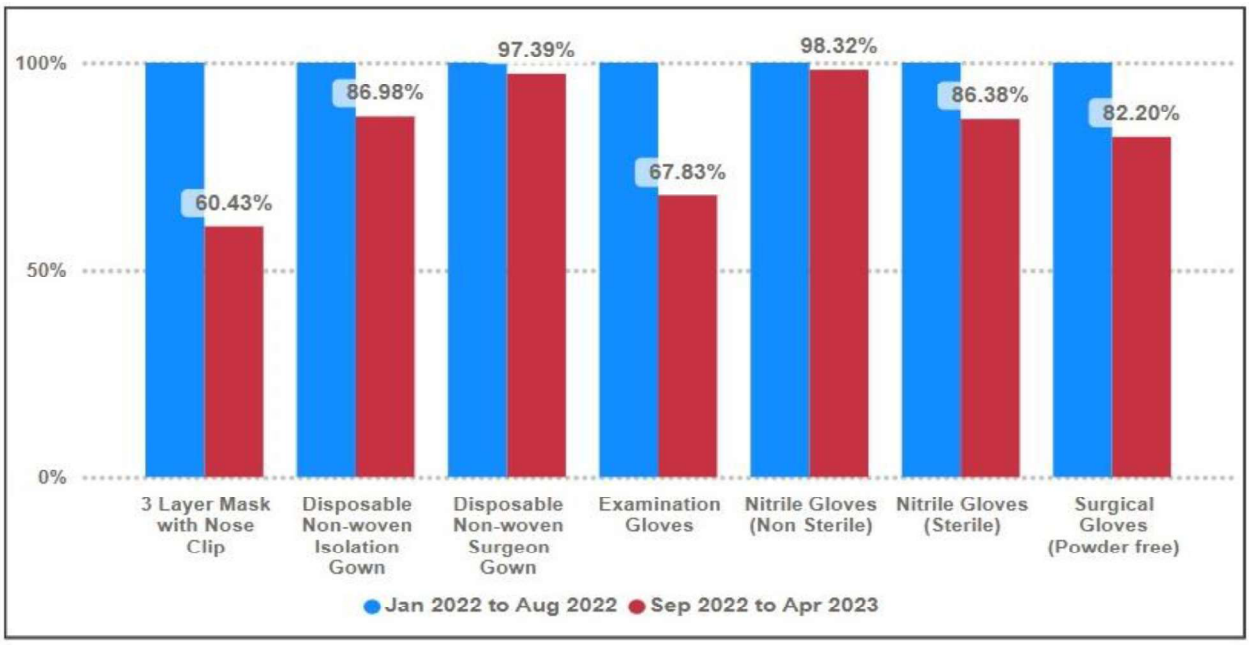

Figure 2: Comparison of Average Unit Cost

The percentage reduction in average unit costs varied across product categories. The 3 Layer Mask with Nose Clip exhibited the highest reduction of 39.67%, while Nitrile Gloves (Non-Sterile) showed the smallest reduction of 1.68%. Examination Gloves and Surgical Gloves, which were purchased in large volumes, also demonstrated significant cost savings, indicating the PDGS's ability to streamline high-demand procurement processes effectively. Unit costs decreased across several key categories in Period 2, including "Surgical Gloves" and "Examination Gloves," reflecting better rate negotiation. Items that previously experienced price fluctuations, such as "Nitrile Gloves" and "3 Layer Mask with Nose Clip," showed more stable and uniform pricing after the PDGS's implementation. This uniformity aligns with the system's objective of achieving rate reasonability.

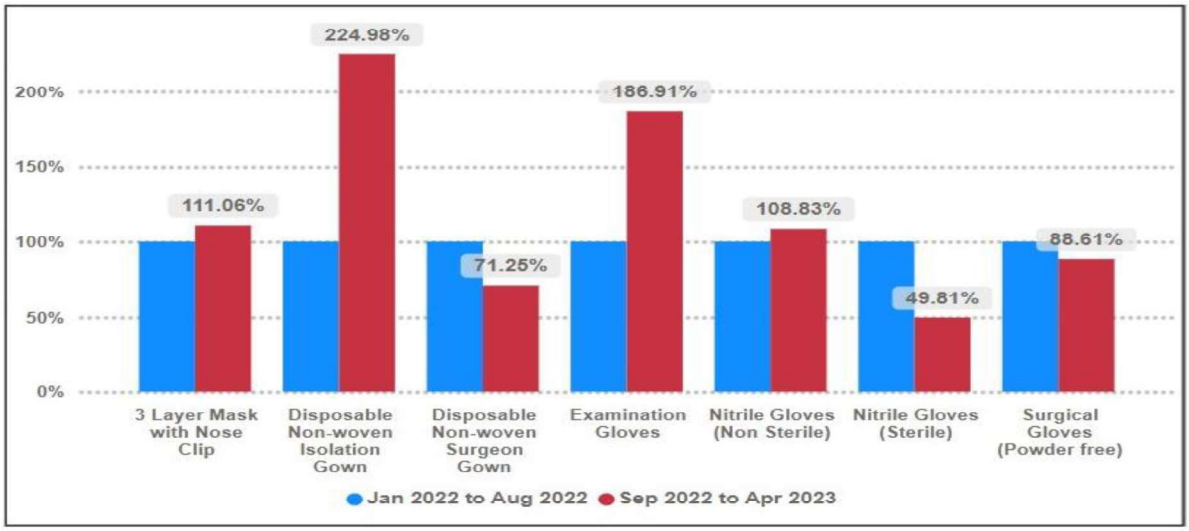

Figure 3: Comparison of Procurement Volume

An analysis of the relationship between procurement volume and savings revealed a very weak or negligible correlation, with a correlation coefficient of 0.18. While higher volumes contributed marginally to cost savings, factors such as price negotiations and procurement efficiency were likely more influential in achieving the observed reductions. Additionally, price variability was assessed by examining the range between the lowest and highest prices for each item. The Disposable Non-woven Surgeon Gown, for example, showed significant price volatility across both periods, underscoring the need for greater procurement consistency.

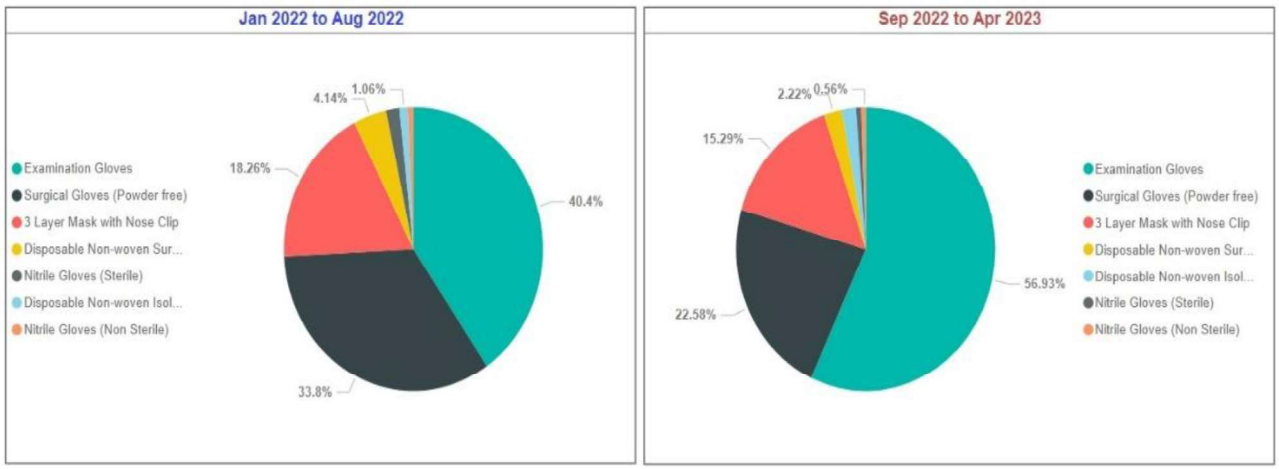

Figure 4: Comparison of Share of Each Item by Total Quantity

Fig-3 compares the percentage share of total quantities procured for various items. The examination Gloves demonstrated a significant increase in share, rising from 40.4% to 56.93%, indicating a

strategic prioritization or growing demand. In contrast, Surgical Gloves (Powder-free) saw a notable decline, with their share dropping from 33.8% to 22.58%, reflecting a reduced demand on this category. The share of Disposable Non-woven Isolation Gowns also decreased slightly from 18.26% to 15.29%. Other items, such as 3 Layer Masks with Nose Clip and Nitrile Gloves (Sterile and Non-Sterile), maintained smaller and relatively stable shares. These shifts highlight adjustments in procurement priorities to align with changing requirements and resource optimization strategies.

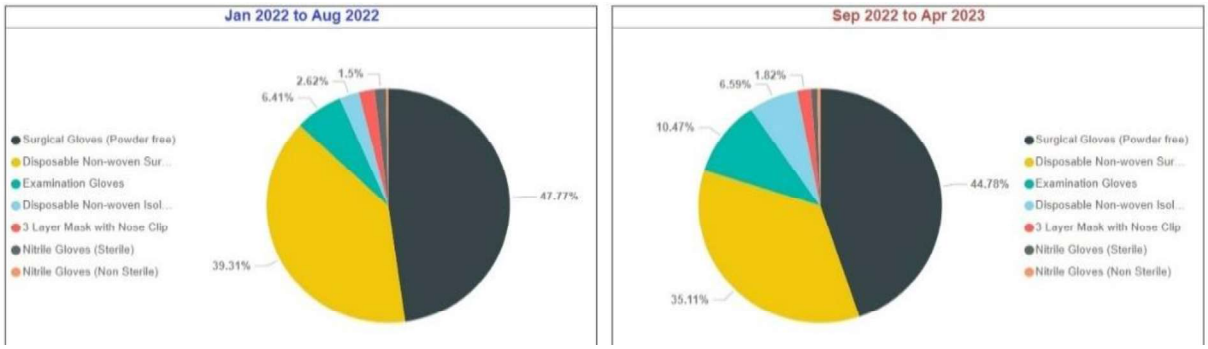

Figure 5: Comparison of Share of Each Item by Total Cost

Surgical Gloves (Powder-free) consistently accounted for the largest share of costs, though it decreased slightly from 47.77% in the initial period to 44.78% in the subsequent period, indicating a relative cost optimization. Disposable Non-woven Surgeon Gowns also showed a slight decline in cost share, from 39.31% to 35.11%, reflecting improved cost efficiency or adjusted procurement focus. In contrast, the share of Examination Gloves in total costs increased from 6.41% to 10.47%, highlighting a shift in resource allocation toward this category. Similarly, the cost share for Disposable Non-woven Isolation Gowns increased modestly from 2.62% to 6.59%. Other items, such as Nitrile Gloves (Sterile) and 3 Layer Masks with Nose Clip, maintained smaller proportions with minimal changes.

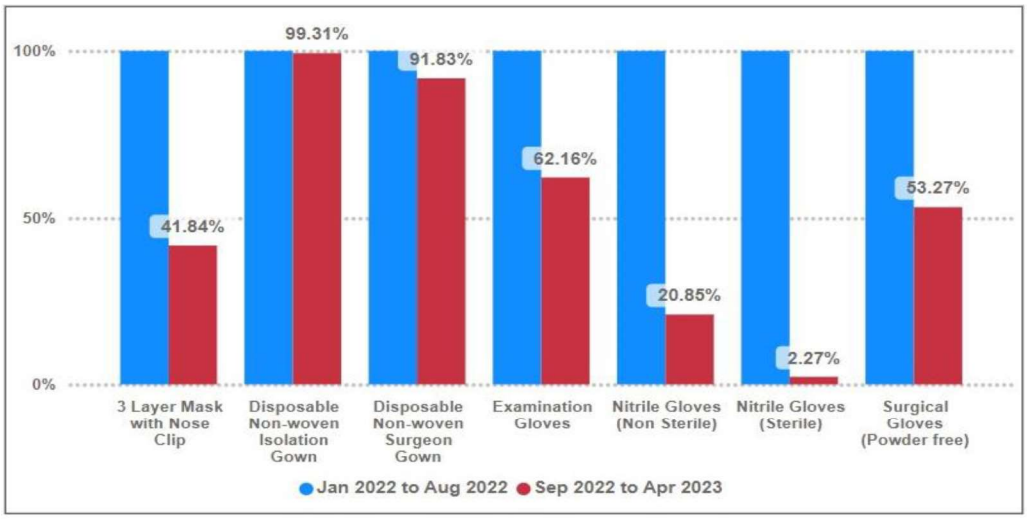

Figure 6: Comparison of Volatility

A significant reduction in volatility is observed for most items, reflecting improved price stability. For instance, the volatility for the 3 Layer Mask with Nose Clip decreased notably to 41.84%, while Examination Gloves saw a reduction to 62.16%. Nitrile Gloves (Non-Sterile) experienced one of the most substantial drops, with volatility falling to 20.85%, and Nitrile Gloves (Sterile) achieved near-total price stability, with volatility at just 2.27%. Disposable Non-woven Isolation and Surgeon Gowns maintained relatively high volatility levels of 91.83% and 99.31%, respectively, indicating consistent but less stable pricing. Overall, the data underscores a positive trend toward reduced price fluctuations, ensuring more predictable procurement costs.

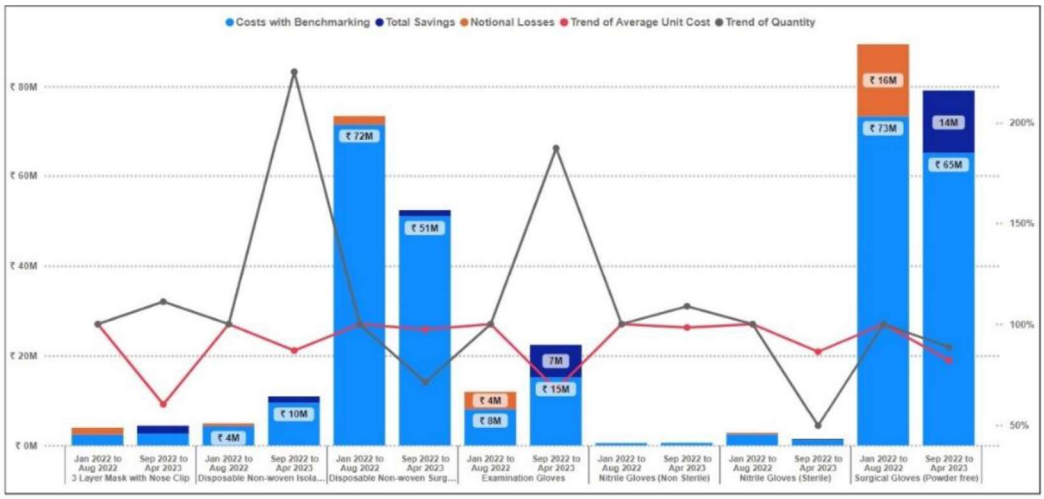

Figure 7: Benchmarking of Procurement Costs, Savings, and Trends

The chart demonstrates the benchmarking of procurement costs and highlights savings achieved through strategic price optimization by data accessibility. For Surgical Gloves (Powder-free), if they had been purchased at the new benchmark price during the initial period (January 2022 to August 2022), the cost would have been ₹73M. However, due to the lack of established benchmarks, ₹16M was paid in excess. In the subsequent period (September 2022 to April 2023), with clear benchmarking in place, the item was procured at ₹65M, resulting in a saving of ₹14M compared to previous prices. The trendlines in the chart further illustrate that the average unit cost during the two periods is independent of the quantity purchased. The fluctuations in the quantity trendline (grey line) and the average unit cost trendline (red line) do not follow any consistent pattern, reinforcing that the reductions in total costs were driven by strategic price benchmarking and procurement management rather than changes in purchase volumes or unit prices. This underscores the effectiveness of implementing benchmarking practices to achieve significant cost savings irrespective of these variables.

6. Conclusion

The implementation of the Procurement Data Governance System (PDGS) at AIIMS has transformed procurement efficiency, cost savings, and pricing consistency in a complex, decentralized public hospital environment and dynamic pricing. By centralizing procurement data, integrating with financial systems like PFMS, and enabling real-time analytics, the PDGS has enhanced transparency, reduced redundancies, and optimized resource utilization for enhanced patient care. It has set a benchmark for digital procurement systems, empowering data-driven decision-making and ensuring compliance with regulatory standards. The average unit cost reduction varied across product categories, with the highest decrease observed for the 3 Layer Mask with Nose Clip (39.67%) and the smallest for Nitrile Gloves (Non-Sterile) (1.68%). High-demand items like Examination Gloves and Surgical Gloves demonstrated substantial cost savings, emphasizing the system's effectiveness in streamlining large-volume and diverse procurement system. Price stability also improved, with volatility for items like Nitrile Gloves (Non-Sterile) dropping to 20.85% and Nitrile Gloves (Sterile) achieving near-total stability at 2.27%. Benchmarking practices enabled substantial savings to the public exchequer, exemplified by Surgical Gloves

(Powder-free), where savings of ₹14M were achieved in the second period through better rate reasonability and reduced costs. Importantly, it is pertinent to note that cost reductions were independent of purchase volumes or unit prices, underscoring the impact of strategic data-driven procurement management in achieving predictable and reasonable pricing.

The adoption of a digital procurement framework, like the Procurement Data Governance System (PDGS), has the potential to be as transformative for public procurements as the Right to Information (RTI) Act has been for public administration, fostering transparency and accountability. By leveraging technology to streamline procurement data, public institutions can enhance fiscal responsibility, improve operational effectiveness, and build trust in public spending. The PDGS, with its unified repository for procurement insights, balances departmental autonomy with collective efficiency. Its functionalities, including price benchmarking, supply order tracking, payment monitoring, and analytics, have streamlined workflows, reduced inefficiencies, and fostered accountability. Expanding the PDGS model across other public sector institutions offers a pathway to standardize procurement practices, align with national financial goals, and achieve a fair, efficient, and cost-effective system that serves the interests of citizens more effectively.

By addressing longstanding challenges and aligning with national financial goals, the PDGS serves as a model for equitable, efficient, and transparent procurement. Its success at AIIMS underscores the need for broader adoption of such digital frameworks in public institutions, paving the way for transformative reforms in public administration and resource management.

Procurement Data Governance System (PDGS) has transformative implications for hospital procurement practices and policy. By centralizing procurement data and introducing tools such as price referencing and rate reasonability checks, the PDGS enables more transparent and efficient decision-making. This not only minimizes redundancy and price variability but also enhances accountability across departments, aligning procurement activities with institutional goals and regulatory standards. The integration of unique vendor and procurement codes fosters improved vendor management, while data-driven insights enable better budget forecasting and resource allocation. From a policy perspective, adopting such digital systems can streamline compliance with financial regulations, reduce the risk of corruption, and standardize

procurement practices across large, decentralized institutions, ultimately setting a benchmark for public sector healthcare procurement.

7. Recommendations

This study has highlighted how data centralization could address challenges in ensuring congruity & propriety in procurement in matrix organizations with delegated procurement systems. To replicate the transparency and efficiency benefits observed in this study, public sector institutions in India should consider implementing centralized procurement data governance systems while maintaining the autonomy with users to procure as per their needs. Introducing PAN/GST Linked Unique Vendor Codes (UVC) and Unique Procurement Codes (UPC) within a digital procurement system would enhance tracking and accountability for each transaction. These codes facilitate the monitoring of vendor performance, track payment histories, and provide a clear audit trail. Mandating the use of UVC and UPC across public sector institutions would also prevent over-reliance on specific vendors, encourage competitive bidding, and improve the overall procurement process.

Such data governance systems have the power to transform procurement efficiency & transparency similar to what Right to Information (RTI) Act did for public administration, by making historic procurement data accessible to relevant stakeholders. Establishing clear policies for data access within a digital procurement system can empower oversight bodies, reduce the likelihood of corruption, and build trust among stakeholders. Regular audits and public reporting on procurement activities would further reinforce this transparency.

It is also emphasised, that for successful implementation of a data governance system, it is crucial to invest in training and capacity-building initiatives for procurement staff across public institutions. Training programs should focus on digital skills, data management, and regulatory compliance to ensure that procurement teams are equipped to utilize the digital system effectively, fostering a culture of transparency and data-driven decision-making.

To ensure continuous improvement and address potential issues, preventive vigilance via regular reviews and audits of the digital procurement data should be conducted. These assessments can identify gaps, monitor adherence to procurement standards, and measure the

effectiveness of cost-saving strategies. Insights gained from periodic reviews can inform updates to the system and refine procurement policies to better meet organizational needs.

A centralized digital procurement system would benefit from fostering a collaborative environment where departments can share knowledge, procurement strategies, and vendor insights. This approach can prevent duplication of efforts, leverage shared experiences for better decision-making, and encourage alignment across departments, especially in large institutions with diverse procurement needs.

By implementing these recommendations, the public sector in India can move toward a longitudinal data driven and evidence based procurement system that is more transparent, efficient, and aligned with best practices, ultimately leading to significant cost savings, improved vendor accountability, and enhanced public trust in government spending.

8. Future Research Directions

Future research can explore the potential of an integrated digital framework that may unify three critical domains—Human Resource Management System, Financial Management System, and Procurement Data Governance System —into a comprehensive digital platform to streamline healthcare procurement and administration. This can potentially be a significant step toward digital transformation in hospitals and healthcare administration, creating a unified system that addresses multiple operational challenges. Future research should evaluate the feasibility, implementation strategies, and potential impact of such a system on hospital efficiency, resource optimization, and overall governance.

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Dispute Resolution through Arbitration in Public Procurement: An Overview

ABSTRACT

Public procurement plays a vital role in government functions, ensuring the acquisition of goods, services, and works to meet public needs. However, given the complexity of contracts and the involvement of multiple agencies, disputes are inevitable. Arbitration has emerged as a preferred method of dispute resolution in public procurement due to its efficiency, expertise, confidentiality, flexibility, and enforceability. This paper explores the significance of arbitration in public procurement, detailing its advantages, common disputes, and the arbitration process. While arbitration offers a streamlined approach to resolving conflicts, challenges such as enforceability issues, costs, and potential bias remain. By ensuring well-drafted contracts and adherence to contractual obligations, stakeholders can maximize the benefits of arbitration while mitigating its limitations. The study also highlights judicial interpretations and suggests adopting AI-driven bid document customization to reduce ambiguities and enhance contract execution.

Keywords Public Procurement, Arbitration, Dispute Resolution, Contract Management, Alternative Dispute Resolution (ADR), Government Contracts, Arbitration and Conciliation Act, India, Tendering Process, Contractual Disputes

JEL Classification: K12, K41, H57, D86

1. *Introduction*

THERE IS HARDLY ANY ACTIVITY which can be performed without procurement; be it manufacturing, agriculture, commerce et al. When the procuring agency or the buyer is a government entity, it is termed Public Procurement. Public procurement, therefore, involves the acquisition of goods, services, or works by government agencies or public entities on belief of the public and for, directly or indirectly, catering to public requirements. It is important to understand that public procurement is made using public money and therefore the public buyer in India is accountable to the public through Parliament. Another feature of public procurement is involvement of multiple agencies. A typical case in government involves raising of requirements by some department, firming up technical and functional specifications by another

department, getting the approvals for incurring financial commitments through a series of authorities, forwarding the requirement to yet another, the purchase department, involvement of a large number of vendors and/or other stakeholders in tendering process, agencies responsible for inspection and quality control, units involved in manufacturing and logistics and the authority releasing the payment. Even post supply aspects like warranty and guarantee are watched by yet another agency. This necessitates entering into well-defined and drafted contract agreements with no scope for any doubts or ambiguities. And, we have experienced, the government contracts are amongst the most compressive and explicit ones.

Yet the performance of a procurement contract involves coordinated efforts of a host of entities and during this course failures do take place which become the cause for disputes wherein both the parties, while defending their own conduct, intend to establish non fulfilment by their opponent's responsibilities of the contractually defined reciprocal promises.

With complex contracts and high stakes, such disputes between contracting parties assume inordinate proportions. This, unless resolved appropriately and quickly, may culminate in non-performance of the contract leading to project delays and defeating the very purpose of the procurement. Arbitration has become a popular method of dispute resolution in public procurement, offering a fair, effective, confidential and, above all, quick process for resolving disputes.

2. Advantages of Arbitration in Public Procurement

- Efficiency: Arbitration proceedings are generally faster than litigation, allowing parties to resolve disputes quickly and avoid delays.

- Expertise: Arbitrators are often experts in the field of public procurement, bringing valuable knowledge and experience to the dispute resolution process.

- Confidentiality: Arbitration proceedings are typically confidential, protecting sensitive information and maintaining the reputation of contracting parties.

- Flexibility: Arbitration allows parties to tailor the dispute resolution process to their specific needs, including the selection of arbitrators and the procedure to be adopted for conduct of the arbitration proceedings. It is noteworthy that in India, an arbitral tribunal is not bound by the provisions of The Indian Evidence Act, 1872 which has

since been renamed as the Bharatiya Sakshya Sanhita, 2023 and Code of Criminal Procedure 1973 (CrPC) now replaced by the Bharatiya Nagarik Suraksha Sanhita, 2023 repealing the erstwhile CrPC.

- Enforceability: Arbitral awards are generally enforceable providing a high degree of certainty for contracting parties. Arbitral wards can be implemented sans any need for intervention by the courts and courts are not expected to interfere with the Arbitral wards. There are catenae of judgements including those from the Apex court of India about sustainability of Arbitral awards. It has been ruled by courts through several judgments that an award made by an Arbitral tribunal cannot be set aside by courts except where there are patent illegalities in such awards. It has been made amply clear that unless there exist reasons for doing so, the courts need not go into the merits of a reasoned award.

3. Types of Disputes in Public Procurement

- Contractual disputes: Disputes arising from the interpretation or performance of the contract, such as scope of work or services, payment issues or delays.
- Tendering disputes: Disputes related to the tendering process, involving ambiguity in bid document, evaluation criteria for bids or qualifying requirements for award of the contract.
- Intellectual property disputes: Disputes related to intellectual property rights, such as patents, trademarks, or copyrights.
- Liability disputes: Disputes related to liability for damages or losses, such as defects in goods or services.

4. Arbitration Process in Public Procurement

Most public procurement contracts have an inbuilt Arbitration Clause that provides for referring the disputes to an Arbitral Tribunal according to the terms of the contract and its Arbitration Clause.

- Notice of dispute: The disputing party provides written notice to the other party, specifying the nature of the dispute and the relief sought.
- Appointment of arbitrators: The parties appoint one or more arbitrators, either by agreement or through an appointing authority.

- Arbitral Proceedings: The arbitrators usually hold a preliminary meeting with the parties to discuss the procedure for the arbitration. This is followed by Submission of evidence whereby the parties submit evidence and arguments to support their claims or counterclaims. The arbitrators then hold a hearing to receive oral evidence and arguments from the parties. This may involve examination of witnesses and expert consultation if it is deemed necessary for settlement of disputes at hand.

- Arbitral award: The arbitrators issue a reasoned and binding award, which may include an order for payment of unpaid amount including interest on awarded sum, specific performance, or other relief as considered fair and equitable.

5. Challenges and Limitations

While arbitral awards are generally enforceable, there may be challenges in enforcing awards in certain jurisdictions. Secondly Arbitration can be a costly process, particularly if the dispute is complex or involves multiple parties. Another feature of Arbitration is that its proceedings are typically confidential, which can limit transparency and accountability. There is also a risk of bias in arbitration, particularly if the arbitrators have a conflict of interest or are not impartial.

6. Important points for the public procurement stakeholders to remember

Once the dispute arises and is submitted before an arbitral tribunal, the tribunal must identify the party which has defaulted. This is done based on evidence brought before the tribunal. In a large number of cases the public procurement officials are not able to establish the chronology of events backed by written evidence. Government official's failure to produce proof of replies to the references made by the contractors, at times, weakens their defence.

Bid documents and bid conditions are quite exhaustive in government purchases. These documents eventually become parts of the contract agreement. However often the parties to dispute fail to completely abide by the provisions made in the contract agreement leading to their failure of establishing their claim or counterclaim.

In a large number of court-judgements, it has been ruled that applicability of a particular condition or clause in the contract agreement including the arbitration clause must be seen not in isolation but in totality of conduct of parties during the execution of the contract. As an

instance, securing a "no claim certificate" from the contractor before making final payment does not guarantee for the government that the contractor shall not raise any claims or, in other words, it does not strip the party giving the NOC, of its right to prefer claims arising out of unlawful acts of the other party.

It is also important to note that the government drafts a comprehensive conditions of contract; viz. General Conditions of Contract (GCC), which is common to all contracts and supplement it with Special Conditions of Contract applicable to a particular tender or scope of work. The GCC contains several provisions which are extraneous to a particular tender or contract or, at times, even contradictory to each other. It becomes overly difficult during the execution of the contract as to while following a particular provision which of the remaining provisions is getting violated. With the availability of AI and other advanced tools, it should now be possible to develop customised bid documents which are fully and comprehensively applicable to that particular contract sans any superfluous or inapplicable conditions.

7. Conclusion

In conclusion, despite there being challenges and limitations to arbitration, it remains an effective way to resolve disputes in public procurement contracts. The advantages of arbitration in public procurement include efficiency, expertise, confidentiality, flexibility, and enforceability. However, it is important for public procurement stakeholders to abide by the provisions made in the contract agreement and to be aware of the challenges and limitations of arbitration. The Arbitration and Conciliation Act 1996 in India has been enacted to provide better party autonomy and need to reduce interference by the courts to make India a preferred hub for International Arbitration. With the policy of independence of arbitral tribunals, party autonomy and minimal interference by courts, there is enormous scope of quick, fair, acceptable and reasonable settlement of commercial disputes.

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Public Procurement, Marketing and Entrepreneurship

VIVEK SUNEJA[1]

ABSTRACT

For far too long, the procurement function, in both private and public spheres, has not received its due recognition as a key strategic activity that is critical to the efficient functioning of the economic system. This paper attempts to situate procurement in the broader context of marketing. By viewing marketing as the activity of market making under conditions of uncertainty, a task that is an essential part of entrepreneurship, the paper explores the linkages between procurement and entrepreneurial decision making. In doing so, it examines the judgemental and discretionary aspect of the procurement function, the resultant risk, and the implications for efficiency and ethics. The paper also explores how procurement in the public domain poses complex and unique challenges requiring creative and nuanced solutions that are the hall-mark of entrepreneurial decision making.

Keywords: Public Procurement, Marketing, Entrepreneurship, Transaction cost, Ethics

JEL Classification: H57, D81, L26, M31, D23, K42

1. *Introduction*

ALL TOO OFTEN, AND ESPECIALLY in the contemporary age of specialisation and super-specialisation, one fails to situate aspects of knowledge within their broader context. With technological advancement and increase in integration of economic activity across national and international boundaries, the scale and complexity of the managerial task has gone up substantially. With the increase in the complexity of the coordination task, the division in labour in management has progressed at a rapid pace, akin to the division of labour involved in the production process, as first made famous by Adam Smith's description of pin-making (Smith 1776). Management is no longer just management. One is a HR manager, an IT manger, a specialist in finance, logistics,

[1] Faculty of Management Studies
University of Delhi

marketing, sales, procurement and so on. Given the high and increasing degree of specialisation, it is easy to overlook the linkages and inter-dependencies between the various specialised functions and activities. This can lead to loss in approaching management as a holistic activity. A fragmentary approach to management that fails to synthesise the division of managerial labour is likely to be sub-optimal. A whole is more than the sum of its parts.

The market economy is based on the functioning of markets. Markets are institutions that facilitate exchange, both the exchange of products (goods and services) and the exchange of factors of production (land, labour, capital) between economic agents. Economic theory tells us that under certain conditions, the process of free and voluntary exchange in product and factor markets leads to an optimal and efficient allocation of factors of production that generates an optimal level and mix of products. This is achieved through the operation of the price mechanism. Prices represent the terms of exchange (the exchange ratios) and are generated by the interaction of the conditions of demand and supply, which in turn depend upon the preferences of buyers and sellers. Sellers compete with other sellers and buyers with other buyers as they seek to get the best bargains, and this competitive interaction generates prices which represent the relative scarcity of products and of the factors of production. The 'invisible hand of the market' leads to an efficient governance of the economic system (Smith 1776).

As has been pointed out in the economics literature, the above description of the functioning of the market economy is subject to two sets of assumptions or qualifications. The first set of qualifications is about the absence of market failure caused by imperfect competition, externalities and public goods. Imperfect competition refers to deviation from perfect competition, such as occasioned by presence of monopoly power (on the seller or buyer side) which may lead to prices that do not result in optimal resource allocation. Externalities refer to conditions where the transactors do not bear the full benefits or costs of their actions, such as when the activity of a economic agent leads to environmental pollution that he is not liable to pay for. Externalities can lead to either over or under-production relative to the optimal level, since there is a wedge between private and social costs or benefits. Public goods refers to goods which have the nature of collective consumption, such as national defence, characterised by non-rivalry or non-excludability. Public goods cannot be provided through the operation of the market mechanism, and may

hence be provided through taxation and public provision.

2. TRANSACTION COST, MARKETING AND ENTREPRENEURSHIP

There is a second set of conditions that needs to be satisfied to ensure efficiency in the functioning of the market mechanism. This relates to transactions costs involved in carrying out exchanges (Coase 1937, Williamson 1975, Buckley and Casson 1976). Given the presence of transaction costs, markets do not exist automatically, markets need to be created (Carter, Casson and Suneja 1998). This fact is often overlooked in neo-classical economic theory which implicitly assumes the absence of transaction costs. In reality, as opposed to the analysis provided by traditional neo-classical economics, a number of obstacles need to be surmounted before market exchanges can occur. To begin with, buyers and sellers need to communicate their respective needs and wares to each other. Once this has been accomplished, buyers need to ascertain the quality of the goods that the sellers are offering. The prices and terms of trade need to be negotiated. The products need to be delivered to the buyers and payment for the same collected by the sellers. After-sales service and guarantees or warranties need to be taken care of. All of these activities involve expenditure of time and resources and hence entail costs, referred to as transaction costs. Given the presence of transaction costs, it is appropriate to view marketing as the activity of market-making. Marketing attempts to reduce the transaction costs involved in exchange as much as possible. From a transaction cost perspective, achievement of efficiency in the market-making process constitutes the raison d'être of the discipline of marketing.

Marketing being market-making, marketing should be regarded as a critical aspect of entrepreneurship (Carter, Casson and Suneja 1998) Entrepreneurs are essentially market-makers. Entrepreneurs create markets by discovering what buyers want, help in organising the production of the desired products by bringing together the requisite factors of production (land, labour, capital) and facilitate the exchange between the sellers and buyers. In other words, entrepreneurs help in the organisation and facilitation of the functioning of markets to create value.

The presence of various kinds of transaction cost introduces uncertainty and risk in the market making process that entrepreneurs need to deal with. If no uncertainty were to be present, entrepreneurship would be indistinguishable from routine management. The presence of various kinds of transaction costs

leads to all manner of uncertainty. As an example, it is no simple a task to ascertain or forecast the needs and preferences of potential buyers. Similarly, sellers need to ascertain how best to bring together appropriate technology, capital and various kinds of skilled and unskilled labour to produce products of the right quality and price which consumers may be willing to purchase. These critical decisions involve dealing with uncertainty and transaction costs relating to search, communication, quality assurance, negotiation, delivery, logistics and so on.

Faced with uncertainty and risk that market-making inevitably entails, entrepreneurs needs to find ways to deal with the same. First, the entrepreneur needs to try and reduce the uncertainty and risk involved in market-making. Second, since it may not be possible to completely eliminate the uncertainty and risk, the entrepreneur must have the capacity to bear risk. In the entrepreneurship literature, as well as in popular perception, it is this second aspect that is often associated with entrepreneurship. An entrepreneur is regarded as a risk-taker. It is indeed true that risk-bearing is an important aspect of the entrepreneurial function. However, it may be equally or even more important that the entrepreneur reduces the risks involved in the market-making process by having the capacity to make good and sound judgements. An entrepreneur is someone who on average makes better judgemental decisions than others with respect to market-making in uncertain conditions, in order to create superior value.

When considered in light of the above perspective, it should be evident that the entrepreneurial function in an organisation is often not performed exclusively by a single entrepreneur. Anyone making a judgement about some aspect of the uncertain market-making process in order to create value, can be regarded as acting in entrepreneurial fashion. A scientist working in a R&D department may contribute to entrepreneurial decision making by offering informed suggestions as to which R&D investment option seems most likely to generate the best return, just as a salesperson may act in entrepreneurial fashion when he decides what the optimal offer to make to his client is. In the same vein, a procurement manager may be regarded to act in entrepreneurial manner when he takes judgemental decisions that best achieve value for money, under uncertainty caused by incomplete information relating to product characteristics, quality, costs etc.

Entrepreneurship being the capacity for superior judgmental decision making in uncertain environments, one may inquire as to how entrepreneurial capacity can be acquired or enhanced. What personality traits, skills,

knowledge, training and experience may confer the capacity for entrepreneurial decision making? Our discussion about the nature of the entrepreneurial function can provide some pointers. Formal training in the discipline and sub-disciplines of management may help provide contextual and conceptual understanding of the various market making activities and processes. Since many of the skills that entrepreneurship may require may be tacit in nature and be acquired through learning by doing, experience may be a good teacher. Mentorship under those who have a record of having achieved entrepreneurial success may help. Entrepreneurial skills are likely to be quite diverse and wide ranging, including the capacity for analysis and synthesis, creativity and innovation, communication and team-work. In order to cope with uncertainty and risk, entrepreneurs also require self-confidence, the capacity to persevere in the face of failure and to learn from mistakes.

3. RE-ENVISIONING PROCUREMENT

Procurement generally refers to buying by organisations (private or public) in contrast with buying by individual consumers.

Since the market process involves the activities of buyers and sellers, the efficiency in buying or procurement is as important as the efficiency in the activity of selling. The literatures on marketing and entrepreneurship have tended to pay greater attention to the role of the seller than the buyer or procurer in the market making process. The buyer is often regarded to be passive relative to the seller who is supposed to take the major initiatives involved in facilitating exchange. The marketing literature describes how the seller conducts market research to discover the needs of the buyer, organises the production of the desired goods or services, communicates the availability of the products to potential buyers through suitable promotion channels, and assures product quality by investing in brand building or through other means. The seller negotiates the terms of exchange, organises the logistics involved in delivering the product to the buyer and the means for collecting payment. The seller also makes arrangements to provide after-sales service and honour warranties or guarantees.

From the above, it appears that it is the seller who is responsible for undertaking the activities involved in market-making. This is an incomplete picture since it does not pay sufficient attention to the role played by the buyer. Every decision or activity of the seller may have a buyer counterpart. The buyer needs to ascertain and define his needs in terms of desired product attributes and his willingness to pay for products that embody

various levels and combinations of the various attributes. The buyer needs to decide upon the desired quality level of the product. He needs to have the capacity to ascertain the quality of the good being offered by the sellers. In the case of goods whose quality can be assessed pre-purchase, the 'search' category of goods, he may need to invest resources to carry this out. In the case of 'experience' and 'credence' products, he may need to rely on other means to make judgements about the likely quality of the good, such as by relying on available market information, brand reputation etc (Akerlof 1978, Nelson 1974). The buyer may also need to invest in negotiating the terms of exchange and in making legal contracts with respect to after-sales provision. All of this requires expertise and skilful decision making. Imperfect information frequently creates uncertainty in various dimensions. The buyer can hence be as much a market-maker or 'marketer' as the seller.

The above description of the role of the buyer is applicable both to the buying activity of the individual consumer and that of the procurement manager in the private or public organisation. However, there are likely to be greater possibilities for exploiting economies of scale in market making activities in the case of organisational buying or selling compared to individual buying and selling. Market making activities often involve both fixed costs and variable costs. For example, on the sellers side of the market, promotional activities such as advertising, brand building or setting up retail establishments involve both fixed and variable costs. The existence of fixed costs implies that as the volume of sales increases, the average fixed cost decreases, which in turn reduces the average cost involved in market making. This implies that when organisations sell to individual buyers, it may be more efficient for organisations to make the larger share of investment in market making relative to individual consumers, since they can reduce marketing costs by exploiting economies of scale. For similar reasons, organisational buyers / procurers may have more opportunities to exploit economies of scale involved in marketing activities relative to buying by individual consumers. Our analysis also implies that when an organisation (public or private) procures from individuals, it should do the bulk of the market making activity. On the other hand, when organisations procure from other organisations (B to B markets), then the logic of efficiency suggests that the market making costs can be shared between the procuring and selling organisations.

In view of our paper, the role and significance of the procurement function needs significant re-envisioning.

Procurement is not just a peripheral function but integral to the effective functioning of markets and organisations. Procurement managers must be recognised for the critical market making and entrepreneurial roles that they play.

Apart from conferring due status, our analysis points to how the role and responsibilities of the procurement manager need to be re-thought. Procurement must be regarded as a strategic activity, given its linkages with diverse organisational activities such as market research, R & D, product development, finance, contract negotiation and formulation, logistics, inventory, supply chain management etc.

The procurement manager needs to have appropriate competencies to discharge the strategic market making and entrepreneurial role that he should ideally play in an organisation. This calls for appropriate training, both formal training and that gained through experience, to equip the procurement manager with the requisite competencies. It may also be desirable to rotate the procurement manager through several departments such as market research, product development, sales etc to help him acquire the knowledge and skills required for his effective functioning.

4. THE DISTINCTIVE CHALLENGE OF PUBLIC PROCUREMENT

The foregoing analysis is applicable to procurement in both private and public sector organisations. In both cases, the aim of procurement should be to maximise efficiency in market making and create maximal value, given the constraints.

Public sector organisations however are often not profit maximising entities that freely operate in markets in response to market demand and supply conditions. As pointed out earlier, public sector organisations may be set up in circumstances characterised by various kinds of market failure, such as relating to imperfect competition, externalities or provision of public goods. They may also be established to provide merit goods or products that help reduce inequities in access caused by inequalities in income and wealth distribution. Public sector organisations may be financed partially or fully through taxation, rather than through the levy of profit maximising market prices.

On account of the above, public sector organisations may lack the discipline that operation in the free market may impose. In the case of the private sector, if an organisation is inefficient, it may be seen to deliver less value or profits relative to its competitors,

and invite necessary corrective action from its shareholders or other stakeholders. Since the public sector organisation may not be charging profit maximising prices, and may be partially or fully funded through taxation, it may not be subject to the discipline of the market to the same degree as its private counterpart.

The above implies that public sector organisations often need to be governed in ways distinct from those in the private sphere. To substitute for the performance related market discipline, rules and procedures may be framed to govern the functioning of public sector organisations. Apart from trying to ensure efficiency, these bureaucratic arrangements attempt to ensure that public funds are not unfairly diverted into private hands.

The opportunities for inefficiency and corruption can be quite considerable with respect to the procurement function in the public sphere. This possibility arises because of the principal-agent problem (Jensen and Meckling 2019). The procurement manager is the agent who is supposed to work in the interests of the principal, the public sector organisation which is being financed by the tax payer. Unless the procurement manager is ethical, he may be tempted to work in his own interest rather than in the interest of the public. This principal-agent problem in procurement is of course not unique to the public sector. Even in a private organisation, the procurement agent may be tempted to further his own interest rather the interest of the principal, the organisation. However, since the private organisation is subject to the performance related discipline of the market, the private organisation may have greater incentive and capability to monitor the behaviour of the procurement managers.

The principal-agent problem being more severe in the public relative to the private sphere implies that the rules governing procurement need to be more detailed and comprehensive in the case of public procurement. In the terminology of transaction cost economics, while the rules and procedures governing procurement in the private organisation can be relatively incomplete and relational in character, they tend to be more completely specified in the public setting. For example, while competitive bidding is almost always required for high value public procurement, the procurement agent in a private organisation may not necessarily be so bound. The degree of discretion and flexibility permissible in decision making can tend to be lower in the case of public procurement. The public procurement manager is not just expected to do the right thing, he has to be seen to do the right thing. This requirement for

demonstrating efficient and honest behaviour can extract a high transactional price in the case of public procurement. The requirement for objective transparency that is readily demonstrable to others (such as auditors) may lead to rules being specified in great detail, with less room left for exercise of discretionary, subjective decision making. Given the uncertainty involved in the various market making activities, the bureaucratic rule-based decision making process can lead to sub-optimal procurement decisions.

One may hence be tempted to argue that the procurement manager in the public sphere lacks the entrepreneurial freedom required for making judgements that lead to optimal procurement. As an example, since it may be difficult to specify the quality of the product in great detail at the tender drafting stage, such requirements may constrain the ability to procure goods with the desired quality level.

The challenge of public procurement is to find innovative ways that do not stifle the freedom required for entrepreneurial decision making. Instead of highly detailed rules, decision making powers may be vested in duly constituted purchase committees that allow for considerable discretionary decision making. For expenditure upto a certain amount, purchase committees may be allowed to base their procurement decisions on market surveys rather than through a competitive bidding process. In the case of the latter, committees may be allowed the freedom to give suitable weights to various quality dimensions of the product offerings rather than necessarily choose the lowest price bid once the minimum technical qualifications have been satisfied.

While innovation in design of procurement rules and procedures may help in improving procurement decisions, a degree of imperfection and risk is likely to remain. Inefficient or unethical procurement managers can try and work around the most well-intentioned and well-crafted procurement rules and procedures. The only remedy for this risk in decision making is ethical behaviour. If an organisation can institute an ethical culture whereby the public procurement managers monitor themselves and act wholeheartedly to promote public interest, then this helps in achieving the twin goals of efficiency and absence of malpractice. While ethical behaviour is also important in the case of private sector organisations, its importance in the case of the public sector cannot be over-stated. The creation of an ethical culture can in itself be regarded as an entrepreneurial activity, since it involves a number of judgements concerning how to establish ethical values and norms

through exercise of appropriate means such as leadership, rituals, mentoring, training etc.

5. CONCLUDING REMARKS

To sum up, public procurement should not be regarded as a bureaucratic, mechanical function that is essentially about administering a competitive bidding process in accordance with strictly pre-defined rules. As the various papers in this special volume demonstrate, public procurement can be richly innovative, entrepreneurial and exciting. The public procurement managers may explore a wide variety of ways to contribute to value creation, including through e-procurement, use of integrated automation and predictive analytics, supplier prioritisation and proactive risk management. They may investigate how procurement efficiency may be enhanced by utilising the modern, data-driven procurement process, by bidding, invoice and regulatory analytics, multi-sourcing of suppliers, automation of human resource intensive tasks, shortening of procurement cycle times and optimisation of inventory management. Enterprise resource planning, supplier contract negotiation and contract management systems are other areas which public procurement managers can explore for creative possibilities. The use of public procurement to induce innovation, promote green and sustainable practices, achieve indigenisation goals and promote medium and small enterprises are other areas that the public procurement managers can engage with. All this involves problem-solving, entrepreneurial activity aimed at creating value for stakeholders, for the public at large. The risks involved in undertaking these entrepreneurial activities may be considerably reduced by improving the levels of self-confidence of public procurement managers. This may be achieved by enhancing their level of competence in various market making activities (via appropriate training, mentoring and experience) and by enhancing the level of trust through the establishment of an ethical culture. After all, public service, of which public procurement is a part, cannot fully flourish without public spiritedness.

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Leveraging Sustainable Public Procurement to Drive Sustainable Development in India

B.K. PANDEY[1] AND JAYA BHALLA[2]

ABSTRACT

Sustainable Public Procurement (SPP) is a transformative policy tool essential for integrating environmental, social, and economic considerations into India's procurement processes. Representing approximately 25% of India's GDP, public procurement offers a unique opportunity to drive sustainable development by promoting green economies, ethical labor practices, and resource conservation. This paper explores India's SPP landscape, highlighting its alignment with Sustainable Development Goals (SDGs), particularly Target 12.7, and its 17 potential to reduce carbon footprints and foster inclusive growth. India's public procurement policies, supported by frameworks like the General Financial Rules (GFR) 2017 and initiatives such as the Government e-Marketplace (GeM) and the Bureau of Energy Efficiency's Standards and Labelling Program, have laid a foundation for sustainability. However, hurdles exist, including limited awareness, higher costs for green products, and inadequate supply chain monitoring. The paper proposes actionable strategies such as capacity building, lifecycle cost analyses, and incentivizing green technologies. By adopting these measures, India can adopt the SPP, bridging gaps in policy and practice. This approach advances environmental conservation and reinforces India's global commitment to sustainable development, positioning SPP as a cornerstone of a greener, more equitable future.

Keywords: Sustainable Public Procurement (SPP), Public Procurement, Green Economy, Sustainable Development Goals (SDGs), Environmental Policy, Ethical Labor Practices, Resource Conservation, Government e-Marketplace (GeM), General Financial Rules (GFR) 2017, Lifecycle Cost Analysis, Carbon Footprint Reduction, Supply Chain Monitoring

JEL Classification: H57, Q56, O44, L50, D61, K32

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[1] Dr B K Pandey, Professor of Practice, Arun Jaitley National Institute of Financial Management, Sec-48, Pali Rad, Faridabad, Haryana-121001

[2] Dr Jaya Bhalla, Associate Professor (SG), Arun Jaitley National Institute of Financial Management, Sec-48, Pali 2 Rad, Faridabad, Haryana-121001

1. *Introduction*

SUSTAINABLE PUBLIC PROCUREMENT (SPP) is a strategic approach to purchasing that integrates environmental, social, and economic considerations into the process of procurement to achieve long-term value and responsible outcomes. Governments worldwide are major buyers of goods, services, and works, accounting for approximately USD 9.5 trillion annually, representing 12% of GDP in OECD countries and 30% in developing nations. With public procurement—encompassing goods and services—accounting for approximately 25% of India's GDP, SPP has significant potential to influence market dynamics and drive the shift toward a green economy. For India, which has a large and growing economy, sustainable procurement is essential to maintain a balance between economic growth environmental 7 preservation, and social development (United Nations, 2024). Through effective policies and practices, sustainable procurement can help India reduce carbon footprints, encourage responsible production and consumption, and promote fair labor practices. Sustainable Public Procurement (SPP) serves as a powerful policy instrument for fostering the transition to green and inclusive economies, particularly in India ((United Nations, 2024).

Sustainable public procurement (SPP) plays an important role in achieving the Sustainable 8 Development Goals (SDGs), particularly Target 12.7 of Goal 12, which promotes procurement practices aligned with social, economic, and environmental objectives (ibid). SPP encompasses decisions regarding purchases with environmental impact, social equity, and economic viability throughout the lifecycle of goods and services. By aligning procurement practices with the SDGs, countries can stimulate demand for sustainable products and services, which in turn encourages suppliers to adopt more sustainable practices and innovate in eco-friendly technologies. This paper examines the progress, challenges, and future roadmap of sustainable procurement in India, mainly aim on policy frameworks, implementation barriers, and strategies to enhance sustainable practices.

2. Sustainable Procurement and the SDGs

Sustainable procurement is explicitly addressed in SDG 12 (Responsible Consumption and 1 Production) under Target 12.7, which calls on all countries to "promote public procurement practices that are sustainable, in accordance with national policies and priorities."

2.1 Beyond SDG 12, sustainable procurement indirectly supports other SDGs:

SDG 13 (Climate Action): By reducing carbon emissions through green supply chains and 22 energy-efficient products, procurement contributes to climate mitigation (ibid).

SDG 8 (Decent Work and Economic Growth): Ethical procurement practices ensure fair wages 25 and safe working conditions, promoting decent work (UNEP, 2024).

SDG 9 (Industry, Innovation, and Infrastructure): It fosters innovation in green technologies and sustainable infrastructure projects (World Economic Forum, 2022).

SDG 15 (Life on Land): Sustainable procurement helps conserve biodiversity by sourcing products that minimize harm to ecosystem (UNEP, 2024).

In India, aligning procurement with SDG 12 and other goals can help address critical sustainability challenges such as resource scarcity, high levels of carbon emissions, and social inequalities. Through the sustainability criteria into public procurement policies, India can 26 influence various industries to shift toward greener practices, thereby supporting the nation's broader climate and social goals. Moreover, India's commitment to sustainable procurement reinforces its alignment with global standards, facilitating international partnerships and enhancing its reputation as a responsible economic player on the world stage. As one of the fastest-growing economies, India's rapid industrialization and urbanization have significantly increased its carbon footprint and strain on natural resources (TERI, 2024).

By adopting sustainable procurement practices, India can promote eco-friendly technologies, reduce waste, and lower greenhouse gas emissions, contributing to its climate goals under the 15 Paris Agreement. Furthermore, sustainable procurement encourages ethical labour practices, supports local businesses, and empowers marginalized communities, aligning with the country's vision of inclusive development. It also ensures long-term cost savings and resilience by prioritizing lifecycle value over short-term gains. In a country of vast socio-economic diversity, sustainable procurement is not just an environmental necessity but a strategic imperative for building a greener, more equitable, and prosperous future[3].

3. Policy Context

[3] https://sustainabledevelopment.in/wp-content/uploads/2022/01/Shakti-Foundation-Sustainable-Procurement Report-Phase-2-5.pdf 3

3.1 International Policy Framework
The United Nations Environment Programme (UNEP) and the Sustainable Development Goals 2 (SDGs) emphasize sustainable procurement as a critical tool for achieving global sustainability objectives. Both frameworks highlight how integrating environmental, social, and economic considerations into procurement practices can make significant progress toward creating a 16 more equitable and environmentally sound future (UNEP, 2024).

4. UNEP's Role in Sustainable Procurement

Several initiatives like the 10-Year Framework of Programmes on Sustainable Consumption 2 and Production (10YFP), include a dedicated program on Sustainable Public Procurement (SPP). UNEP advocates for procurement policies that decrease the impact on the environment, conserve resources, and promote ethical labor practices. It works with governments, businesses, and international organizations to develop tools, guidelines, and capacity-building programs that help embed sustainability into procurement processes.

UNEP's work underscores the significance of lifecycle thinking in procurement, emphasizing the need to evaluate products and services based on their environmental and social impacts throughout their lifecycle. By fostering collaboration among stakeholders and providing technical support, UNEP plays an important role in encouraging nations to adopt sustainable 7 procurement policies that align with global climate and development goals.

5. Indian Context

India's approach to sustainable procurement has gradually evolved, with various initiatives and policy updates guiding its implementation. The Public Procurement Policy of 2012 marked an early step by emphasizing inclusivity, particularly for small and medium enterprises (SMEs), which are a major part of India's industrial landscape and have substantial implications for social sustainability4This policy indirectly promoted sustainable procurement by encouraging https://sustainabledevelopment.in/wp-content/uploads/2022/01/Shakti-Foundation-Sustainable-Procurement3 Report-Phase-2-5.pdf 4 https://www.india.gov.in/public-procurement-policy-micro-and-small-enterprise-2012 diversity and local economic development (Min of MSME, 2012). MSMEs are pivotal in driving environmentally friendly practices by producing biodegradable products, recycling materials, and utilizing renewable energy. They also lead in innovative

sustainable technologies, including energy-efficient machinery and waste management solutions. Policies prioritizing MSMEs in procurement amplify these efforts, fostering economic and environmental benefits (PIB, 2024).

Capacity-building initiatives like the ZED Certification Scheme support MSMEs in adopting green practices and improving product quality, making them ideal suppliers for sustainable projects. MSMEs also contribute to the circular economy by promoting resource efficiency and waste reduction, while their operations in rural and semi-urban areas enhance local development by reducing transportation costs and strengthening local supply chains (M/o MSME, 2021)

6. Public Procurement Regulatory and Legislative Ecosystem in India

- Public procurement in India plays a crucial role in shaping environmental sustainability and supporting the nation's ecosystem. As the government is one of the largest consumers in the economy, its purchasing decisions significantly impact the environment, resource use, and economic practices. To address these concerns, India has been moving towards integrating green procurement principles into its public procurement processes. These initiatives focus on reducing environmental impacts, such as lowering carbon emissions, minimizing waste, and conserving natural resources. By prioritizing products and services that are eco-friendly, energy-efficient, and sustainable, public procurement policies can foster the transition towards a greener, more resilient economy while promoting environmental conservation.

- The Indian government has made several strides in incorporating environmental standards into public procurement policies. Several legislative frameworks provide a foundation for SPP in India. The Environment (Protection) Act, of 1986, and the Energy Conservation Act, 2001 have set guidelines that support sustainable practices in various industries. More recently, the Central Public Procurement Portal (CPPP) has been a platform to integrate sustainable procurement guidelines and improve transparency in government procurement processes. The Bureau of Indian Standards (BIS) has also developed eco-labeling schemes, enabling government agencies to identify and procure environmentally friendly products (MoEFCC, 2018). Furthermore, the Ministry of Environment,

Forest, and Climate Change (MoEFCC) and the Ministry of New and Renewable Energy (MNRE) have supported sustainable procurement through initiatives in sectors like forestry and renewable energy.

- The government has also supported green certification and environmental impact assessments for suppliers, requiring that public sector projects adhere to certain ecological standards. For example, government contracts for infrastructure development often include requirements for using eco-friendly materials, promoting renewable energy solutions, and minimizing construction waste. This regulatory framework helps ensure that public procurement decisions contribute positively to ecosystem protection.

- India's commitment to a circular economy has further influenced its public procurement policy. Procurement decisions now increasingly emphasize the entire lifecycle of products, focusing on reducing waste and promoting the reuse, recycling, and responsible disposal of materials. By encouraging the use of recyclable and biodegradable products, the government aims to reduce resource depletion and environmental damage. Public procurement that integrates lifecycle costing ensures that ecological concerns, such as energy consumption, materialsourcing, and waste generation, are factored into purchasing decisions, leading to more sustainable outcomes for the ecosystem.

- The Government e-Marketplace (GeM) has been a significant step toward sustainable procurement in India. Through this digital platform, the government has made it easier for departments and agencies to purchase eco-friendly products, such as energy-efficient appliances and green construction materials. The GeM platform allows vendors to showcase sustainable products with relevant certifications, such as Energy Star ratings or eco-labels, thus promoting environmentally responsible purchasing. This system streamlines procurement processes and makes green procurement options more accessible, enhancing the overall environmental sustainability of public sector projects.

Building on this, the General Financial Rules (GFR) 2017 introduced specific provisions for green procurement, promoting energy-efficient and eco-friendly products in government purchasing practices (Ministry of Finance, 2017). The GFR

amendment was a significant milestone in embedding sustainability into public procurement policies.

7. The General Financial Rules (GFR) 2017

- The General Financial Rules (GFR) 2017 introduced specific provisions to encourage green procurement as part of India's sustainable development strategy. These changes aimed to align public procurement practices with environmental sustainability goals and encourage the adoption of eco-friendly products and services in government purchases. Key changes in GFR 2017 for green procurement include:

i. Preference for Environmentally Friendly Products: GFR 2017 explicitly promotes the procurement of energy-efficient, recyclable, and eco-friendly products. Rule 144 specifies that government buyers should consider energy-saving products like those certified under Bureau of Energy Efficiency (BEE) ratings or carrying Ecomark labels (Bureau of Energy Efficiency, 2024).

ii. LCC Approach: Rule 173 emphasizes the adoption of Life Cycle Costing rather than only considering the lowest purchase price. This approach evaluates the total cost of ownership, including procurement, operation, maintenance, and disposal costs, promoting the selection of sustainable options.

iii. Mandatory Inclusion of Sustainable Criteria: Rule 150 of GFR 2017 includes provisions for integrating sustainability criteria into tender specifications. For instance, tenders can mandate energy efficiency standards or waste management criteria for procured goods and services.

iv. Promotion of Green Building Standards: When procuring services for construction or maintenance, GFR 2017 encourages adherence to green building codes and sustainable practices, supporting resource conservation and energy efficiency in government infrastructure.

v. Central Public Procurement Portal (CPPP) Integration: GFR 2017 mandates the use of CPPP for transparency and accountability. It also facilitates the identification and prioritization of green products and vendors with sustainable certifications.

- GFR 2018 amendments reinforced these provisions, focusing on: Preference for Renewable Energy: Rules under energy procurement guidelines promote the inclusion of

renewable energy solutions, such as solar power systems and LED lighting, in government projects.

Provisions for Recycling and Waste Management: GFR 2017 includes clauses that encourage contracts and tenders to address recycling, reuse, and waste management during and after the lifecycle of the products or services.

Impact of GFR 2017 Reforms on Green Procurement: The inclusion of these provisions in GFR 2017 has improved awareness and set a framework for green procurement within government departments. However, implementation challenges, such as limited supplier capacity and cost concerns, have slowed widespread adoption. Moving forward, these rules could be enhanced with specific, enforceable guidelines and performance metrics for departments.

- Key Initiatives in Sustainable Procurement

i. Focus on Green Public Procurement: Building on the 2017 provisions, the Ministry of Environment, Forest and Climate Change reinforced the preference for eco-friendly products, including those certified by the Bureau of Energy Efficiency (BEE) or marked with the Ecomark label. These changes sought to institutionalize green procurement across all government departments and public sector undertakings.

ii. Mandatory Energy Efficiency Compliance: Procurement of energy-intensive equipment and services (e.g., air conditioners, lighting systems, or electronics) required mandatory compliance with energy efficiency standards. These provisions aimed to reduce carbon footprints and promote energy conservation in government purchases.

iii. Circular Economy Provisions: The amendments encouraged practices supporting the circular economy, such as: Prioritizing products with recyclable content. Including end-of-life disposal provisions in procurement contracts.

iv. Support for Local Green Enterprises: The 2018 amendment in MSEs Rules incentivized procurement from SMEs engaged in sustainable production practices, aligning with India's focus on promoting green entrepreneurship and Make in India (Public Procurement Policy for Micro and Small Enterprises (MSEs) Amendment Order, 2018). 5https://pib.gov.in/PressReleasePage.aspx?PRID=2061878

v. Improved Monitoring Mechanisms: A provision was added to strengthen the monitoring and reporting of sustainable procurement efforts. Departments were required to incorporate sustainability criteria into tender

evaluations and report progress toward adopting sustainable procurement.

vi. Lifecycle Cost Analysis (LCA) Strengthened: Provisions for Lifecycle Cost Analysis (LCA) were expanded to ensure procurement decisions considered the total environmental and economic costs, including maintenance, operation, and disposal. This shift from lowest-cost bidding to value-based procurement promoted long-term benefits over short-term savings (International Institute for Sustainable Development (IISD),2009).

Centralized Green Procurement Guidelines The amendments proposed the development of standardized green procurement guidelines to assist procuring entities in specifying sustainability requirements across different product and service categories (OECD, 2020).

Integration with SDG Framework: The amendments explicitly linked sustainable procurement with India's commitment to the Sustainable Development Goals (SDGs), particularly Target 12.7 under Goal 12 (Responsible Consumption and Production). This alignment helped departments prioritize sustainability in their procurement plans.

The GFR 2018 amendments marked significant progress toward embedding sustainable procurement in India's public procurement framework. By emphasizing energy efficiency, lifecycle costing, and recycling, the amendments aligned with global best practices and India's national priorities under the SDG framework. To fully realize their potential, continued efforts are needed to enhance compliance, build supplier capacity, and integrate sustainable procurement into all levels of governance (Sustainable Public Procurement in India: Selection of Priority Products and Preliminary Market Assessment, 2019).

8. *The Make in India Initiative*

The Make in India initiative, launched in 2014, has provisions that indirectly and directly support green procurement by promoting environmentally sustainable manufacturing and procurement practices (Ministry of Commerce and Industry). The initiative aims to boost domestic production while aligning with SDG, emphasizing eco-friendly technologies, and reducing the environmental impact of industrialization. Below are the key provisions under Make in India that relate to green procurement:

Provisions in Make in India for Green Procurement:

8.1 Promotion of Renewable Energy and Clean Technologies:

The initiative encourages investment in renewable energy, including solar, wind, and hydro projects. It incentivizes the production and procurement of equipment for renewable energy, such as solar panels, batteries, and wind turbines, through domestic manufacturing hubs. https://www.oneplanetnetwork.org/sites/default/files/handbook_spp.pdf 6 https://www.meity.gov.in/writereaddata/files/PPP_MII_Order_dated_16_09_2020.pdf 7

8.2. Emphasis on Energy Efficiency:
Make in India supports industries adopting energy-efficient technologies, aligning with the goals of green procurement. Energy-intensive industries are encouraged to adopt green building standards, sustainable materials, and efficient machinery that meet procurement criteria for reduced energy consumption.

8.3. Encouragement for Eco-Friendly Manufacturing:
The National Manufacturing Policy (NMP) under Make in India emphasizes sustainable production processes, encouraging industries to produce goods with minimal environmental impact. Industries are incentivized to use recyclable and biodegradable materials, supporting eco-friendly product categories in green procurement.

- Preference for Domestic Manufacturers with Sustainable Practices: Under the Public Procurement (Preference to Make in India) Order, 2017, preference is given to domestic manufacturers producing goods with eco-friendly certifications or adopting sustainable production methods. This order has been extended to sectors like renewable energy, electric vehicles (EVs), and energy-efficient appliances.

- Development of Green Industrial Clusters: Make in India promotes the establishment of green industrial clusters that focus on sustainable practices, such as using renewable energy and managing industrial waste effectively. These clusters are key suppliers for public procurement that meet green criteria (Mitigating the barriers to green procurement adoption, 2022).

- Support for Electric Mobility: The initiative aligns with the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme by supporting local manufacturing of EVs and associated infrastructure. This ensures a steady supply of EVs and components for green procurement in public transportation and government fleets (PIB, Delhi, 2024).

- Policy Synergy with Green Initiatives: The initiative works in tandem with programs like the Perform, Achieve, and Trade (PAT) scheme under the Energy Conservation Act, 2001, which promotes energy efficiency in industrial sectors. Products and services complying with such initiatives align with green procurement standards.

- Incentives for Green Certifications: Manufacturers producing green-certified products, such as those with BEE star ratings, Ecomark, or other eco-labels, benefit from enhanced visibility and preference in public procurement. This provision helps in the adoption of green-certified goods and services by government entities (Ecomark Certification Rules, 2023).

- Circular Economy and Waste Management: The initiative encourages manufacturers to adopt practices aligned with the circular economy, including recycling, reuse, and efficient waste management. Public procurement policies under Make in India increasingly demand products that adhere to these principles.

- Impact on Green Procurement: The Make in India provisions have strengthened the supply chain for green procurement by fostering domestic manufacturing of sustainable goods and technologies. By prioritizing eco-friendly practices, the initiative aligns with the Sustainable Development Goals (SDGs), particularly Goal (Responsible Consumption and Production) and Goal 13 (Climate Action).

9. Lessons from the BEE Standards and Labeling Programme

The Bureau of Energy Efficiency (BEE) plays a pivotal role in promoting sustainable procurement in India through its Standards and Labelling (S&L) Program, which is designed to encourage the purchase of energy-efficient products. This program aligns with India's broader sustainability and energy conservation goals, ensuring that public procurement policies prioritize environmental responsibility and economic savings

9.1 Key Contributions of BEE Standards and Labeling

The Bureau of Energy Efficiency (BEE) Standards and Labeling (S&L) Program is integral to advancing sustainable procurement in India by promoting energy-efficient products and fostering policy integration. It provides energy efficiency ratings for appliances, enabling informed procurement of 4-star and 5-star products, which significantly reduce energy consumption,

operational costs, and environmental impact

The program mandates prioritization of BEE-labeled products in procurement, supported by initiatives like the Energy Conservation Building Code (ECBC) for government buildings. While BEE-certified products may have higher upfront costs, their lower energy use ensures substantial lifecycle cost savings, making them economically and environmentally beneficial (Ministry of Power, 2019).

BEE standards also promote renewable energy integration through products like solar water heaters and energy-efficient pumps, supporting clean energy transitions. By creating demand for energy-efficient products, the program drives market transformation, incentivizing manufacturers to adopt sustainable practices.

Aligned with India's commitments to the Paris Agreement and SDG goals, BEE standards help reduce energy intensity and greenhouse gas emissions, solidifying their role in shaping a greener public procurement framework.

BEE's Standards and Labeling Program significantly advances sustainable procurement in India by embedding energy efficiency into public purchasing decisions. By fostering accountability, economic savings, and environmental stewardship, the program helps India move closer to achieving its sustainability objectives.

10. Progress and Current Status of Sustainable Procurement

Despite the progress in policy formulation, the adoption rate of sustainable procurement practices in India remains. While recent amendments provided a robust framework for sustainable procurement, several challenges persisted, including limited awareness and capacity-building among procurement officers, higher costs for certified green products, https://beeindia.gov.in/en/star-label 8 https://beeindia.gov.in/en/programmesstandards-labeling/star-labelled-appliances 9 making adoption slower, and lack of local suppliers meeting green certification requirements (State of Play of Drives for Implementing Sustainable Procurement in India, 2022).

Implementing sustainable procurement policies faces certain challenges in India. Studies suggest that sustainable procurement constitutes only a small percentage of overall public procurement, estimated at around 5-10% of government purchases

(World Bank, 2023). Many government departments and public sector units lack the necessary awareness and technical capacity to fully implement SPP. In addition, compliance with sustainability criteria is often challenging due to limited availability and higher costs associated with certified green products.

There is also a common perception that eco-friendly products are more expensive, which can deter government agencies from adopting greener alternatives. Moreover, the limited availability of certified sustainable products and services, especially in remote areas, makes it difficult to consistently apply green procurement practices across the country. Furthermore, monitoring and compliance with sustainability standards throughout the supply chain remains a challenge due to gaps in oversight mechanisms.

Additionally, capacity-building initiatives and awareness campaigns for both procurement officers and suppliers are essential to encourage the adoption of sustainable practices. Incentives for innovative and local green technologies can also boost the availability of eco-friendly products and foster sustainable industries. Lastly, collaboration with international organizations and leveraging global best practices can help India develop more effective procurement policies that contribute to ecosystem conservation and sustainable development (British Safety Council, 2024).

Sustainable Public Procurement (SPP) in India faces several challenges, including the higher costs of eco-friendly products, which strain limited budgets, and the limited capacity of SMEs to meet sustainability criteria. Public procurement officials often lack awareness and training on SPP standards, while inadequate monitoring mechanisms make it difficult to measure the impact of these practices on national sustainability goals. These barriers highlight the need for targeted interventions to ensure the effective adoption of SPP across sectors (Green Public Procurement in India and Charting Pathways for a Cleaner Future, TERI, 2024).

Advancing sustainable procurement in India requires a comprehensive approach that integrates the three pillars of sustainability—environmental, social, and economic—into procurement frameworks. To achieve this, it is essential to define "sustainability" and "green" within the Indian context, addressing local challenges such as unemployment and affordability. Prioritizing local content in procurement policies can enhance job creation, reduce regional disparities, and align with global sustainability frameworks like the

SDGs. A phased approach, starting with readily available green alternatives such as energy-efficient appliances and eco-friendly materials, will allow for incremental progress while setting measurable and timebound targets for broader adoption across sectors and states (World Bank, 2023).

Strengthening regulatory and operational frameworks is critical to promoting green public procurement (GPP). Updating the General Financial Rules (GFRs) to explicitly include sustainability criteria will provide clarity and improve compliance. Platforms like the Government e-Marketplace (GeM) can serve as hubs for disseminating information on sustainable products and integrating tools like GPP dashboards for real-time monitoring. Promoting ecolabeling and lifecycle-based standards such as ISO 20400 will guide procurement decisions and enhance transparency. Additionally, fostering interdepartmental coordination and collaboration with international organizations will ensure policy coherence and the adoption of best practices while addressing concerns like green protectionism.

Investing in capacity building and addressing supply-demand gaps are vital to the success of sustainable procurement. Regular training for procurement officials on sustainability criteria and lifecycle cost analyses will build expertise, while financial and technical support for MSMEs will enable them to transition toward greener alternatives. Facilitating green financing and encouraging R&D investments will scale up the production of sustainable goods, making them more affordable. Initiatives like Mission LiFE can promote behavioural shifts, encouraging both government bodies and markets to adopt sustainable practices. Tax rebates, subsidies, and preferential procurement terms for suppliers of green products will further incentivize sustainable practices.

Finally, robust monitoring and evaluation mechanisms are essential to track progress and ensure accountability. A centralized system for monitoring GPP implementation will provide transparency, while periodic cost-benefit analyses will measure environmental, social, and economic impacts, refining policies as needed. Highlighting the lifecycle benefits of green products will showcase their long-term cost-effectiveness, driving adoption. By adopting a holistic, phased, and incentivized approach, India can advance sustainable procurement, fostering environmental preservation, economic growth, and social equity (RMI Report, 2024).

To accelerate sustainable procurement in India, targeted

strategies are essential. Capacity building and training programs can empower procurement officials to implement Sustainable Public Procurement (SPP) standards effectively. Incentivizing suppliers, particularly SMEs, with financial and technical support can encourage the adoption of green production practices and expand sustainable product availability. Strengthening the policy framework through mandatory guidelines in key sectors and promoting voluntary adoption in others ensures balanced progress. Furthermore, fostering innovation and partnerships among government entities, the private sector, and international organizations can drive the development of sustainable solutions and facilitate the exchange of best practices. Together, these measures can enhance SPP adoption and align procurement practices with India's sustainability objectives. By implementing these policy recommendations, India can create a transformative 3 framework for sustainable procurement. This approach not only supports environmental 24 conservation but also drives economic inclusivity and social equity, establishing GPP as a cornerstone of India's sustainable development agenda (Global Review of Sustainable Public Procurement, 2017). 10https://rmi.org/wp-content/uploads/dlm_uploads/2024/04/sub-Final_RMI-CAI-India-GPP-Cement-Report041224.pdf

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Environmentally Sustainable Public Procurement in Construction of Hydroelectric Power Projects

P. K. RAWAT[1] AND ANAND KUMAR[2]

ABSTRACT

Environmentally Sustainable Procurement (ESPP) focuses on acquiring goods and services that minimize environmental impacts across their lifecycle. In India, increasing environmental concerns, including pollution and climate change, are driving green procurement adoption. Government initiatives such as the Government e-Marketplace (GeM), Central Public Procurement Portal (CPPP), Social Accountability 8000 compliance, ISO 14001 standards, and certifications like Energy Star support sustainable procurement practices. Key drivers include climate change mitigation, global environmental commitments, and consumer demand for eco-friendly products. However, challenges such as greenhouse gas emissions, limited product availability, and lack of awareness hinder widespread implementation. Despite these obstacles, ESPP presents opportunities for innovation, collaboration with global partners, and the promotion of a circular economy.

In hydroelectric power projects, ESPP enhances resource efficiency, promotes green technologies, and integrates sustainability into procurement, tendering, and construction processes. By prioritizing eco-friendly materials, energy-efficient designs, and waste management, ESPP mitigates deforestation, biodiversity loss, and water pollution while reducing carbon footprints. Compliance with environmental regulations, stakeholder engagement, and lifecycle cost analysis ensure long-term project sustainability. ESPP fosters innovation, strengthens green supply chains, and supports India's climate commitments, making hydroelectric projects more environmentally and socially responsible.

Keywords: Environmentally Sustainable Procurement (ESPP), Green Procurement, Public Procurement, Climate Change Mitigation, Renewable Energy, Circular Economy, Green Technologies, Resource Efficiency, Carbon Footprint Reduction, ISO 14001, Energy Star, Hydroelectric Power, Environmental Regulations, Biodiversity Conservation, Lifecycle Cost Analysis
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[1] Group General Manager, (Contract E&M) , NHPC Limited, Faridabad
[2] Group General Manager, (Contract E&M), NHPC Limited, Faridabad

1. Introduction

NHPC IS AS A NAVRATNA Enterprise of Government of India and is one of the top ten companies in the country in terms of investment base. NHPC is the largest hydropower development organization in India, with capabilities to undertake all the activities from conceptualization to commissioning and operation of hydropower projects. NHPC is also actively involved in a wide range of diversified projects (including wind, solar, green hydrogen) that are essential for meeting India's energy needs while making a significant impact in reducing the country's carbon emissions and promoting sustainable development. In addition to its core operations, NHPC provides consultancy services to clients in various sectors, offering expertise in construction, operations, maintenance and renovation of hydropower projects.

2. Procurement Modes for Hydroelectric Projects

For construction of Hydroelectric Projects and thereafter during Operation and Maintenance of Power Plant and for various other requirements, procurement of Goods/ Services / Works / consultancy Services are required. To meet the requirement NHPC adopts procurement through following modes:

Modes of Tendering

- Open Tenders
  - (i) Open Tender Enquiry (OTE)
  - (ii) Global Tender Enquiry (GTE)
- Procurement through Selected Suppliers
  - (i) Limited Tender Enquiry – LTE
- Nomination Basis Tenders
  - (i) Proprietary Article Certificate (PAC); and
  - (ii) Single Tender Enquiry (STE) on urgent basis
- Procurements without Calling Tenders
  - (i) Direct Procurement by Local Purchase Committee;
- Mandatory Procurement thorough e-procurement portal
  - (i) Goods and Services through Government e-market place (GeM)
  - (ii) Works through Central Public Procurement (CPP) Portal

3. Environmentally sustainable public procurement (SPP)

Environmentally sustainable public procurement (SPP) is a process that considers the environmental, social, economic, and institutional impacts of a purchase or investment.

Within procurement and supply chain, sustainability can be defined as the process of making decisions that benefit not only the organization but society as a whole, while minimizing its impact

on the environment. This means considering social and environmental factors alongside purely financial and economic ones.

Environmentally sustainable public procurement is a significant component in addressing the climate challenge and promoting a circular economy.

(i) The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

In recent years, there has been a significant shift in governments recognizing the potential of public procurement as a strategic tool to drive innovation, combat climate change, and promote environmental sustainability.

Figure 1: The Circular Economy Model: Less Raw Material, Less Waste, Fewer Emissions
Source: European Parliament Research Service

4. *NHPC's Commitment to Renewable Energy and India's 2030 Sustainability Goals*

NHPC is actively contributing to India's goal of generating 50% of its cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 as envisaged in updated Nationally

Determined Contribution under Paris Agreement (COP21). Through harnessing India's abundant water resources and other renewable sources, NHPC is dedicated for generating clean and affordable power, thus driving India's growth story forward.

5. Environmental Stewardship and Sustainable Development through ESG Initiatives

An approach to environmental stewardship includes strategies and actions centred on emission reduction, effective non consumptive use of water and energy conservation, waste reduction and increased use of renewable energy by implementing established environmental safeguard measures. NHPC has integrated environmental and ecological conservation, social well-being and responsible corporate governance in all its activities. The onset of Hydropower Stations by NHPC has contributed to the socioeconomic progress of the region through the creation of employment opportunities, the development of infrastructure and community development initiatives as part of its CSR initiatives. It has provided several indirect employment/ entrepreneurial opportunities in the field of transportation, construction, tourism and other small-scale businesses, thus promoting the continuous sustainable progress through an Environmental, Social and Governance (ESG) vision.

6. Sustainable Procurement

NHPC fosters sustainability across its supply chain through innovative procurement strategies, actively promoting a sustainable and socially responsible ecosystem. NHPC's Sustainable Procurement Policy aims to achieve efficiency, transparency, economy, fairness, integrity, fit for purpose and value for money by following standards, policies, procedures & practices, guidelines and uniformity in all procurement of the Corporate Office and Projects/Power Stations of NHPC. The Environmental, Social, and Governance (ESG) expectations from suppliers include on the directives related to Occupational Health and Safety, Labour and Human Rights, Environmental Sustainability and Business Integrity and Ethics.

- NHPC has a systematic supplier screening approach to identify significant suppliers and it provides supplier support (remote/on-site) on implementation of corrective/improvement actions, as and when required.

7. Government e-Market Place, Central Public Procurement Portal & Government Guidelines

NHPC leverages the Government of India's e-tendering platform, GeM, to efficiently engage with a wide range of vendors and suppliers, facilitating smooth coordination and efficient resource distribution. All tender processes are conducted via the Central Public Procurement (CPP) Portal and the GeM Portal, both of which adhere to the Government of India's guidelines for transparent and efficient procurement practices. This commitment to transparency and efficiency fosters fairness in the bidding process, ensuring equal opportunities for all interested parties to participate and thrive.

NHPC adheres meticulously to all relevant government policies governing public procurement, including the 'Public Procurement (Preference to Make in India) Order' 2017, the Public Procurement Policy for Micro and Small Enterprises (MSEs) Order 2012 and policies related to Land Border sharing, among others. Additionally, NHPC maintains its own preferential policy for project-affected families.

Bids undergo evaluation by a dedicated Tender Evaluation committee (TEC) in accordance with Central Vigilance Commission (CVC) guidelines and vendor/supplier assessment criteria are comprehensive, encompassing social, environmental and governance considerations.

NHPC diligently follows the latest directives from the Government of India on Public Procurement, prioritising indigenous products and fostering opportunities for Micro and Small Enterprises (MSEs) and Start-Ups.

NHPC strictly follows the International Competitive Bidding (ICB) system to ensure the selection of the most qualified agencies for hydropower projects. The evaluation process adheres to internationally recognised ICB practices, Central Vigilance Commission (CVC) guidelines and Government of India norms.

8. *Integrity Pact*

Through a recent Memorandum of Understanding (MoU) with Transparency International India, NHPC is committed to effective implementation of the Integrity Pact Programme, as per CVC guidelines.
Under the integrity pact, there is a mutual commitment of Bidder(s)/Contractor(s) as well as employer (NHPC) to follow the transparent procedure during tendering and execution of the contract.

Additionally, the grievance redressal policy, outlined in bid/tender documents, includes engagement of Independent External Monitors (IEMs) to ensure accountability and address concerns during procurement.

9. Supplier Code of Conduct

NHPC expects from its vendors and suppliers to strictly follow or adhere to the Supplier Code of Conduct for procurement of Goods, Services and Works and encourages all the vendors and suppliers to comply with the said principles. NHPC is committed to responsible, sustainable and ethical business practices to encourage environmental conservation, adhere to human rights and labour standards, promote social welfare and community development, ethical business conduct and is aligned with ESG landscape.

NHPC adheres with the tendering process which is well defined and transparent and takes due care of all dimensions of Human Rights and Labour to eliminate Forced Labour, Child labour, comply with occupational health and safety standards, discrimination and harassment, freedom of associations and collective bargaining etc. The process incorporates environmental aspects and various Government guidelines viz; minimum wages, labour laws etc. are in the tender document as a minimum qualification criterion.

10. Tender Conditions

NHPC's procurement is conducted in line with the procurement manual as well as the standard tender document for procurement of Goods, Services and Work as it evaluates vendors on basis of well-defined tender terms and conditions that includes various social and environmental aspects. Some of the special conditions are as below:

10.1 Ecological Balance:

During the course of work the Contractor shall ensure compliance to Ecological balance under various regulations and acts in vogue including following:-

- Environment Protection Act 1986
- The Water (Prevention and control of Pollution) Act,1974
- Air (Prevention and control of Pollution) Act 1981

10.2 Social Accountability 8000 Compliance:

The Contractor shall comply with all the requirements of SA 8000:2014 and maintain appropriate records in support thereof, and produce for inspection by Employer/ NHPC representatives as and when called for.

10.3 Protection of Environment:

- The Contractor shall be required to ensure that there shall be no felling of trees by him or his labourers or their family members and he will be solely responsible for their acts in this regard. The Contractor shall try to maintain ecological balance by preventing deforestation, water pollution and defacing of natural landscape in the vicinity of work areas. The Contractor shall so conduct his construction operations as to

prevent an unnecessary destruction of, scarring or defacing the natural surroundings in the vicinity of the work area. In order to maintain the ecological balance, the Contractor shall specifically observe the following instructions:

i. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operation, the same shall be repaired, replanted or otherwise corrected at the Contractor's expense. The Contractor will prevent scattering of rocks and other debris outside the work areas. All work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape as directed by the Engineer.

ii. All trees and shrubs which are not specifically required to be cleared or removed for construction purposes shall be preserved and protected from any damage that may be caused by the Contractor's construction operation and equipment. The removal of trees or shrubs will be permitted only after prior approval by the Engineer. Special care shall be exercised where trees or shrubs are exposed to injuries by Construction Equipment, blasting, excavating, dumping, chemical damage or other operation and the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Engineer. Trees shall not be used for anchorage. The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into

the river. Pollutants and wastes shall be disposed of in a manner and at sites approved by the Engineer. The Contractor shall fully comply with Water (Prevention and Control of Pollution) Act 1974- Section 33 (A).

- In the conduct of construction activities and operation of Construction Equipment, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize air pollution. The Contractor shall fully comply with Air (Prevention and Control of Pollution) Act, 1981 – Section 31(A)

- Burning of materials resulting from clearing of tree, bush, combustible construction materials and rubbish may be permitted only when atmospheric conditions for burning are considered favourable

- Contractor (including its Sub-contractor) shall provide alternative fuel arrangement i.e. cooking gas/ kerosene oil, electricity free of cost to all its canteen /mess, labourers and staff working in the Project during the whole period of construction activity to avoid felling of trees for use as firewood. In case alternative fuels supply i.e. kerosene, gas, electricity is not available in the project area, the Contractor shall approach the forest department/forest corporation to open fuel depot in the project area for meeting the demand of fuel wood.

- No wood shall be used for scaffolding, shuttering or cantering in the construction of Works.

- Wood, if required, shall have to be purchased from the State Forest Department.
- The Contractor shall be required to prevent flowing of debris and muck in to the river. Necessary retaining structures like walls/crates etc. shall be constructed for the purpose. The Contractor shall also stabilize the muck fully i.e. consolidation and compaction of the muck shall be carried out in the muck dump sites before handing it over to the Employer at the end of construction period.

- Medical facilities as well the recreational facilities shall also be provided to the labourers.

- All labourers to be engaged for the construction work shall be thoroughly examined by health personnel and adequately treated before they are deployed in the work.

- Contractor shall employ maximum number of local people in not only un-skilled category but also in semi-

skilled and skilled categories by imparting skills through training to selected locals. Detailed plan regarding this should be submitted by the Contractor within two months from the Commencement Date.

- All the Construction Equipment which are likely to generate high noise levels are to be fully equipped (with noise reduction measures) to meet the ambient noise control standards.

11. Capacity Building and Stakeholder Training Programs

NHPC regularly organizes training programs for various stakeholders like suppliers/ contractors and vendors, Project Affected Families and employees on varied socio-environmental and governance parameters.

12. Workplace Safety, Environmental Sustainability, and Resource Efficiency

The vendors should strive to provide a safe, healthy and clean working environment for its employees, workers and extended workforce while aiming for environmental sustainability and resource efficiency, particularly for GHG emission.

13. ESG Expectations from Suppliers

NHPC is establishing guidelines for its suppliers to encourage them to adhere to the ESG framework requirements, which are part of the collaborative approach to sustainability. NHPC aims to create a more responsible and resilient business ecosystem by upholding these standards. Most of NHPC's vendors and suppliers are reputed companies with strong ESG practices.

14. ESG Strategy & Management

14.1 Approach towards Materiality Assessment

Materiality is typically used to identify an organisation's most important ESG issues, which become foundational material topics to drive ESG strategy, performance and reporting on managing these topics. For FY 2021-22, NHPC undertook a materiality assessment with reference to the GRI Standards to include a sustainability-focused approach into the corporate strategy. The materiality analysis process begins with identifying sector-specific material topics using the SASB framework. This included industry patterns, legal prerequisites, significant issues highlighted by stakeholders and potential risks and opportunities.

14.2 Management Approach for Material topics

The material topics were mapped for GRI (Global Reporting Initiative, an independent, international, non-profit organization that provides sustainability reporting

standards) and BRSR alignment (BRSR stands for Business Responsibility and Sustainability Reporting. It's a framework that helps businesses integrate sustainable and responsible practices into their operations. The Securities and Exchange Board of India (SEBI) introduced the BRSR format to improve disclosures on ESG standards). The approach of NHPC in addressing these material topics is provided below:

- Environmental
  i. Climate Change
    - NHPC has carried out measurements of GHG emissions from some of its reservoirs under R&D scheme and post-construction EIA studies.
    - To reduce GHG emissions from its activities and facilities (such as DG sets, vehicles etc.), NHPC has taken several steps such as implementing energy efficient lightings and building management solutions, solar installations and reducing the fossil fuel consumption by shifting to electrical mobility solutions and retrofitting DG sets.
    - NHPC monitors, evaluates and conserves energy at all operating locations by adopting energy efficient solutions and shifting towards renewable energy sources to reduce environmental footprint and Scope 2 emissions.

  ii. Water Management
    - Low water footprint due to non-consumptive usage for power generation.
    - Optimises water consumption by implementing water- saving measures at offices/Power Stations.
    - Implementation of wastewater treatment at several of its power stations
    - by ensuring water reuse and recycling

  iii. Biodiversity Conservation.
    - NHPC complies with the baseline study of the flora and fauna in the project

area as part of EIA study through independent accredited consultant, prior to implementation of the Project. Accordingly, biodiversity conservation plan is prepared as a part of EMP and implemented in consultation with State Forest Department

- NHPC undertakes voluntary initiative such as voluntary plantation, herbal parks butterfly parks etc. for the long- term conservation of the fauna and flora of the regions in which NHPC operates.

- Social

i. Stakeholder Engagement and Community

- NHPC maintains strategic relationships with both internal and external stakeholders, responding to their expectations and concerns in a timely and appropriate manner, displaying a commitment to continue a progressive engagement in the company's activities and operations.

- NHPC conducts CSR activities in and around its business operation in line with Section 135 of the Companies Act, 2013 and Companies (Corporate

Social Responsibility Policy) Rules, 2014, read with its amendments and general circulars issued by the Ministry of Corporate Affairs. NHPC also adheres to guidelines on CSR issued by Department of Public Enterprises (DPE).

ii. Safety and Working Conditions

- NHPC prioritises worker health and safety, as well as good working conditions and a conducive working environment that encourages staff productivity along with a good health.

- NHPC has put in place steps to assure continuous improvement, such as updating safety guidelines, giving safety training and conducting regular mock drills on probable emergency scenarios to increase the awareness among employees and other stakeholders.

iii. Employee Wellbeing

- NHPC strives for holistic development of its workforce from recruitment to retirement, through various career advancement related trainings and related initiatives.

- Governance

i. Compliance

- NHPC complies with environmental laws and regulations established by governmental agencies or other regulatory bodies to protect natural resources, ecosystems and human health. Multiple monitoring mechanisms (6 monthly report to MoEF & CC, Monitoring by SPCB, EMC meetings) are in place to ensure compliance.
- NHPC ensures compliance with statutory and regulatory laws, regulations and requirements.

ii. Risk Management

- NHPC has developed and implemented an effective risk identification, mitigation and management strategy that is aligned with international standards and includes risks such as financial and regulatory risks, including the impact of climate change on business continuity. Cyber security and data protection procedures are implemented as part of risk management to provide a zero-default environment for data leakage and breaches.

iii. Ethics & Transparency

- NHPC has fostered a business culture on integrity and open communication.

Maintaining ethical integrity and openness in the governance process integrates ethical leadership, generates

confidence and creates long-term benefit for all stakeholders.

15. Environmental, Social and Governance (ESG) Vision

NHPC aims to lead India's energy sector by safeguarding the environment, fostering societal welfare and upholding governance principles. NHPC seeks to create a vibrant, eco-friendly future while positively impacting communities through innovative hydroelectric projects and renewable energy initiatives. NHPC is committed to continuous enhancements in ESG performance, active stakeholder collaboration and significant contributions towards a resilient, equitable and sustainable world.

15.1 ESG Goals, Targets and Initiatives

NHPC is committed to the vision of being a "Global leading organisation for sustainable development of clean power through competent, responsible and innovative values." Being an environmentally conscious and socially responsible company, NHPC strives to align its ESG goals with the requirements of national and international sustainability frameworks, such as the United Nations Sustainable Development Goals (UNSDGs) and the Business Responsibility and Sustainability Reporting (BRSR).

- Focus area 1: Drive sustainability best practices throughout NHPC's operations to minimise environmental footprint.
  - Goal 1: Optimise resource efficiency and business operation management.

i. Continuation of investment in renewable energy, improve energy efficiency and minimise GHG emissions through dedicated initiatives and fostering sustainable energy landscape.
ii. Ensure environmental flow from its hydropower stations.
iii. Conserve the ecosystem through Integrated Sustainable Waste Management (ISWM) and contributing to a responsible future
iv. Implement effective water-saving measures to achieve water conservation.
v. Demonstrate unwavering dedication in preserving and enhancing the natural environment.
vi. Encourage a shared objective of sustainability with the upstream value chain by collectively nurturing responsible supply chain management practices.

- Focus area 2: Improve social impact of NHPC throughout company's value chain and communities in which it operates.

- Goal 2: Promote an inclusive and healthy work environment.

i. Foster diversity and nurture equality to drive a more inclusive and dynamic organizational culture. Encourage women in leadership role at NHPC.
ii. Maintain a "zero accident" and "zero fatality" work environment on a year- on-year basis.
iii. Encourage employees, workers and local communities to work together by promoting awareness to strengthen efforts in addressing SDG agenda.
iv. Maintain its pro-active thrust as socially conscious company on elevating the quality of life and building essential facilities/ opportunities for its communities.

- Focus Area 3: Uphold business integrity and establish clear governance mechanism.

- Goal 3: Upholding business ethics, integrity and transparency Target NHPC initiatives

i. Ensure a zero tolerance for corruption and unethical practices.
ii. Ensure that NHPC is 100% compliant local and national regulations.

16. Nurturing Environmental Sustainability

A key strategy for combating climate change and attaining sustainability is the transition to renewable energy sources, which provide low-carbon and sustainable energy alternatives.

India has established an ambitious objective of attaining Net Zero energy capacity by 2070, which will be complemented by 500 GW of renewable energy capacity by 2030. The primary objective of this ambitious goal is to mitigate climate change and decrease dependence on fossil fuels through the promotion of alternative energy sources such as solar, hydropower, wind and Green Hydrogen.

NHPC's corporate strategy is in accordance with the significance of environmental conservation and is focused on providing clean and sustainable energy alternatives. This exemplifies commitment in addressing climate change and preserving the environment. NHPC Corporate Environment Policy (CEP) thoroughly examines the social and environmental factors that are critical for the continued progress of renewable energy technologies and it involves the formulation and execution of a management strategy with the objective of reducing environmental consequences to the maximum degree possible.

NHPC reasserts its commitment to ethical development practices through its adoption of Integrated Management System (IMS) accreditation. Most of NHPC Power Stations have ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 accreditations. NHPC actively participates in a range of environmental conservation initiatives, such as afforestation, waste management, water conservation and energy conservation, in fulfilment of regulatory requirements and as a voluntary effort. This is in addition to the implementation of approved environment management plans.

Green Hydrogen Technology is expected to be the future of energy and NHPC has begun development of three pilot green hydrogen projects in the Leh and Kargil Districts of the UT of Ladakh, as well as the Chamba District of Himachal Pradesh. These pilot projects will provide the groundwork for the future development of Green Hydrogen and the accompanying decrease of carbon emissions in the transportation/heating sector.

- NHPC is dedicated to support India's ambitious "Panchamrit" commitment which aims for 500 GW installed electricity capacity from non-fossil fuel sources by 2030.

- NHPC has established an Environment and Diversity Management (EDM) Division at its Corporate Office to oversee and support the implementation of environmental safeguard measures across all Projects, Power Stations and Regional Offices. This dedicated division plays a pivotal role in addressing environmental planning requirements throughout the planning, clearance, construction and operational phases of hydropower projects.

- EDM Division has defined roles and responsibilities, related to obtaining the statutory clearances required for the construction of the hydropower projects, finalisation of EIA/EMP studies, Remote Sensing and GIS, CDM, providing inputs of NHPC on draft policy/ Acts/ guideline of Government related to environment & Forest matters, coordination with the State Government for SIA and R&R plan as per "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR, 2013). EDM Division coordinates with different Power Stations on regulatory compliance and implementation of EMP and post-construction EIA studies for the sustainable development of hydropower projects.

- In addition, the EDM Division has embarked on ESG disclosures in the form of Sustainability Report (with effect from FY 2021-22) and is providing inputs to Planning Division for preparation of BRSR as mandated by SEBI, Government of India. The Division acts as nodal point for the Corporate Sustainability Assessment Survey for ESG Rating Framework of S&P Global where it prepares and submit responses for the award of ESG Scores.

17. Energy Management

NHPC is committed to minimise its environmental footprint through the expansion of its renewable energy portfolio and the adoption of sustainable technologies.

17.1 Energy consumption at NHPC

Consumption of energy at NHPC is primarily for the operational activity of NHPC and the key sources include grid-based supply, auxiliary hydropower, fossil fuels and solar plants. NHPC has implemented a comprehensive energy consumption strategy that intelligently blends grid- sourced electricity with renewable energy sources. This approach ensures that all facilities, buildings and offices are powered by a sustainable and environmentally friendly energy mix.

17.1.1 NHPC's initiatives to reduce energy consumption.

NHPC is dedicated towards sustainable and efficient energy production and has successfully incorporated a diverse range of energy conservation measures into its operations. NHPC has successfully incorporated energy-saving practices across all facets of its operations.

- The Energy Audit of NHPC Office Complex, Faridabad is conducted by accredited External Agencies recognised by the Bureau of Energy Efficiency (BEE).

- A state-of-the-art Grid Solar Power Station, boasting an impressive capacity of 230 kWp, has been successfully installed on the rooftop of the Neer Shakti Sadan, Jyoti Sadan and Canteen Building of Corporate Office. Solar PV Power Plant of 1000 kWp capacity is installed at residential colony of NHPC, Faridabad.
- This rooftop solar panels plant also partially powers the Colony electricity requirement. NHPC regularly cleans and performs pro-active maintenance activities to ensure optimal productivity and availability of these Solar PV Plants.

17.1.2. Emission Management

India has demonstrated remarkable progress in transitioning to clean energy, achieving the fastest renewable capacity addition among major economies and articulating ambitious goals, as highlighted in the Panchamrit declaration at COP26. NHPC plays a pivotal role in India's proactive stance against climate change, aligning with the nation's ambitious Nationally Determined Contributions (NDCs) to reduce emission intensity by 33–35% by 2030 compared to 2005 levels and achieving net zero emissions by 2070.

i. Scope 1 and Scope 2 GHG Emissions

Even though, the business activities of NHPC do not contribute significantly to GHG emissions, NHPC acknowledges its responsibility in setting industry benchmarks and showcasing exemplary practices. In pursuit of this objective, NHPC closely tracks its emissions and is integrating top-tier management practices and environmentally friendly behaviours to advance its environmental objectives.

NHPC has collected data for the calculation and reporting of all Scope 1 and Scope 2 emissions since FY 2018-2019. This demonstrates NHPC's commitment to transparency and accountability regarding its GHG emissions and environmental impact.

ii. GHG Emission Intensity

NHPC's commitment to sustainability drives its relentless efforts to reduce GHG emissions, with notable achievements in this area. While NHPC primarily focuses on measuring and reducing Scope 1 and 2 emissions, it also aims to incorporate Scope 3 emissions into its reporting framework.

iii. NHPC's Carbon Credits trading

Clean Development Mechanism (CDM) of United Nations Framework Convention on Climate Change (UNFCCC) allows emission-reduction projects in developing countries to earn Certified Emission Reduction (CER) credits, each equivalent to one Tonne of CO2. These CERs can be traded and sold, used by industrialised countries to meet a part of the emission reduction targets under the Kyoto Protocol. Carbon Credits have been earned from various Power Stations of NHPC under (A) Clean Development Mechanism (CDM) of United Nations Framework Convention on Climate Change (UNFCCC) and (B) Verified Carbon Standard (VCS) program of Verra.

iv. Electric Vehicles at NHPC Corporate Office

NHPC is dedicated towards the environment and is committed to contribute towards reducing carbon footprints and has planned to replace its conventional fossil fuel powered vehicles with Electric Vehicles in phase manner. This initiative has been taken in reference to Government of India Scheme "The Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME Scheme), under National Electric Mobility Mission Plan (NEMMP) with an aim to promote eco- friendly vehicles in the country.

v. Air Quality

NHPC actively monitors ambient air quality at its Project Sites and Power Stations during the development and operational phases. NHPC conducts regular monitoring of ambient air quality at these sites using laboratories approved by the National Accreditation Board for Testing

and Calibration Laboratories (NABL).

17.1.3 Water Conservation

NHPC recognises the significance of water conservation for dependable electricity generation and achieving sustainability. NHPC's Corporate Environment Policy highlights its commitment to water conservation via appropriate water resource management. This policy underscores comprehensive plans for successful water management throughout all operations, with the goal of maintaining ecosystems and benefiting communities.

18. Clean Energy for Sustainable Future

India announced a net-zero emission objective at the COP26 climate summit in Glasgow, with a strong climate ambition to reach net-zero by FY 2070. The Hon'ble Prime Minister of India adopted an updated Nationally Determined Contribution (NDC) under the Paris Agreement to increase India's response to the challenge of climate change. The updated NDCs include aggressive targets on five essential elements (Panchamrit) that would speed the transition to a low-carbon economy. In 2019, Ministry of Power, Government of India, has declared Large Hydropower Projects as renewable energy source. NHPC's commitment to hydropower aligns with the broader mission of achieving net-zero emissions, as it supports India's efforts to transition towards cleaner and more sustainable energy sources.

19. Conclusion

Sustainability will always be NHPC's top focus in all its business operations, policies, programmes and activities. NHPC is deeply committed to develop sustainable and clean power-generating infrastructure that will meet the needs of our present generation without compromising the planet's valuable resources.

MISCELLANEOUS

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