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EDITOR:

David Tavželj

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Foreword by the Editor

As we progress towards the end of 2024, it is with great enthusiasm that we present Volume 28(2) of our journal, *Public Enterprise*. This edition continues the advancing of academic discourse on the challenges and opportunities faced by public enterprises. Building on the foundation laid by our previous volume, this edition reflects our commitment to exploring contemporary issues, promoting innovative practices, and offering insights that bridge theory and practice.

The articles in this edition exemplify the dynamic and interdisciplinary nature of public enterprise management. They discuss themes that resonate with the evolving global priorities of sustainability, governance, and social innovation. The selection is designed to spark thought, debate, and action among policymakers, scholars, and practitioners.

The first article, *Water Supply as a Public Enterprise: Decentralisation and Corruption* by Edward Horesh, critically examines the impact of decentralisation on corruption within water supply systems in India. Through a longitudinal study of rural and semi-urban regions, the research highlights how decentralisation initially exacerbates corruption but shows promise for reducing it over time. This work offers valuable insights into the nuanced dynamics of governance reforms and their implications for public service delivery.

In *Enhancing Social Intelligence in Public Enterprise Executives through Yoga: The Mediating Role of Mindfulness*, Brian C. Smith explores a novel intersection of ancient practices and modern management. The study empirically demonstrates how yoga can enhance social intelligence among public enterprise executives, mediated by increased mindfulness. This innovative research underscores the potential of integrating holistic well-being practices into leadership development.

The third article, *Enhancing Production Efficiency of Public Enterprises through Stakeholder Participation: The Case of Irrigation Systems* by Jan C. Verwoerd, investigates how participatory governance models can enhance the efficiency of irrigation systems in Laos. By focusing on Farmers Water User Committees (FWUCs), the study provides robust evidence of the benefits of community engagement in improving operational outcomes and sustainability. It offers actionable insights for policymakers and development practitioners.

In *Green Finance for Public Enterprises in India*, R. K. Mishra and Priyanka Mishra analyze the burgeoning landscape of green finance as a transformative tool for public enterprises. By examining regulatory frameworks, market mechanisms, and international best practices, the authors illuminate pathways for aligning economic growth with environmental sustainability. This article contributes significantly to the discourse on sustainable development and the role of public enterprises in achieving climate goals.

Finally, *Institutional Discursive Power in Federal Public Enterprises: A Framework for Evaluating State-Centre Dynamics* by Clementine C. Hendricks et al., introduces a comprehensive framework to evaluate the interplay between federal and state-level public enterprises in India. By applying discursive power theories, the authors provide a unique lens to understand how narratives and institutional strategies shape governance and policy outcomes in federal systems.

As the International Center for Promotion of Enterprises (ICPE) enters its sixth decade, this volume stands as a testament to our efforts to address critical issues at the intersection of public policy, economics, and management. The insights presented here are a call to action for all stakeholders to strive for excellence, sustainability, and inclusivity in public enterprise governance.

We are confident that the diverse perspectives and innovative solutions offered in this volume will inspire readers to engage with the challenges and opportunities shaping the future of public enterprises.

David Tavželj

Water supply as a public enterprise: Decentralisation and corruption

Edward Horesh

University of Aberdeen, UK

ed.horesh@abdn.ac.uk

Abstract

Decentralisation of powers and responsibilities from a higher to a lower level of government has been held out as an answer to a multitude of diverse political challenges. It is often assumed that as an organising principle, decentralisation reduces corruption by bringing government closer to the people. This article adds to the small literature dealing with the relationship between decentralisation and corruption by examining decentralisation of water supply from one level of sub-national government to another. It extends this literature by considering a dynamic situation and examining whether the relationship changes over time. The area of study covers the rural and semi-urban areas of two large Indian states. The study compares the level of corruption in piped water supply schemes run by centralised agencies and decentralised agencies. The study is based on experiential, not perception-based corruption measures. We find that decentralisation increases corruption significantly in the immediate aftermath of decentralisation. At the same time, we observe that with time, this increase in corruption is reduced substantially, although the increase persists in the medium term.

KEYWORDS: Water supply, local governance, decentralisation, corruption, difference-in-difference, longitudinal study

Introduction

Following the Soviet Union's decline and fall, decentralisation emerged as a popular approach in governance, public administration, and development. It was seen as a solution to various political challenges, from managing transitions in Eastern Europe and South Africa to addressing issues in Latin America and supporting economic growth in China and India. Decentralisation attracted diverse supporters, including free-market economists sceptical of an overextended state and those concerned about market failures, as well as various activist groups. The World Bank embraced

decentralisation as a major governance reform, and questioning its merits became almost unthinkable.

The high hopes placed in decentralisation partly stem from dissatisfaction with centralised governance models, which often bred corruption among officials (Bardhan and Mookherjee, 2006). Arguments for decentralisation are frequently based on subjective assessments and unclear definitions. At its core, decentralisation involves transferring powers and responsibilities from higher to lower levels of government. The concept has long been central to public administration, leading to various classification systems (Dubois and Fattore, 2009). The most widely accepted approach categorises decentralisation into three types: deconcentration, delegation, and devolution (Brennan and Buchanan, 1980). Deconcentration transfers authority over specific functions within the government's jurisdiction. Delegation involves transferring authority for defined tasks to organisations outside direct government control. Devolution occurs when higher levels of government transfer authority to autonomous lower levels through constitutional or legislative means. Decentralisation literature typically focuses on devolution, based on the assumption that decentralised systems allow for greater citizen influence on outcomes.

While the standard decentralisation model doesn't explicitly address corruption, it's assumed that by bringing government closer to the people and empowering citizens, decentralisation enhances accountability and reduces corruption (McGuire, 2010). Some argue that decentralising corruption could have redistributive effects, but this isn't typically used to justify decentralisation. Instead, proponents claim it will reduce corruption overall. This claim partly arises from conflating decentralisation with public participation, two distinct concepts often used interchangeably in development debates. For instance, the World Bank (2024) has suggested that decentralisation can achieve development goals by responding to local community needs and assigning control to those with relevant information and incentives. While development professionals generally agree that beneficiary participation improves outcomes, this doesn't necessarily endorse decentralisation. Confusing these terms diminishes their individual potential.

Recent theoretical research has shifted focus from inter-jurisdictional externalities and preference heterogeneity to examining whether decentralisation can effectively discipline government officials (Inman and Rubinfeld, 1997). Some argue that local democracy allows citizens to control corruption using their knowledge of officials' behaviour (Seabright, 1996). Critics counter that local levels may have fewer safeguards against corruption due to underdeveloped media and audit systems, potentially leading to clientelistic networks and elite capture (Prud'homme, 1995;

Manzetti & Wilson, 2007) and elite capture (Platteau, 2004). Ultimately, theory suggests that decentralisation's impact may be context-specific, making empirical assessment crucial.

Cross-country studies on decentralisation's effect on corruption have yielded mixed results. World Bank-sponsored research often finds that decentralisation reduces corruption (e.g., Huther & Shah, 1998), but these studies have been criticised for methodological issues such as confusing correlation with causality and inadequately addressing endogeneity. Other studies have found contrasting results, with some indicating that federal structures are associated with higher perceived corruption (Goldsmith, 1998; Treisman, 2000; Kunicová & Rose-Ackerman, 2005). The discrepancies in findings often stem from differences in control variables, data sources, and methodological approaches (Fisman & Gatti, 2002). Overall, cross-country empirical studies have failed to provide clear guidance on decentralisation's effect on corruption, with some researchers suggesting that the relationship is not robust. Arian (2004) analyses decentralisation measures on Transparency International's Corruption Perception Index in a cross-country dataset and finds levels of corruption to be lower in decentralised countries. However, as pointed out by Lessman & Markwardt (2010), her study too fails to adequately tackle the problem of endogeneity.

Yet another factor is the problematic use of the term "sub-national government" in contexts where provinces or states may have populations larger than many countries. Additionally, these studies often fail to distinguish between decentralisation from national to sub-national governments and decentralisation between different levels of sub-national government. This lack of nuance can lead to flawed policy advice, as the effects of decentralisation may differ depending on the levels involved. For example, decentralisation from national to sub-national governments might promote democracy, while decentralisation to local governments could potentially weaken regional governments and consolidate central power, as seen in some autocratic regimes.

Given the limitations of cross-country studies, more localised and disaggregated empirical evidence may prove more useful. While numerous within-country studies examine decentralisation's effects on various economic and social factors, few directly address its relationship with corruption in public services. One exception is Asthana's (2008) study in central India, which found higher corruption levels in water supply agencies run by local governments compared to those run by regional governments. However, this study provides only a snapshot and doesn't necessarily imply that decentralisation is inherently flawed. Some researchers suggest that corruption may initially increase with decentralisation but decrease over time as local governments learn and adapt.

Measuring corruption typically involves assessing transactions, either directly or indirectly. While observational approaches would be ideal, they are rare due to the risks and logistical challenges involved. Most empirical studies rely on reports of perceived or experienced corruption. Perception-based research is common and convenient, with indices from organisations like Transparency International, the World Bank, and ICRG widely used. However, reliance on perceptions can lead to flawed results, especially in dynamic situations where increased transparency might initially appear to increase corruption. Recent studies suggest that experiential data may be more reliable than perception data. As Daniel Treisman (2007) notes, the next wave of corruption research will need to focus on refining and gathering more experience-based measures to examine the patterns they reveal.

The Setting

The research area encompasses the rural and semi-urban regions of two sizeable Indian states, Madhya Pradesh and Chhattisgarh, which span the entirety of central India. These states collectively cover 440,000 km² and house a population of 81 million. Excluding some minor outlying states of India and metropolitan cities with high human development levels, the demographic and socio-economic profile of the study area mirrors that of the rest of South Asia. According to India's constitution, water-related matters fall under state government jurisdiction. Water is a crucial input for various sectors such as health, agriculture, industry, inland transport and tourism, which are also state government responsibilities. In theory, the federal government's role is confined to coordinating inter-state water sharing and engaging with international agencies. In practice, the federal government's involvement is more extensive as it provides substantial funding to state governments for irrigation and drinking water schemes, both directly and through federal welfare programmes like the employment guarantee scheme. The financing pattern for the drinking water sector has remained relatively stable over the past two decades. For new and expansion projects, sub-national governments contribute 60% of the finances, the federal government provides 35%, and 5% comes from international aid agencies. For operations and management (O&M), sub-national governments provide 100% of the funds. India's water supply programme is not aid-dependent, as the financial contribution from international agencies constitutes a small proportion of total sector expenditure. Consequently, policy-making is autonomous. Federal and state government officials find the aid component useful for demonstration projects, training, and overseas visits. International agencies are also viewed as a source of intellectual capital. Many prefer to continue projects in lower middle-

income countries like India where they can show results to their donors rather than in some poor African countries where it is difficult to get results in the short run.

Although India's federal system has existed for six decades, a 1993 constitutional amendment formalised the political structure of local governments. State governments are encouraged to devolve more functions to local governments. Much of the federal funds transferred to state governments in the drinking water sector are contingent upon decentralisation to local bodies. In numerous programmes, such as employment guarantee schemes, the state government retains authority functions while the provider function is delegated to the local government. In some instances, like the construction of piped water supply schemes, the local government may secure a loan from a public institution and, lacking technical capacity, have the project executed by a state government agency as a 'deposit work'. O&M functions of government infrastructure remain with the respective government, meaning authority functions and provider functions remain consolidated. All state governments are committed to transferring the O&M of drinking water schemes to local bodies. This decision has not been fully implemented, primarily because local bodies are reluctant to accept responsibility for utilities unlikely to generate profits. In India, privatisation of water supplies is limited to some small industrial areas. Due to a lack of political consensus and appetite for social conflict, privatisation is not an option even for larger cities. Private sector participation is restricted to management contracts for some water purification plants. Privatisation of water supplies in small towns or villages is not currently under consideration.

Non-governmental organisations (NGOs) support decentralisation but hold state governments accountable in crisis situations, even when the water utility is under local government control. Since the adoption of a General Comment on the Right to Water by a UN Committee in November 2002, federal and state human rights commissions have become active in the drinking water sector. These commissions hold the relevant state government responsible for human rights violations when a water utility, decentralised or not, fails to deliver. At one point, a state human rights commission even recommended that drinking water supplies should remain under State Government control.

Methodology and data

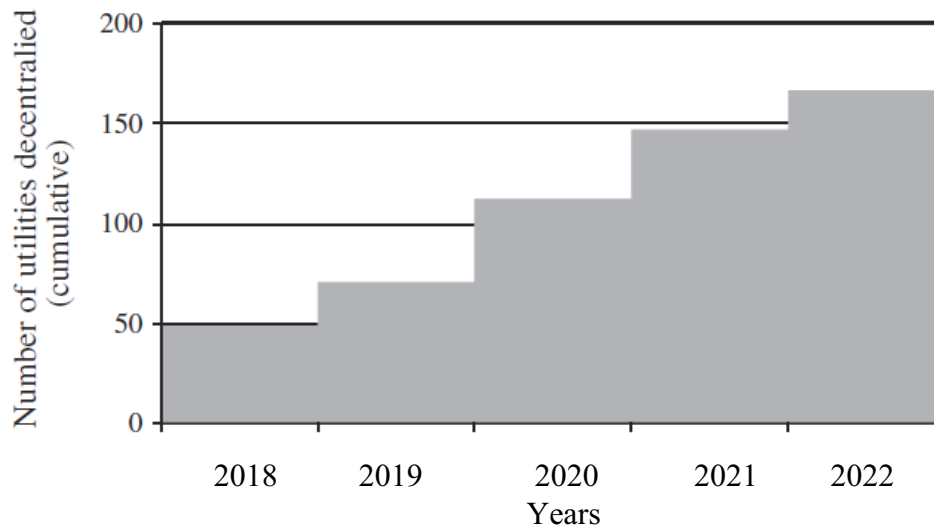
To explore the impact of decentralisation from state to local government on corruption, we employ experience-based measures and analyse a 'natural experiment' using the difference-in-differences (DD or DiD) method. This approach traces its roots to John Snow's (1855) work in water supply and public health. During that era, cholera was believed to be caused by foul air, with methods

such as exhuming and removing horse carcasses being attempted to control the disease. To demonstrate that contaminated water, rather than air, caused cholera, Snow compared changes in cholera mortality rates across districts served by two water utilities that, in 1849, sourced their water from the River Thames in central London. Three years on, one utility relocated its waterworks upstream to an area with less sewage contamination. Cholera mortality decreased in both cases, but more significantly in the districts supplied by the company that moved upstream. Natural experiments and the DD method remained largely overlooked in social sciences literature until the 1990s, after which they gained prominence in mainstream social science research. By this time, the methodology had been largely standardised, though finer points continue to be debated. Over the past decade, public policy and public administration researchers have published numerous studies using this approach. In 2009, an entire issue of *Political Analysis* was dedicated to natural experiments. While the simplicity of DD methods negates the need for advanced computational power, it also renders the methodology and results comprehensible to readers with only basic statistical knowledge.

About 85 per cent of the population of large villages and small towns is covered by piped water supply schemes, with either household connections or public stand posts within easy reach. The uncovered population, usually on the periphery of the habitations, gets water from hand pumps or from unsafe sources. Water vending, an activity popular in African countries like Kenya is not prevalent in the area of study. Often people with household connections and those living near public stand posts supplement their water requirements from other sources as piped water supply is available for only few hours a day. The data are obtained from a longitudinal survey for research on good governance and human rights which also covers issues other than corruption and decentralisation, which commenced in 2018. Each year the sampling frame was the latest census list of small towns and villages of population above 2000. For the stratified two stage random sampling, the first stage units are the water supply schemes in small towns and large villages and the second stage units are the households. The villages which did not have a functioning piped water supply scheme were left out. From the pruned list, 200 small towns and villages were selected. The results of the first survey in June 2018 were reported in cross sectional study. At the time 49 utilities were centralised, i.e., controlled by the state government and 151 were decentralised, i.e., under the control of the local governments. In the succeeding years, more utilities were transferred to the local governments. Yearwise details are given in Figure 1. This short period of time avoids the utilities becoming less comparable over time.

Figure 1

Timing of Decentralisation



The investigators listed the houses in the same order as that of the latest census. Where such listings were not available, listings were started from the northwestern corner of the habitation. From this list, households without water connection were deleted. Thereafter, from each scheme, 30 households were selected. First, we focused our attention on the consumers: have they paid a bribe during the last one year in a matter relating to the water bill, be it for showing lower consumption or for avoiding being charged for higher than actual consumption. Next we considered two smaller samples—those consumers who needed repairs during the last 1-year and those that needed new connections.

All the contractors concerned with these schemes were interviewed. They were asked whether they have paid a bribe to any official or politician during the last one year for any purpose relating to the utility. Interviews were also conducted with ‘key informants’ viz. NGO staff, union representatives and elected officials. Data collection was achieved through semi-structured interviews based on pretested flexible questionnaire. While a questionnaire and an interview not specifically related to corruption could lose focus, the advantage was that since the questions relating to corruption came at the end, the investigator had a better chance of developing a rapport with the interviewee.

The required assumption for the estimations to be valid is that the changes in the outcome variables (i.e., corruption) would not have differed systematically between the decentralised utilities and the control districts if decentralisation had not occurred. While this assumption is essentially untestable, it is likely to hold if there are no initial systematic differences in trends. The impact of

decentralisation is thus identified using cross-utility differences in the status (centralised or decentralised) over time. It is important to see whether the timing of decentralisation had anything to do with the trends in corruption. We interviewed state government officials, who insisted that the timing of implementation of decentralisation had nothing to do with the changes in the level of corruption in the past or the expectation thereof in the future. The fact that the utilities were not randomly selected for decentralisation does not invalidate the identification strategy as the strategy relies on the changes over time being similar across timing of decentralisation and the decentralisation of various utilities was not related to the lagged values or expected future values of outcome variables of interest. The three checks described above validate the strategy.

Results

Table 1 reports the preliminary results of the study. The most common form of bribery is manipulating bills. Some consumers bribe the utility officials to get a lower bill; others pay a bribe (or an illegal gratuity) to avoid getting an inflated bill. Often the purpose of the payment was to secure both objectives and hence a combined figure is reported in Table 1.

Table 1

Types of corruption

S. no.	Type of corruption	Decentralised	Centralised	Difference
1	Manipulating bills	0.513	0.409	-0.104***
2	Average payment per transaction	US\$ 0.44	US\$ 0.45	-0.01
3	Expediting repairs	0.397	0.304	-0.093**
4	Average payment per transaction	US\$ 1.90	US\$ 1.92	-0.02
5	Expediting new connections	0.156	0.092	-0.064**
6	Average payment per transaction	US\$ 23.00	US\$ 23.41	-0.41
7	Kickbacks from contractors	0.753	0.724	-0.029*

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

Overall, as many as 51.3% respondents had paid bribes in the case of decentralised agencies and 40.9% in the case of centralised agencies. The difference is statistically significant. However, the difference between the amounts paid in case of the decentralised agencies and the centralised agencies is statistically insignificant. The next sample was smaller, as we considered only those consumers who needed repairs during the last one year. Of these, 39.7% of the respondents had paid

bribes in the case of decentralised agencies and 30.4% in the case of centralised agencies. This is a statistically significant difference in the proportion of transactions which involved speed money. The difference in the amounts involved in the transaction is statistically insignificant. The third sample was still smaller, though large enough for meaningful testing—households that needed new connections. Only a small number paid bribes. Even so, as reported in Table 1, the percentage of bribe payers in case of decentralised was significantly higher than those in case of centralised agencies. The fourth sample related to contractors. As reported in Table 1, the percentage of contractors paying bribes to officials of decentralised utilities is significantly higher than that of contractors paying bribes to centralised utilities. The results of linear multivariate regression are given in Table 2. We find that the coefficient for decentralisation is positive and significant in all types of bribery.

Table 2

Determinants of corruption

Variables	Meter reading	Repairs	New connections	Contracts
Decentralisation	0.10***	0.09**	0.05**	0.03**
Size (utility)	0.00	0.00	0.00	0.001*
Age (utility)	-0.01	-0.02	-0.03*	0.02*
Size (contractor)				0.08*
Education (consumer)	-0.02*	-0.02*	-0.03*	
Income (consumer)	0.03	0.03*	0.04**	
Sample size	18,300	4,941	1,809	1,538

*** Significance at the 1% level.

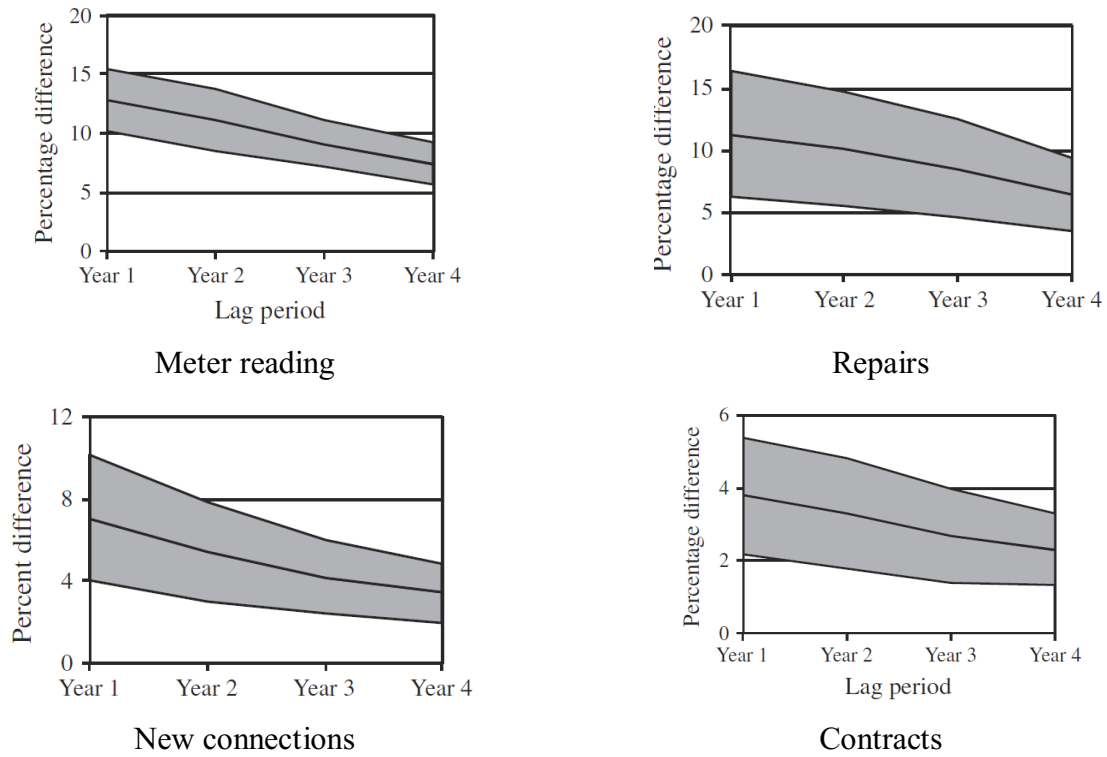
** Significance at the 5% level.

* Significance at the 10% level.

Figures 2 shows plots of the coefficients of decentralisation over time relating to corruption in (a) meter reading, (b) repairs, (c) new connections and (d) contracts. For the sake of clarity, we have scaled the coefficient. For example a coefficient of 0.01 has been converted to show that in case of decentralised utility, corruption is 10 percentage points higher than that in a centralised utility. The gray area in these plots shows these differences with a 95% confidence interval.

Figure 2

Variation in corruption over time



We observe that the grey area in these figures does not touch horizontal axis which is set at 0. The net result is that after decentralisation, the corruption level rises but declines subsequently. In the medium term, the difference remains significant.

Conclusion

The decentralisation drum has been rolling on for a long time, gaining momentum in various parts of the world. Developing country governments have been under increasing pressure from donor agencies as well as their own metropolitan elite to decentralise the provision of public services to local governments. This push for decentralisation has been particularly strong in regions with a history of centralized governance. Among international agencies, a broad consensus has emerged that decentralisation is not only desirable but essential for the sustenance of democracy and for significant improvement in efficiency of public service delivery. Often these agencies do not hesitate to demand decentralisation to local governments as a key conditionality in their development projects and aid programs. However, the widely held assumption that decentralisation will automatically reduce corruption is without solid foundation and merits closer scrutiny. Contrary to popular belief, our research finds that decentralisation actually increases corruption significantly in the short term. At the same time, we observe an interesting trend: with the passage of time, this initial

increase in corruption is reduced substantially, although the overall increase persists in the medium term. This pattern points towards the existence of a learning curve in decentralised entities, suggesting that local governments gradually develop better governance practices and accountability mechanisms. This observation is a cause for cautious optimism, indicating that while the path to effective decentralisation may be challenging, there is potential for long-term improvements in governance of public enterprises.

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Enhancing Social Intelligence in Public Enterprise Executives through Yoga: The Mediating Role of Mindfulness

Brian C. Smith
Durham University, UK
b.c.smith@durham.ac.uk

Abstract

This study investigates the potential of yoga to enhance social intelligence in public enterprise executives, with mindfulness as a mediating factor. Utilising a randomised controlled experiment design, 247 executives undertaking professional development programmes were allocated to intervention and control groups. The intervention comprised a 10-week yoga regimen including asanas, pranayama, and meditation. Social intelligence was measured using the Tromsø Social Intelligence Scale, whilst mindfulness was assessed via the Mindful Attention Awareness Scale. Results indicate that yoga practice positively influences social intelligence both directly and indirectly through increased mindfulness. The partial mediation observed suggests that whilst mindfulness is a crucial mechanism, it is not the sole pathway through which yoga enhances social intelligence. These findings contribute to the nascent field of contemplative practices in professional development by empirically demonstrating yoga's efficacy in cultivating social intelligence. The study underscores the potential of integrating ancient contemplative practices into contemporary public sector management, offering a novel approach to developing crucial competencies for navigating complex stakeholder relationships and societal challenges.

KEYWORDS: Social intelligence, Yoga, Mindfulness, mediation analysis

Introduction

In recent years, the landscape of public sector management has undergone significant transformations, with an increasing emphasis on social intelligence as a crucial competency for executive leadership. This shift reflects a growing recognition of the complex, interconnected nature of societal challenges and the need for public enterprise executives to navigate diverse stakeholder relationships with finesse and empathy. Concurrently, the ancient practice of yoga has experienced a renaissance in contemporary society, transcending its traditional spiritual roots to emerge as a

holistic approach to physical and mental well-being. This confluence of evolving managerial paradigms and resurgent interest in yogic practices presents a compelling avenue for exploration: the potential of yoga to enhance the social intelligence of public enterprise executives.

Social intelligence, broadly defined as the ability to effectively interact, understand, and manage social relationships, has become increasingly vital in the public sector. Public enterprise executives are tasked with balancing myriad stakeholder interests, fostering collaborative partnerships, and steering organisations through turbulent socio-political waters. These demands require a sophisticated grasp of human dynamics, emotional nuance, and interpersonal communication. The cultivation of social intelligence is thus not merely a desirable trait but a fundamental necessity for effective leadership in the public sphere. However, traditional approaches to developing social intelligence, such as leadership workshops and interpersonal skills training, often fall short in addressing the deep-seated cognitive and emotional patterns that underpin social behaviour.

Yoga, with its millennia-old tradition of integrating physical postures, breath control, and meditative practices, offers a unique and potentially transformative approach to cultivating social intelligence. The practice of yoga is predicated on the holistic development of body, mind, and spirit, fostering self-awareness, emotional regulation, and empathic understanding. These core tenets of yoga align remarkably well with the constituent elements of social intelligence, suggesting a promising synergy between yogic practice and the development of socially adept leadership. Moreover, the emphasis in yoga on mindfulness and present-moment awareness may provide public enterprise executives with valuable tools for navigating the complex, often stressful terrain of public sector management.

The potential of yoga to enhance social intelligence in public enterprise executives is rooted in its capacity to foster neuroplasticity and emotional resilience. Neuroscientific research has begun to elucidate the profound impact of yogic practices on brain structure and function, particularly in regions associated with empathy, emotional regulation, and social cognition. Regular yoga practice has been shown to increase grey matter density in the anterior cingulate cortex, a region crucial for self-regulation and conflict monitoring in social interactions. Additionally, yoga's emphasis on interoceptive awareness—the ability to perceive internal bodily states—may enhance emotional intelligence and empathic accuracy, key components of social intelligence.

Furthermore, the public sector's unique challenges, including bureaucratic constraints, political pressures, and the imperative to serve diverse public interests, underscore the need for

innovative approaches to leadership development. Traditional management paradigms, often borrowed from the private sector, may prove insufficient in addressing the nuanced demands of public enterprise leadership. Yoga, with its emphasis on holistic well-being and interconnectedness, offers a framework that aligns more closely with the ethos of public service and the complexities of stakeholder management in the public sphere. By cultivating a deeper sense of self-awareness and interconnectedness, yoga may enable public enterprise executives to navigate ethical dilemmas, foster inclusive decision-making processes, and build more robust, empathetic relationships with both internal and external stakeholders.

The integration of yoga into leadership development programmes for public enterprise executives represents a novel approach at the intersection of ancient wisdom and contemporary management theory. This integration poses both opportunities and challenges. On one hand, the potential benefits of enhanced social intelligence through yogic practices are manifold, ranging from improved stakeholder relations to more effective policy implementation and increased public trust. On the other hand, the incorporation of yoga into professional development contexts may face scepticism, cultural barriers, and logistical hurdles. Addressing these challenges requires a nuanced, evidence-based approach that bridges the gap between yogic philosophy and public administration practice.

This study aims to explore the potential of yoga as a tool for enhancing the social intelligence of public enterprise executives, examining both theoretical foundations and practical implications. By investigating the mechanisms through which yogic practices may influence social cognitive processes, emotional regulation, and interpersonal dynamics, this research seeks to contribute to the evolving discourse on leadership development in the public sector. Moreover, by situating this exploration within the broader context of public sector reform and the quest for more responsive, empathetic governance, this study aspires to open new avenues for integrating holistic well-being practices into the fabric of public administration.

As societies grapple with increasingly complex, interconnected challenges, the need for socially intelligent leadership in the public sector has never been more pressing. The exploration of yoga as a means to cultivate this crucial competency not only offers a novel approach to leadership development but also invites a reimagining of the relationship between personal well-being and professional efficacy in public service. This research thus stands at the confluence of ancient wisdom and modern governance, seeking to unravel the potential of yogic practices to foster a more empathetic, responsive, and socially adept cadre of public enterprise executives.

Social Intelligence

The idea that leaders need something more than technical skills is not new. More than a century ago, Columbia University professor Edward Thorndike had pointed out that “the best mechanic in a factory may fail as a foreman for lack of social intelligence” (p. 229). This section of the paper attempts to outline what social intelligence is. The following sections analyse whether and how yoga can enhance social intelligence of MBA students.

The term social intelligence was first used by educational psychologists John Dewey (1909) and Herbert Lull (1911) but the modern concept has its origins in Thorndike’s (1920) formulation: “By social intelligence is meant the ability to understand and manage men and women, boys and girls – to act wisely in human relations” (p. 228). Similarly, Fred Moss and Thelma Hunt (1927) defined social intelligence as the “ability to get along with others” (p. 108). Few years later, another educational psychologist Philip Vernon (1933) provided the most wide-ranging definition of social intelligence as the “ability to get along with people in general, social technique or ease in society, knowledge of social matters, susceptibility to stimuli from other members of a group, as well as insight into the temporary moods or underlying personality traits of strangers” (p. 44). American Psychological Association defines social intelligence as the ability to understand people and effectively relate to them (VandenBos 2015).

The century old concept of social intelligence has had a sporadic development but promises to be a late bloomer. It had been casually dismissed as just general intelligence applied to social situations. Since there was a high correlation between intelligence and social intelligence, there seemed to be no need to pay attention to the latter. The search for social intelligence in pre 1983 literature with its record of disappointing empirical results and substantial theoretical criticism is aptly summarised in the title of Frank Landy’s (2006) paper: “The long, frustrating and fruitless search for social intelligence: A cautionary tale”.

Daniel Goleman (2006) draws on the emerging field of neuroscience research to propose that social intelligence is made up of “social awareness, what we sense about others – and social facility, what then we do with that awareness” (p. 84). It is both sensing what the other person is feeling and based on that having smooth effective interaction. Studies in neuroscience reveal that our social relationships have a direct effect on our physical and mental health (Goleman and Boyatzis 2008).

Operationalisation of SQ had been problematic for researchers for decades. Even Thorndike (1920) had pessimistically noted that social intelligence “eludes the formal standardized conditions of the testing laboratory. It requires human beings to respond to, time to adapt its responses, and

face, voice, gesture, and mien as tools” (p. 231). Such logic, however, has never stopped psychometricians into venturing into the unknown and it could not stop them in this case. True to the goals of their tradition, soon enough psychometricians were translating the abstract definitions of social intelligence into standardised laboratory instruments for measuring individual differences in social intelligence (Taylor 1990). The first attempts were made in 1920’s in George Washington University under the leadership of Thelma Hunt. However, the George Washington Social Intelligence Test (GWSIT) was “so heavily loaded with ability to work with words and ideas, that differences in social intelligence tend to be swamped by differences in abstract intelligence” (Thorndike & Stein 1937, p. 282). Recent advances in factor analysis techniques and growing interest in cognitive neuroscience has given a new life to the notion that SQ is not a mere component of IQ and can be measured in a credible manner.

Introducing Yoga

Yoga is arguably the longest standing curriculum aimed at embodied learning. Over the past four centuries, the Sanskrit text of the ancient Indian book Gita has been translated into a number of languages and is still a favourite with commentators from various philosophical traditions (Lloyd 2015). Recently, western management experts have also been interested in yoga as it is described in the Gita (Turci 2021). Sometime between third century BC and third century AD, sage Patanjali compiled the ‘Yoga Sutras’, the original textbook of classical yoga (Stiles 2021). This is a secular text that has become preeminent in teaching yoga. Other texts and translations that have followed refer to these sutras as being the heart of yogic thought. The eight limbs of yoga in Yoga Sutra are:

1. Yama (Selfless values): Non-harming, truthfulness, non-stealing, self-restraint and greedlessness.
2. Niyama (Self-discipline): Cleanliness, contentment, austerity, self-study and acceptance.
3. Asana (Postures) Body positions that open energy channels and develop physical stability for meditation and other advanced practices.
4. Pranayama (Breathing practices) Cardiovascular control to enhance the flow of vital energy through retraining the respiratory organs.
5. Pratyahara (Withdrawal of senses) Withdrawal of sensory inputs, coming from the five senses into the physical being.
6. Dharna (Concentration): Creation of one-pointedness of the mind.
7. Dhyana (Meditation): Uninterrupted flow of concentration.

8. Samadhi (Merger of individual consciousness with universal consciousness): Highly esoteric practice that cannot be taught. Not practiced in the West.

Modern yoga came into being by bridging the realms of Indian spirituality and European physical culture. It has been moulded in conformity with contemporary aspirations and inclinations that are the common heritage of a cosmopolitan culture. Of the eight limbs of yoga, three - physical postures, breathing practices and meditation - are popular in the West. It is generally accepted that the primary goal of yoga is to maintain physical fitness and to cultivate balance, calm, harmony and awareness.

There is a wide range of research in field and that it is hard to compare and evaluate this research due to the different approaches and styles included as 'yoga' and also the different methodologies researchers use. The yoga of Patanjali is now considered 'classical' (Singleton 2008). Yoga in the West puts more emphasis in the postural practice. It is presented without its religio-philosophical teachings and is therefore compatible with secularisation (De Michelis 2004). Hatha yoga that was used in the programme is the most common form of yoga as practiced in the West and comprises of three of the eight limbs outlined by Patanjali, viz., asanas (physical poses), pranayama (breath control) and dhyana (meditation). The followers of yoga guru Tirumalai Krishnamacharya (1888-1989) from Mysore, India popularised yoga in the West (Alter 2004), the most famous being Pattabhi Jois (Ashtanga yoga), B. K. S. Iyenger (Iyenger yoga) and T. K. V. Desikachar (Viniyoga). Other examples of Krishnamacharya-inspired yoga school are Flow yoga, Process yoga, Power yoga, Yin yoga and Dynamic yoga. They synthesise yoga practices that have originated from the teachings of Krishnamacharya, Jois, Iyenger and Desikachar (Nevrin 2008). Scholars believe that that health, peace and joy are not the primary goals of yoga practice; the ultimate objective of yoga is to release the latent powers within the human body and mind, which leads to care for the welfare of others.

In the recent decades, interest in yoga research has skyrocketed in the West. Numerous empirical studies have demonstrated the therapeutic effects of yoga practices on a wide range of physical and mental health indices (McCall 2007). Yogic science is not just a set of physical exercises or religious rituals but a set of theories about the mind that have bio-psycho-social implications in relation to health and illness (Pradhan 2014). Yoga is also credited with promoting ethical behaviour (Asthana 2022). The growing interest in yoga and its possible applications in health, psychology, and other fields is noteworthy. Yet, the research on effect of yoga on intelligence is not even a trickle as compared to the flood of studies on therapeutic effects of yoga. This study aims to partially close this gap. . The discussion and literature cited above leads us to the formulation of the following hypotheses:

H1 Yoga will be positively related to SQ.

Mediation by mindfulness

Mindfulness describes a present-oriented state of conscious awareness, in which the individual is aware of multiple perspectives. The concept of mindfulness was brought to the West by venerable Buddhist scholar Thích Nhất Hạnh in the 1960's. The person credited most in popularising mindfulness in the west is Jon Kabat-Zinn who had been a student of Nobel laureate microbiologist Salvador Edward Luria as also of Thích Nhất Hạnh. He introduced Mindfulness Based Stress Reduction Programme (MBSR) in 1979 at University of Massachusetts Medical Centre. as a flexible vehicle for the seamless integration of eastern meditative practices and perspectives within a western paradigm of behavioural intervention. Mindfulness-Based Cognitive Therapy (MBCT) is a direct extension of traditional Cognitive Behaviour Therapy. It was initially developed to prevent relapse among patients who had recovered from depression. Interest in incorporating mindfulness is on the rise and it is being used in treatment of various psychiatric disorders including generalized anxiety disorder, panic disorder, social anxiety disorder (Baer 2003). As pointed out by Grossman & Van Dam (2011), “mindfulness within Western psychology is generally assumed to reflect the Buddhist construct. However, definitions of the term vary greatly from that of a simple therapeutic or experiential technique to a multi-faceted activity, which requires practice and refinement” (p. 220).

During the last three decades, several measures have come up many of them prone to different interpretations due to representational problems. Commonly used scales (in order of vintage) are: Freiburg Mindfulness Inventory (2001; with 30 items), Mindful Attention Awareness Scale (2003; with 15 items), Kentucky Inventory of Mindfulness Skills (2004; with 39 items) Cognitive Affective Mindfulness Scale (2004; with 12 items) and Five-facet Mindfulness Questionnaire (2005; with 16 items).

Yoga lays more emphasis on mind-body awareness than it does on exact physical posture alignment (De Michelis 2007). Pranayama focusses on awareness of breath (Iyenger 1981) and meditation is a scaffolding to mindfulness (Kabat-Zinn 2005). Accordingly, yoga practice is expected to enhance awareness of the present moment. Danielle Shelov and colleagues (2009) discovered that yoga intervention was a practical way to raise levels of mindfulness in their study of 46 staff and students from two institutions in the Bronx, New York. Similar outcomes were recently discovered in a study of 47 nursing students in Turkey (Erkin & Senuzun Aykar 2021). Janika Epe and colleagues (2021) discovered in a study of 26 students and employees at a German institution

that various yoga practices improve mindfulness. The discussion and literature cited above leads us to the formulation of the following hypothesis:

H2 Yoga will be positively related to Mindfulness.

H3 Mindfulness will mediate the relation between yoga and SQ.

Materials and Methods

Study Design: Since our purpose is to evaluate the hypotheses deductively, we chose a quantitative instead of a qualitative technique. The Randomised Controlled Experiment covered public sector executives undertaking Executive development programmes. This was not a clinical trial as no specific pathologies were being treated. No measurements were made by clinical instruments. All participants had prior management experience and were well-educated. Average age was 35 years 10 months. Prior to joining MBA programme average work experience in managerial capacity as in the participants' bio-data was 5 years and 2 months.

Sample: The personal information of the participants was encrypted using a secure key code. Individuals could request a personal report with their results after the tests were completed. Neither the faculty nor the administrators were given access to questionnaires or study data. Following baseline measures, the participants were randomly assigned to either the next batch (intervention group) or the waiting list (control group) using a computer-generated randomisation sequence, and they were notified via automated emails.

Intervention: Yoga classes were scheduled every day for 90 minutes, seven days a week for ten weeks. The schedule comprised 5 minutes of warm-up, 45 minutes of asanas (physical poses), 20 minutes of pranayama (breathing exercises), and 20 minutes of meditation. Those who could not spare that much time on a particular day, were advised to do a shorter version at home and report at the end of the week. The unit of measurement was hours per week.

Measures: Tromsø Social Intelligence Scale (TSIS) designed by Silvera et al. (2001) is used in this study to measure social intelligence. TSIS is a twenty-one-item self-report instrument of the scale with social information processing (e.g., "I can predict other people's behaviour"), social skills (e.g., "I often feel uncertain around new people who I don't know") and social awareness ("I often feel that it is difficult to understand others' choices.") as sub-dimensions. The scale has good psychometric properties (Grieve & Mahar 2013). Recently, this scale been used in several research studies similar to this study (e.g., Swain et al. 2022). The items in the scale are accompanied by a Likert-type rating scale (1-7). In our study Cronbach alpha was 0.86. MAAS (Mindful Attention Awareness Scale) designed by Brown and Ryan (2003) has been used to measure mindfulness. While

MAAS has many detractors, it continues to be used more widely than any other scale for mindfulness. It was decided to use MAAS as a unidimensional scale – rather than using a multidimensional scale such as the Five Factor Mindfulness Questionnaire – because our theorising does not differentiate among different mindfulness dimensions. The Cronbach’s alpha was 0.91.

Data analysis: To determine causation, four sets of data were compared – data from control group before and after intervention and of control group before and after the experiment. The data related to mindfulness and social intelligence. Since the intervention group and the control group were selected on random basis, as expected there was no difference between the two groups. Significant change in the variables of interest in the two groups after the intervention. Correlations between variables were examined to get preliminary indications of relationship among variables. Once it was seen that the correlations are in the expected directions, it was examined whether mediation exists and if so whether it is positive or negative, partial or complete. For mediation analysis, PROCESS macro for regression (Hayes 2022) was used.

Results and Discussion

The effectiveness of the yoga intervention is shown in Table 1 in a difference-in-differences manner. Over time change in mindfulness and social intelligence of the control group was insignificant. The intervention resulted in substantial increase in mindfulness and social intelligence.

Table 1

Scores at baseline and follow-up for intervention and control group

Variables	Intervention group (n=125)		Control group (n=122)		Difference in difference
	initial	final	initial	final	
Mindfulness	3.89 (0.71)	4.12 (1.05)	3.88 (0.69)	3.89 (0.70)	0.22***
Social intelligence	4.48 (0.67)	4.75 (0.75)	4.49 (0.68)	4.55 (0.68)	0.21***

*** $p < 0.001$

Table 2 shows the means, standard deviations and correlations of yoga, mindfulness and social intelligence. All correlations are positive and significant with p value near zero, as predicted. Yoga, in particular, is linked to mindfulness and the latter is also positively linked to social intelligence.

Table 2*Means, standard deviations, correlations, and reliabilities*

Variable	M	SD	1	2
1 Yoga	4.98	0.78		
2 Mindfulness	4.12	1.05	0.15*	
3 SQ	4.75	0.75	0.29**	0.35***

N = 125 *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The next step was to see if mindfulness increased through yoga plays a mediating role or is it merely a side benefit. Table 3 shows the regression findings of the mediation model. Our findings demonstrate partial mediation, which means significance of the mediation as also the direct effects.

Table3.*Regression results for mediation model*

	Mindfulness			Social intelligence		
	<i>b</i>	SE	<i>t</i>	<i>b</i>	SE	<i>t</i>
Constant	2.16	0.31	3.97***	2.31	0.70	3.30***
Yoga	0.19	0.06	3.06***	0.25	0.12	2.08**
Mindfulness				0.71	0.26	2.73***
Indirect effect				0.33	0.11	3.00***
Total effect				0.58	0.29	2.00**
R ²	0.41			0.53		

Note. Unstandardised coefficients are reported. *** $p < 0.001$; ** $p < 0.01$

Table 2 shows that yoga is positively related social intelligence. This validates hypothesis 1. There is very thin previous research on impact of yoga on intelligences. There is none on yoga's impact on social intelligence. Based on the results, it could be suggested that yoga positively relates to mindfulness (Hypothesis 2). Previous research has found such results in case of staff and students from two institutions in the Bronx, New York (Shelov et al. 2009) nursing students in Turkey (Erkin & Senuzun Aykar 2021) and students and employees at a German institution (Epe et al. 2021). Our results validate this hypothesis. According to hypothesis 5, mindfulness will mediate the relation between yoga and SQ. While a lot of research is available on the effectiveness of MBSR, MBCT

etc., relationship between mindfulness on SQ has been neglected. Results in Table 3 suggest validation of hypothesis 3.

Yoga increases mindfulness while enhanced mindfulness increases social intelligence. Thus, yoga increases social intelligence directly as also through mindfulness. In case of social intelligence, 43 per cent of increase comes from yoga directly and 57 percent through enhanced mindfulness.

As per practice of western scholars, we have subtracted spirituality from yoga and mindfulness and taken a material approach. However, some educationists consider such an approach a Eurocentric bias. Since we are now in a post-secular age, in order to get the full educational benefits of Eastern contemplative practices, these practices could be linked to their spiritual roots (Morgan 2015). Indifference to religious traditions that go beyond narrow practical ideas negate the benefits and a denaturalised practice detached from its soteriological setting is not useful. Future studies could address these issues.

While the results of the research are robust, with due humility it has to be admitted that sophisticated statistical analysis techniques used may not result in a complete knowledge of yoga-based practices. Yoga is not a sensory toy for business students that can be made perfect through theoretical and empirical studies. There could be modes of mind the working of which may only be accessible through far more advanced research capacities yet to be developed.

Conclusion

This study provides compelling evidence for the efficacy of yoga in enhancing social intelligence among public enterprise executives, with mindfulness serving as a significant mediating factor. Our findings underscore the potential of integrating ancient contemplative practices into contemporary leadership development programmes, particularly within the public sector.

The results demonstrate that yoga practice positively influences social intelligence both directly and indirectly through increased mindfulness. This dual pathway suggests that yoga's impact on leadership competencies is multifaceted, encompassing both immediate cognitive-behavioural changes and more profound shifts in awareness and perception. The partial mediation observed indicates that while mindfulness is a crucial mechanism through which yoga enhances social intelligence, it is not the sole pathway. This finding opens avenues for future research to explore additional mediating factors.

The implications of these findings for public sector management are substantial. As public enterprise executives face increasingly complex stakeholder relationships and societal challenges, the cultivation of social intelligence through yoga-based interventions could significantly enhance

their leadership efficacy. Moreover, the mindfulness cultivated through yoga practice may contribute to more ethical, empathetic, and responsive public service leadership.

However, it is imperative to acknowledge the limitations of this study. While our randomised controlled experiment design provides robust evidence, the relatively short intervention period may not fully capture the long-term effects of sustained yoga practice. Additionally, the study's focus on a specific cohort of public enterprise executives may limit the generalisability of findings to other leadership contexts or cultural settings.

Future research should endeavour to address these limitations by conducting longitudinal studies to assess the enduring impact of yoga on social intelligence and leadership outcomes. Cross-cultural comparisons would also be valuable in understanding how the relationship between yoga, mindfulness, and social intelligence may vary across different societal contexts. Furthermore, qualitative investigations could provide richer insights into the lived experiences of leaders engaging in yoga practice and how it shapes their interpersonal dynamics and decision-making processes.

In conclusion, this study contributes to the nascent field of contemplative leadership development by empirically demonstrating the potential of yoga to enhance social intelligence in public enterprise executives. As public sector organisations grapple with the complexities of the 21st century, the integration of yoga-based practices into leadership development programmes may offer a promising avenue for cultivating more socially intelligent, mindful, and effective public service leaders.

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Enhancing production efficiency of public enterprises through stakeholder participation: the case of irrigation systems

Jan C. Verwoerd

North Western University, South Africa

verwoerd@southwestern.edu

Abstract

This study investigates the impact of stakeholder participation on the production efficiency of irrigation systems in Laos through the implementation of Farmers Water User Committees (FWUCs). Utilising a difference-in-difference methodology, the research analyses data from 79 irrigation projects over a 13-year period. The findings reveal a statistically significant positive correlation between FWUC establishment and improved project effectiveness, even when controlling for variables such as project size, age, and socio-economic factors. Smaller, newer projects exhibited higher effectiveness, whilst remote locations faced greater challenges. The temporal analysis indicates that the benefits of participation accrue gradually, underscoring the importance of sustained implementation. These results carry significant implications for public enterprise reform, particularly in irrigation management. The study contributes to the growing body of evidence supporting the efficacy of stakeholder participation in public enterprise management, offering valuable insights for policymakers seeking to enhance the efficiency and sustainability of irrigation systems.

KEYWORDS: Stakeholder participation, longitudinal study, natural experiment, difference-in-difference, irrigation efficiency

Introduction

The management and efficiency of public enterprises have long been subjects of intense scrutiny and debate within academic and policy circles. Amongst these, irrigation systems stand out as critical infrastructure that significantly impacts agricultural productivity, food security, and rural livelihoods. As governments worldwide grapple with the challenges of resource constraints and increasing demands for public services, the need to enhance the production efficiency of these enterprises has become more pressing than ever. This study delves into the intricate dynamics of

stakeholder participation as a potential catalyst for improving the performance of public irrigation systems, exploring the nuanced interplay between governance structures, community engagement, and operational outcomes.

Irrigation systems, as quintessential public enterprises, serve as the lifeblood of agricultural communities, facilitating the cultivation of crops and the sustenance of rural economies. However, these systems often face a myriad of challenges, including inadequate maintenance, inefficient water distribution, and conflicts over resource allocation. Traditional top-down approaches to management have frequently fallen short in addressing these issues, leading to suboptimal utilisation of resources and diminished agricultural yields. In response to these shortcomings, there has been a growing recognition of the potential benefits of involving diverse stakeholders in the governance and operation of irrigation systems. This paradigm shift towards participatory management seeks to harness local knowledge, foster a sense of ownership, and align the interests of various actors involved in the irrigation ecosystem.

The concept of stakeholder participation in public enterprise management is not entirely novel, with its roots tracing back to broader discussions on democratic governance and community-driven development. However, its application to irrigation systems presents unique challenges and opportunities. The heterogeneous nature of stakeholders in irrigation projects, ranging from smallholder farmers and large agricultural enterprises to local government bodies and environmental agencies, necessitates a nuanced approach to engagement and decision-making processes. Furthermore, the technical complexities inherent in irrigation system management, coupled with the often-contentious nature of water resource allocation, add layers of intricacy to the implementation of participatory approaches.

This study aims to bridge the gap between theoretical frameworks of stakeholder participation and the practical realities of irrigation system management. By examining case studies from diverse geographical and socio-economic contexts, we seek to unravel the mechanisms through which stakeholder involvement can contribute to enhanced production efficiency. Our analysis encompasses various dimensions of efficiency, including water use optimisation, cost-effectiveness of operations, equitable distribution of resources, and long-term sustainability of irrigation infrastructure. Through this multifaceted exploration, we aim to develop a comprehensive understanding of the factors that facilitate or impede successful stakeholder engagement in irrigation management.

The relevance of this research extends beyond the immediate context of irrigation systems, offering insights into the broader discourse on public enterprise reform and participatory governance. As governments worldwide seek to revitalise their public sectors and improve service delivery, the lessons drawn from irrigation system management could inform policy approaches across various domains of public infrastructure and service provision. Moreover, in an era marked by increasing water scarcity and the looming threats of climate change, the efficient management of irrigation systems takes on added significance in ensuring food security and sustainable agricultural practices.

This study adopts a mixed-methods approach, combining quantitative analyses of irrigation system performance metrics with qualitative assessments of stakeholder experiences and perceptions. By triangulating data from diverse sources, including official records, field surveys, and in-depth interviews with key informants, we aim to present a holistic picture of the dynamics at play in participatory irrigation management. Our methodology also incorporates a comparative element, juxtaposing cases of successful stakeholder engagement with instances where participatory approaches have yielded suboptimal outcomes. Through this comparative lens, we seek to distil best practices and identify potential pitfalls in the implementation of stakeholder-driven management models.

The structure of this article unfolds as follows: After this introduction, we present a comprehensive review of the literature on stakeholder participation with a specific focus on irrigation systems. This is followed by a detailed exposition of our research methodology and data collection processes. We then delve into our findings, presenting a nuanced analysis of the relationship between stakeholder participation and production efficiency in irrigation systems. The subsequent discussion section synthesises these findings within the broader context of public enterprise reform and sustainable resource management. Finally, we conclude with policy implications and recommendations for future research directions.

As we embark on this exploration of stakeholder participation in irrigation system management, it is crucial to acknowledge the complexities and context-specific nature of the challenges at hand. While participatory approaches hold promise for enhancing production efficiency, their successful implementation requires careful consideration of local power dynamics, institutional capacities, and cultural norms. By critically examining both the potentials and pitfalls of stakeholder engagement in irrigation management, this study aims to contribute to a more nuanced understanding of how public enterprises can leverage community participation to improve their performance and better serve their constituencies.

Participation in Irrigation

Irrigation water is a common good with special characteristics. It features attributes of public and private goods and of common property resource, depending on the situation. Irrigation can be viewed as an insurance. It enables farmers to produce good, reliable crop yields, often two to three times those of rain-fed crops. Irrigation can reduce the impacts of frequent and even severe droughts though it does not eliminate all the risks of water shortages. Irrigation systems have an inbuilt technical externality due to an asymmetry: the activities of the farmers of the head reaches affect the farmers of the tail reaches but not vice versa. All farmers desire assured supply of water at the time of their choice. The factors that need to be considered are assurance, reciprocity and fairness.

In view of the need for both the regulatory as well as enabling functions it was presumed that only an active state apparatus can provide efficiency and equity. For ideological and practical reasons, irrigation projects are mostly in the public sector. They are difficult to fund on a commercial basis because they cannot deliver short-term predictable financial returns. Irrigation projects are self-contained investments that are dependent on local off-take, or the sustainability of the agricultural activities that use the water. Because water is one of the inputs into the production process, along with water resource management, credit, fertiliser, and market access, the ability and willingness to pay for water services must be weighed against total farmer capacities. There is no guarantee that investments will be recovered.

Most developing countries, especially those that emerged from conflict situations do not have a coherent bureaucracy. In many such countries, the state is viewed by the agrarian society as a predatory organisation. Even in presence of a democratic system with a well-established bureaucracy, the performance of government run irrigation projects has been poor. Robert Wade's (1982) analysis of irrigation in India revealed that an important reason for poor performance is the collection of vast amounts of illicit revenue by irrigation engineers in the field from the distribution of water and contracts, part of which is passed on to superior officers and politicians.

The recognition that a collaborative decision-making process must take into account a wide range of values, knowledge, and viewpoints has resulted in a slew of new approaches and processes being proposed to aid irrigation management, which include participatory forms of management (Von Korff et al., 2012). Empirical cross-disciplinary research in collaboration with practitioners in close cooperation with policy makers and other interested parties such as farmers can give useful results (Raya & Gupta, 2022).

Since 1980's there is a growing recognition that farmers are highly entrepreneurial and small-scale farmers have for many centuries been developing a wide range of irrigation systems independent of development agencies or governments. Elinor Ostrom (1995) describes a World Bank financed irrigation scheme in Nepal for which the loan documents mentioned that the project is important because there was no irrigation in that valley. However, when the project was delayed, additional surveying revealed that there were in fact thirty-two existing and fully operational irrigation schemes in existence. Since these schemes were being-managed by farmers and not controlled by the government, they were invisible to the modernist engineers. Detailed studies of the operation and productivity of the irrigation schemes with modern head-works found that they were actually less productive in delivering water to system tail-enders than were farmer-managed irrigation schemes without modern infrastructure. Related work by Norman Uphoff (1992) on irrigation schemes in Sri Lanka reached a similar conclusion. In the current study, the researchers saw a farmer-managed irrigation scheme in where a person had to climb a tree to reach a platform from where the gate is opened or closed; yet the irrigation scheme was working well.

During the last half century, there has been a divergence in the trajectory of agricultural development in Sub-Saharan Africa and Asia. In the former, the focus has largely been on expanding the irrigated area, whereas in the latter the emphasis has been on intensifying production on existing land by rehabilitating and modernising existing irrigation infrastructure (Makin, 2016, p. 2). In the eyes of the western aid agencies the supposed trade-off in modernisation of irrigation schemes in Asia was between the technical benefits of the modern infrastructure versus the erosion (or shift) in social capital needed to underpin the modern infrastructure; but when informal was not replaced with effective formal administration the new schemes could be “lose–lose”: i.e. “worse at social capital and worse at irrigation” (Andrews et al., 2017, p.46).

The Setting

The Lao People's Democratic Republic, commonly known as Laos, is a landlocked country in Southeast Asia. Bordered by China, Vietnam, Cambodia, Thailand, and Myanmar, Laos is characterized by its mountainous terrain, the Mekong River valley, and tropical climate. The United Nations designates Laos as a least developed country, with agriculture forming a significant portion of its economy, making water management crucial.

The Mekong River, which forms a large part of the western border of Laos, is central to the country's geography, economy, and culture. Laos has been dubbed the "Battery of Southeast Asia"

due to its hydroelectric potential, with numerous dams built or planned along the Mekong and its tributaries. This focus on hydropower development has led to both economic opportunities and environmental concerns.

Water resource management in Laos faces several challenges, the main being managing water for agriculture, particularly rice cultivation. The Ministry of Natural Resources and Environment (MoNRE) is the primary agency responsible for water resource management in Laos. The country has implemented several policies and laws to improve water governance, including the Water and Water Resources Law (1996, amended in 2017) and the National Water Resources Strategy and Action Plan.

Given the importance of agriculture to Laos' economy, irrigation plays a crucial role. The government, often with support from international donors, has invested in irrigation infrastructure to increase agricultural productivity. However, many irrigation systems face challenges related to maintenance, efficiency, and sustainability.

Participatory irrigation management has been introduced in some areas, with the establishment of Water User Groups (WUGs) or Water User Associations (WUAs). These organizations aim to involve farmers in the operation and maintenance of irrigation systems, referred to as FWUCs (Farmers Water User Committees) by scholars. Laos has made progress in recent years in improving its water resource management. The country continues to work with international partners and regional organizations like the Mekong River Commission to address these issues and promote sustainable water use.

Methodology and data

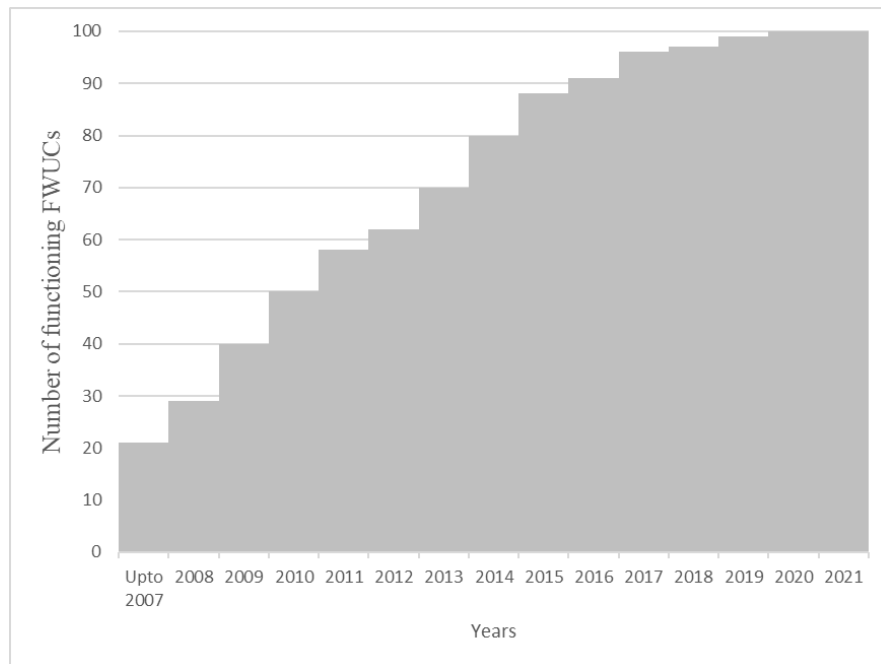
We use difference in difference method that goes back to the work of John Snow (1855) in the water sector. To prove that cholera is caused by bad water rather than bad air (dominant theory at the time), Snow compared the changes in cholera mortality rates in the districts served by two water utilities which in 1849 obtained their water supply from the river Thames in central London. In 1852, one of the utilities moved its water works upriver to an area relatively free of sewage. Cholera mortality fell in both cases but more so in the districts supplied by the company whose water works moved upriver. Natural experiments and the difference in difference (also called D-in-D or DD method) did not attract much attention in the social sciences literature for several decades. Since the 1990s, DD methods have moved into mainstream social science research. The methodology has been more or less standardised and is being used frequently in water sector. Empirical econometricians Guido Imbens, David Card and Joshua Angrist who have shown what conclusions

about cause and effect can be drawn from natural experiments were awarded Nobel Prize for Economics in 2021.

This study is based on analyses of medium and minor irrigation projects, which were selected on a random basis for a study by Japanese Bank of International Cooperation through consultants M/s Mott MacDonald for another broader research project. Of the 50 projects in the study area, 21 projects had functioning FWUCs in the year 2010. Another 50 irrigation schemes were added to the research project and FWUCs were operating in all the projects by 2022. Our sample covers 79 projects where FWUCs were established between 2010 and 2021. The study required contacting the officials of MoNRE as also international support agencies and their consultants. Since the focus of the study was on physical implementation of the projects, the data was verified and updated for each project on the basis of several field visits. The number of projects in which the FWUCs were functioning is given in Figure 1.

Figure1

Year wise growth of Farmers Water Users Committees



As a determinant of Project efficiency, independent variable Participation is a dummy variable, taking a value of 1 for where FWUC was established project and of 0 otherwise. In the choice of independent variables, we have followed a system wherein the independent variables have been chosen on the basis of economic logic rather than through computer programmes which facilitate choosing of variables which give the highest Adjusted R square.

One obvious variable that can affect project effectiveness is the size of the project. When we regress the project effectiveness ratio against the size of the project (designed command area), we find a significant negative relationship ($t > 2.0$). Similar results are obtained when the project effectiveness ratio is regressed against the natural logarithm of the size of the project. We use the MWD test, and find that the log of size will be more appropriate as an explanatory variable. On the basis of similar analysis, the log of age and, as a variable for remoteness, the log of distance was included as the explanatory variables. Other variables included are age of project, rainfall, literacy level and per capita income.

Is it possible that, just as participation influences effectiveness, effectiveness influences participation? When the project is effective for extraneous reasons, do farmers join the FWUC? It is important to test for endogeneity because having endogenous regressors in a model will cause ordinary least squares (OLS) estimators to fail, as one of OLS's assumptions is that the predictor variable and the error term have no correlation. We apply Hausman specification test to detect endogenous regressors (predictor variables) and do not find any endogeneity. In absence of endogeneity OLS estimates are unbiased (even for small samples) and have minimum variance. In such a case, OLS estimators will be BLUE (best linear unbiased estimators). Participation is generally regarded as a good thing. However, because the project effectiveness is a cardinal variable and not a subjectively measured ordinal variable we do not expect any systematic measurement error caused by halo effect

This paper uses the cross-irrigation project and cross-time variation in the participation to determine its effect. The data covers all years from 2009 to 2020. It was felt that the period of thirteen years is long enough to make meaningful assessment of the trend. Moreover, this panel data allows us to exploit only the variation in time of introduction of participation, holding the decision to introduce participation fixed for all irrigation projects in the sample. The identification strategy is valid as long as the changes in outcome variable, that is, project effectiveness would be similar across irrigation projects in the absence of FWUCs. The required assumption for the estimations to be valid is that the changes in the outcome variable would not have differed systematically between the treatment irrigation projects and the control irrigation projects if participation had not occurred. While this assumption is essentially untestable, it is likely to hold if there are no initial systematic differences. We employed three methods for checking for any endogeneity. First, we interviewed the organisers who stated that the programme of participation had nothing to do with the changes in effectiveness of a particular irrigation project in the past or the expectation thereof in the future. To

check whether the irrigation projects are indeed comparable from this point of view, we split our data into two parts – projects with early participation, that is, the irrigation projects in which FWUC were started operating earlier and the irrigation projects where FWUC came into operation later. The comparison in Table 1 shows that the difference between the two groups is statistically insignificant. To further examine the pattern of timing of participation, we regressed each of the variable on the year of participation. The coefficients on the year of implementation were not found significant at even 10% level.

Table 1

Project characteristics

	Early participation average	Late participation average	Difference in averages	Coefficient on year of participation
(1)	(2)	(3)	(4)	(5)
Changes in Outcome variable between 2016 and 2021				
Project effectiveness ratio	0.121	0.117	0.004	0.001
Background variable as in 2021				
Total command area (in ha)	1101	1079	22	21
Age of project (years since construction/rehabilitation)	19.1	17.9	1.2	0.18
Remoteness (distance from capital in km)	189	207	-18	3.3
Rainfall (in cm per year)	167.5	168.5	-1.0	3.2
Literacy (in % for 15+ age group in project area)	83.2	82.6	0.4	1.7
Per capita income (in US\$ in the project area)	1293	1269	24	25
N	39	39		

Note: None of the differences in column 4 and none of the coefficients in column 5 are significant even at 10% significance level.

We can safely conclude that there is no statistically significant trend for changes in any of these variables. The fact that the irrigation projects were not randomly selected for implementation

of participation does not invalidate identification strategy as the timing of participation in various projects was not related to the lagged values or expected future values of outcome variables of interest. The identification strategy relies on the changes over time being similar across irrigation projects; the checks described above validate the strategy.

Results and Discussion

According to the identification strategy described previously, we obtain the main results by running the following regression with OLS:

$$y_{it} = \alpha + \beta_i + \gamma_t + \pi P_{it} + \varepsilon_{it} \quad (1)$$

where the subscript i denotes the project and t denotes years. This regression includes project fixed effects β_i and annual fixed effects γ_t . The variable P_{it} is the Participation dummy and, for each project, it is equal to one for the year in which the FWUC became operational and for all following years. We run the regression without and with the background variables. The standard errors of the regressions are clustered at the project level. As explained in Bertrand et al. (2004), clustering at this level helps to prevent the problem of serial correlation in difference-in-difference estimates which use a large number of time periods. Table 2 shows the main results of this paper.

Table 2

Regression results

Explanatory Variables	Regression coefficients	
	Bivariate	Multivariate
Participation variable	0.168**	0.119**
Total command area (log of)		-0.0009*
Rainfall (in 100 cm per year)		0.010
Age of project (log of)		-0.0002**
Distance from capital (log of)		-0.0002*
Literacy (in %)		-0.0003**
Per capita income (in US\$)		0.0009
Adjusted R square	0.53	0.68
Sample size	79	79

** Significant at 1% level; * Significant at 5% level

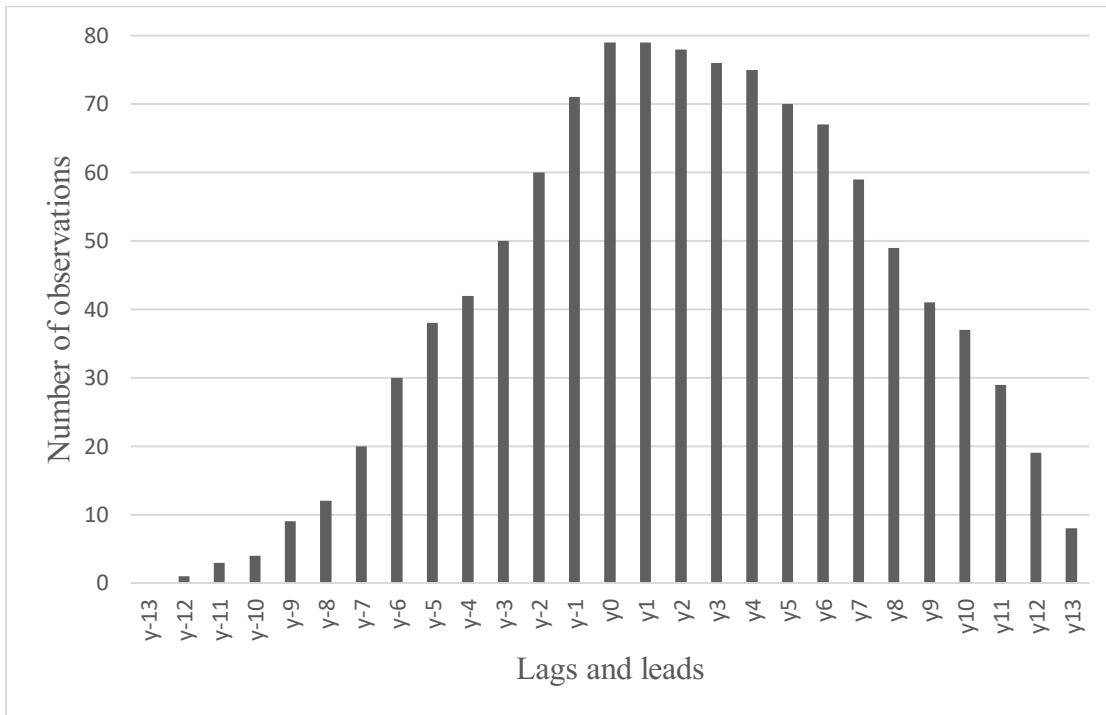
We find Participation variable highly significant. As for background variables, from the last column of Table of we see that the project effectiveness of smaller, newer projects is higher and that

of projects located in remote areas is lower. While literacy has a positive effect on the project effectiveness, the coefficients of rainfall and per capita income in the area are not significant.

While the regression above estimates only the average effect of functioning of FWUC, it is also important to check how this effect looks over time. Since the implementations of participation was phased in over time and since all the projects covered in the regression were those where FWUC was established by 2010, the outcome data for all lags and leads for all projects was not observed. For example, we do not have Y_{+1} data for the years 2023 as no FWUC was established in 2022, and Y_{+2} for the years 2022 and 2023. Data availability is shown in Figure 2.

Figure2

Availability of data



To check how this effect looks over time, we run the following regression with OLS:

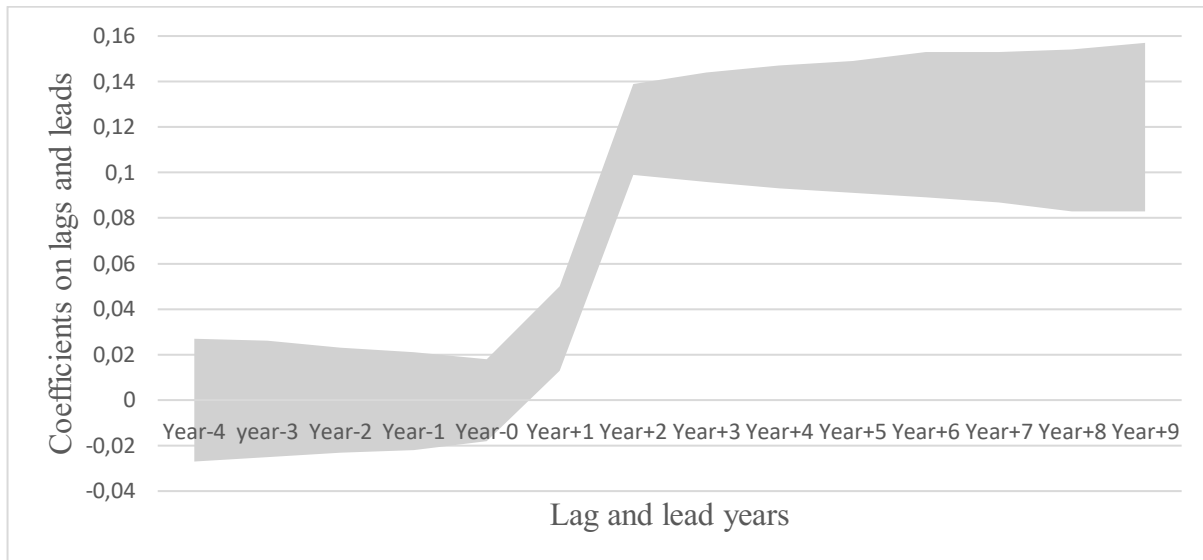
$$y_{it} = \alpha + \beta_i + \gamma_t + \sum \delta_l Y_{li} + \varepsilon_{it} \quad (2)$$

where Y_l is a set of dummy variables for lag and lead years relative to the time of implementation in a given project. For example, Y_{-1} is equal to one for the last year before the FWUC became operational whereas Y_{+1} is equal to one for the year after the year in which the FWUC started working. Keeping in view the limitations of data availability, we limit this regression to observations that fall between Y_{-5} to Y_{+9} . Y_{-5} is also the ‘omitted’ as all other Y observations are being compared with this observation. We do not expect smooth plots of confidence because the sample size in each

year is different causing ‘missing data’ problems. Figure 3 shows the plot of the coefficient of participation over time.

Figure 3

Effect of participation on project performance over time



While this study provides compelling evidence for the benefits of stakeholder participation, there exist a few avenues for future research. A more granular examination of the specific mechanisms through which participation enhances efficiency—be it through improved maintenance, better water allocation, or reduced conflicts—would provide valuable insights for refining participatory management models. Additionally, a comparative analysis of different models of participatory management across various contexts could yield a more nuanced understanding of best practices and context-specific adaptations. The interaction between participatory approaches and technological innovations in irrigation management represents another fertile area for exploration, as does the potential for spillover effects of participatory irrigation management on broader community development and social capital formation.

Conclusion

This study has embarked upon a comprehensive exploration of the impact of stakeholder participation, specifically through the implementation of Farmers Water User Committees (FWUCs), on the production efficiency of irrigation systems in Laos. The findings herein proffer robust evidence that participatory approaches can significantly enhance the effectiveness of irrigation projects, thereby offering valuable insights for policymakers and practitioners in the field of public enterprise management. The results of our difference-in-difference analysis demonstrate a

strong positive correlation between the establishment of FWUCs and improved project effectiveness, with the participation variable exhibiting high statistical significance in our multivariate regression model. This empirical evidence suggests that the introduction of participatory management structures leads to a substantial increase in irrigation project efficiency, even when controlling for various background variables such as project size, age, location, and socio-economic factors.

Our analysis yields several salient observations that merit further consideration. Notably, smaller and newer projects tend to exhibit higher effectiveness, which may be attributed to more modern infrastructure or a greater facility for adapting to participatory approaches. Conversely, projects situated in remote areas face greater challenges, as evidenced by the negative coefficient for distance from the capital. This geographical disparity underscores the need for targeted interventions to support remote communities in their efforts to implement and benefit from participatory management structures. Furthermore, the positive influence of literacy rates in the project area on effectiveness highlights the critical role of education in facilitating successful participatory management. These findings collectively suggest that the benefits of stakeholder involvement are not uniformly distributed and that contextual factors play a significant role in determining the success of participatory approaches.

The temporal analysis of participation effects reveals a nuanced picture of the benefits accruing from stakeholder involvement. Rather than manifesting immediately, the positive impacts of participation appear to grow and consolidate over time. This temporal dimension suggests that the development of social capital and the learning curve associated with participatory management play crucial roles in realising efficiency gains. Such a finding underscores the importance of long-term commitment to participatory management strategies, as the full spectrum of benefits may only become apparent after sustained implementation.

These empirical results carry significant implications for public enterprise reform, particularly in the context of irrigation management. Policymakers would be well-advised to prioritise the establishment and support of participatory structures such as FWUCs as a means to improve the efficiency of irrigation systems. However, this approach should not be viewed as a panacea but rather as part of a holistic strategy that also encompasses capacity building and literacy programmes in project areas to enhance the effectiveness of participatory approaches. Moreover, the challenges faced by remote projects highlight the need for differentiated strategies that account for geographical disparities and allocate additional resources to overcome location-specific obstacles.

In conclusion, this study makes a significant contribution to the growing body of evidence supporting the efficacy of stakeholder participation in public enterprise management. By demonstrating the tangible benefits of participatory approaches in irrigation systems, we provide a compelling case for their wider adoption and integration into public policy. As governments worldwide grapple with the dual challenges of enhancing the performance of public enterprises and addressing resource management issues, the lessons drawn from this research offer valuable guidance for creating more efficient, equitable, and sustainable irrigation systems. The path forward requires a nuanced approach that recognises the complexities of participatory management while harnessing its potential to transform public enterprise efficiency and, by extension, contribute to broader socio-economic development goals.

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Green Finance for Public Enterprises in India

R K Mishra

Independent Researcher, India*
ramkumarmishra@gmail.com

Priyanka Mishra

Ashoka School of Business, Hyderabad, India
priyankamishra@theasb.in

Abstract

This paper examines the burgeoning landscape of green finance for public enterprises in India, exploring its potential to reconcile economic growth with environmental stewardship. Through a comprehensive literature review and case study analysis, the research investigates the regulatory frameworks, market mechanisms, and policy initiatives shaping the adoption of green finance practices within Indian public sector entities. The study scrutinises the multifaceted challenges and opportunities inherent in this transition, considering India's unique socio-economic context and the legacy structures of its public sector. By evaluating policy effectiveness and drawing comparisons with international best practices, this research contributes to the nascent body of literature on green finance in emerging economies. The findings illuminate pathways for enhancing the environmental sustainability of India's public enterprises through innovative financial instruments and strategies, whilst offering insights that may inform policy formulation and institutional reforms in the broader context of sustainable development.

KEYWORDS: Green Finance, Sustainable Finance, Green Bonds, Public Enterprises

Introduction

The nexus of environmental sustainability and public sector finance has emerged as a critical area of inquiry in the contemporary global economic landscape. Within this context, the concept of green finance for public enterprises in India presents a particularly compelling subject for academic scrutiny. As the world's most populous nation and a rapidly developing economy,

* Corresponding author. Former Director, Institute of Public Enterprise, Hyderabad, India.

India's approach to reconciling economic growth with environmental stewardship carries profound implications for global sustainability efforts.

Public enterprises in India, which have historically played a pivotal role in the country's economic development, now find themselves at the forefront of a paradigm shift towards environmentally conscious operations and investments. The imperative to integrate green finance principles into these entities stems from a confluence of factors, including mounting environmental concerns, international climate commitments, and the recognition of sustainable development as a cornerstone of long-term economic resilience.

This paper seeks to examine the multifaceted landscape of green finance as it pertains to Indian public enterprises. It will explore the regulatory frameworks, market mechanisms, and policy initiatives that are shaping the adoption of green finance practices within these organisations. Moreover, it will critically analyse the challenges and opportunities inherent in this transition, considering the unique socio-economic context of India and the legacy structures of its public sector.

By scrutinising a case study of solar energy in Indore, India, evaluating policy effectiveness, and drawing comparisons with international best practices, this research aims to contribute to the nascent but rapidly evolving body of literature on green finance in emerging economies. The findings of this study hold the potential to inform policy formulation, guide institutional reforms, and illuminate pathways for enhancing the environmental sustainability of India's public enterprises through innovative financial instruments and strategies.

As the global community grapples with the exigencies of climate change and environmental degradation, the role of green finance in transforming public enterprises cannot be overstated. This paper endeavours to shed light on this crucial intersection of public policy, finance, and environmental sustainability in one of the world's most significant emerging economies.

Literature Review

We provide a brief review of existing literature on green finance drawn from various sources. The existing literature points out the adoption of green finances across different sectors in compliance with the Paris Agreement towards sustainable development and optimizing the cost of capital. Financial institutions are at the forefront of promoting green finance and offering incentives to entities willing to disclose this concept in the public domain (Aracil et al., 2021). The

project appraisal by these institutions puts a premium on Green Finance. Green Finance has received wide support from investors as it is more than gaining optimal proceeds from investment. More than 800 institutional investors exist presently across the globe, owning assets over \$3 trillion as part of investment in green finance such as stocks, bonds, and bills (Brears, 2022). The proportion of green funds in the market has recorded a significant rise over the years, with the pace still expected to expand further with China, the U.S., and France being the largest issuers of green bonds.

The burgeoning field of green finance has garnered significant attention in recent years, as global concerns about environmental sustainability and climate change have intensified. This literature review aims to synthesise and critically analyse the current state of research on green finance, drawing upon a comprehensive array of scholarly works published between 2014 and 2022. The concept of green finance, broadly defined as financial investments and services that support environmentally sustainable development and growth, has emerged as a crucial mechanism for addressing climate change and promoting ecological conservation (Amoah et al., 2022). De Cunha et al. (2021) map and integrate the key components of the sustainable finance and investment area and pinpoint the most pertinent directions for future study based on a thorough literature evaluation of 166 articles. During this process, they come to the conclusion that the main problems facing the field are the under-theorisation of the notion, the conventional short-term character of financial reasoning, and the absence of evidence of the repercussions on society and the environment.

The literature reveals a multifaceted landscape, encompassing various financial instruments, regulatory frameworks, and market dynamics that collectively contribute to the greening of the global financial system. Al Nuaimi & Nobanee (2019) demonstrate the value that sustainable approaches bring to particular businesses and industries. They show how managers may make better judgements by integrating sustainable policies into financial decisions. In order to ensure that sustainability elements are seamlessly integrated into financial systems, their report offers an outlook on the risks related to the sustainability effort and how those risks might be managed.

A recurring theme in the literature is the pivotal role of green bonds in advancing sustainable finance. An et al. (2021) look into a supply chain system where a manufacturer with little capital and a well-funded supplier dealing with erratic demand looks to banks for green credit

financing in this scenario. They discover that there are areas where the manufacturer's profit and social welfare can coexist together. By imposing various carbon restrictions, the government may direct producers towards a decision that benefits everyone.

Shinde (2021) posits that green bonds serve as an effective investment tool for fostering a resilient future and achieving circular economy objectives. This view is corroborated by Gilchrist et al. (2021), who conducted a comprehensive survey of literature on green bonds and loans, highlighting their potential benefits whilst also acknowledging the limitations of these instruments. The evolution of green bonds is further elucidated by Trompeter (2017), who traces their development from niche products to mainstream financial instruments, exploring the associated environmental paradox within Wall Street's paradigm. AlAhbadi et al. (2020) attempt to find out how sustainability bonds function to balance the value that stakeholders place on businesses across the globe through implementation of a systematic review. According to the study, which was based on 25 research publications that were chosen from a variety of databases, including SCOPUS, EBSCOHOST, and SSRN, sustainability bonds can help commercial organisations across borders gain a competitive edge with stakeholders.

Bjørnbet et al. (2021) want to evaluate the significant relationship between the circular economy in manufacturing and sustainable development through a thorough analysis of the literature. The review demonstrates that the area has progressed from conceptual work alone to empirical investigations and research leading to practical instruments. To prevent implementing solutions that may be portrayed as circular but ignore the sustainability component, holistic methods are required.

The geographical scope of green finance research is notably diverse, with a particular emphasis on emerging economies. China, for instance, features prominently in the literature as a case study for green finance implementation and policy effectiveness. Zhang et al. (2019) offer a bibliometric analysis of green finance research, revealing the current status, developmental trends, and future directions of the field, with a notable focus on China's green finance initiatives. Liu & Xiong (2022) examine the impact of green finance reform on corporate innovation in China, whilst He et al. (2019) investigate the relationship between green financial development and renewable energy investment efficiency in the Chinese context.

The literature also highlights the intricate relationship between green finance and broader economic objectives. Falcone and Sica (2019) assess the opportunities and challenges of green

finance in Italy, specifically within the biomass production sector, underscoring the critical role of green finance in environmentally sustainable innovations. Similarly, Soundarrajan and Vivek (2016) explore the potential of green finance in fostering sustainable economic growth in India, emphasising the need for reorienting banking and capital markets to enhance the supply of green finance.

A significant strand of research focuses on the performance and efficacy of green finance initiatives. Julia and Kassim (2020) compare the green banking performance of Islamic banks and conventional banks in Bangladesh, utilising the Maqasid Shariah framework. Their findings suggest that Islamic banks demonstrate superior performance in preserving faith, intellect, and wealth circulation. In a broader context, Khan et al. (2022) conduct an empirical investigation into whether green finance delivers on its promises, analysing its impact on ecological footprints across 26 Asian economies.

The literature also grapples with the governance challenges posed by the sustainable finance revolution. Park (2018) examines the role of investors as de facto regulators in the green bond market, highlighting the need for a public-private hybrid regulatory framework to optimise stakeholder interests. This governance aspect is further explored by Dong et al. (2020), who analyse China's financial sector sustainability and green finance disclosures, revealing an evolving landscape of regulatory and operational requirements.

Notably, the literature identifies several gaps and future research directions. Zhang et al. (2019) call for increased attention to green finance in developing countries, whilst Chemmanur and Fulghieri (2014) emphasise the need for greater innovation in entrepreneurial finance to support sustainable ventures. Hafner et al. (2020) advocate for a systems perspective in addressing the green finance gap, suggesting policy interventions to improve both green project financing and the broader financial ecosystem.

The literature on green finance presents a rich tapestry of research, encompassing theoretical frameworks, empirical analyses, and policy recommendations. While significant strides have been made in understanding the potential of green finance to drive sustainable development, challenges remain in terms of standardisation, measurement, and implementation across diverse economic contexts. Future research should focus on developing more robust methodologies for assessing the impact of green finance initiatives, exploring the intersection of green finance with emerging technologies such as fintech, and investigating the long-term economic and

environmental outcomes of green finance policies. As the global community continues to grapple with the urgent need for sustainable development, the field of green finance is poised to play an increasingly critical role in shaping the future of the global economy and environment.

Green finance for public sector

The disinvestment targets of the government have fallen short of expectations (Nandy & Sur, 2024). The government has been trying to make the shortfall good by increasing enhanced dividends. A superior earnings management can be of great help in this regard. It may be noted that one of the critical limitations eroding the earnings of public enterprises has been the cost of capital. The higher cost of funds makes public enterprises uncompetitive in domestic and international markets. It impacts the purchasing power of the Indian consumer and perpetuates multidimensional poverty. A large chunk of investments in public enterprises belongs to the energy and transport sectors. Enterprises in these sectors are highly investment-prone and continue to have an unlimited appetite for funding. Green Finance has emerged as an important source of raising cheaper finance for these enterprises and contributes to their effective corporate governance and discharging corporate social responsibility. Equity financing from the government and retained earnings are considered cost-free sources in the case of these enterprises. It is thus obvious that the real cost of capital is far higher than the actual one. It is high time that public enterprises look beyond debt and equity from the government and tap green finance as alternative instruments of finance. Green Finance will provide public enterprises with economic, social, and governance benefits. Clean finance will combat pollution, low-carbon finance will reduce Greenhouse gas emissions, bio-finance will contribute to biodiversity, climate finance will lead to climate change adaptation, and blue finance will foster a blue economy (In et al., 2017). Social finance will provide the wherewithal to public enterprises engaged in education, social housing, health, affordable food, affordable infrastructure, and financial services.

The instruments can be accessed by the government, national development financial institutions, commercial banks, capital markets, and private equity. Government instruments include green subsidies, public spending, public investments, and green facilities. National development financial institutions provide blended finance, green public funds, green project guarantees, concessional funding, transition finance, and credit enhancement. Commercial banks lend green credit, green loans, sustainability-linked loans, and green insurance. Capital market instruments relate to green bonds, green sukuk, transition bonds, social bonds, and sustainability-

linked bonds. Capital markets provide Environment, Social, and Governance funds and green-themed funds. Private equity involvements are seen in green innovation funds and sustainability funds. While structuring the capital mix, it has to be borne in mind that green finance instruments require positive financial returns for investors. Government funding or, partly, development finance funding may be exceptions in this regard.

Green bonds vary in type, use, and debt recourse. “Use of proceeds” bonds are earmarked for green projects and with recourse to the issuer. Green project bonds are earmarked for green projects with recourse to the project’s assets and balance sheet. Securitisation bonds are employed to refinance portfolios of green projects with recourse to a group of projects. A challenge for public enterprises is to select the right standard as various standards for green bonds have come to stay in existence. The difference between the standards may relate to the type of eligible projects and the use of proceeds requirements. Securities and Exchange Board of India laid down such standards in 2017 as disclosure requirements for the issuance and listing of green debt securities. These include a list of broad projects and asset categories for eligible use of proceeds. A green bond issue can attract individual investors as they perceive a lower risk. It can provide ‘greemium’, improve corporate governance, public reporting and improve corporate strategy. Green bonds reduce the risk of stranded assets.

The Government of India, the Reserve Bank of India, and the Security and Exchange Board of India have taken several initiatives to promote green finance in India, including, among other things, the implementation of mandatory sustainability disclosure and bringing the production of renewable energy under priority sector lending scheme, measures that incentivise the production and usage of unconventional energy by firms and households. India has commenced its journey for carbon neutrality and put forward a ‘Green Deal’ to be achieved by 2070. The Green Deal has classified green finance as an enabler to accelerate decarbonisation. It emphasises the need for an increased flow of capital from the national government and private entities to establish green infrastructure.

Finally, the choice of selecting the right green finance instrument would depend on factors such as the type, duration, profit motivation, capacity, operational efficiency, and transparency. ESG funds and green bonds are characterised by longer duration, proposed motivation, risk, high exposure to the market, and high transparency. Green credit and blended finance are for a medium

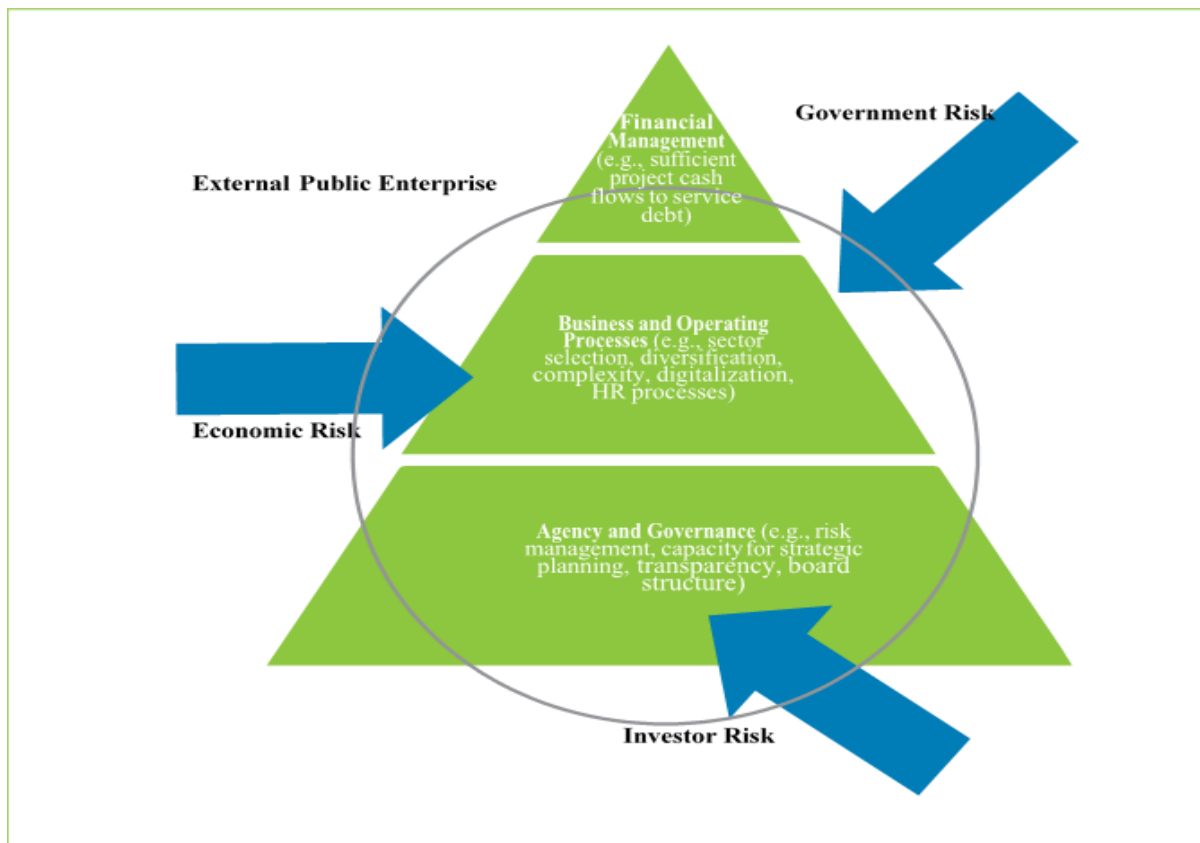
duration and characterised by moderate profit motivation, risk, operational efficiency, and transparency.

Requisite factors for issuance of green bonds

Public Enterprises intending to access green finance should have bankable green assets based on applicable domestic or internationally recognised processes and standards. Government can support public enterprises by creating an enabling environment and tackling governance issues. A better grip on capital market-related issues can help in raising green finance from its constituents successfully. Similarly, the regulators may have to put in place moderately liberal standards. On the score of public enterprises strong stakeholder engagement and timely and regular reporting on the use of proceeds can be helpful in garnering green finance (Nuaimi & Nobanee, 2019). Figure 1 incorporates the determinants for issuing successfully green bonds.

Figure 1.

Determinants for Mobilizing Green Bonds



Source: Asian Development Bank (2021a)

Green bonds can be an investor's choice provided the issuer has sound cash flows and the hedge has the risks (AlAhbabi & Nobanee, 2020). Economic risks can impact a project and

jeopardise the mobilisation of green finance. Internally, deficient operational processes can hit the revenue and impact cash flows adversely. As a corollary, good financial management can ward off any turbulence in projected cash flows. However, these do not obviate the need for setting up an independent unit managing green finance.

A comprehensive process for developing and managing green financial instruments, within a sustainable finance framework needs to be followed (Asian Development Bank, 2021b). This intricate procedure commences with the identification of environmentally beneficial projects and assets, which serve as the foundation for the subsequent stages. Following this crucial initial step, the focus shifts to the formulation of a robust green bond and sustainable finance framework, establishing the parameters and guidelines that will govern the financial instrument. Once the framework is in place, the process moves inward, concentrating on the confirmation of internal processes and controls. This stage is vital for ensuring the integrity and credibility of the green bond issuance. Subsequently, the emphasis transitions to external communication, with the reporting of allocations and green credentials. This transparent disclosure is essential for maintaining investor confidence and regulatory compliance.

The process then evolves to address the broader implications of the green bond issuance. Setting up for impact reporting becomes a priority, as it allows for the quantification and communication of the environmental benefits derived from the financed projects. This is followed by the management of the external review process, a critical step in validating the green credentials of the bond and ensuring alignment with international standards and best practices.

As the process advances, it reaches a stage where formal recognition is sought through certification. This external validation enhances the credibility of the green bond and potentially broadens its appeal to environmentally conscious investors. The subsequent phase involves engagement with a diverse array of stakeholders, including media outlets, relevant indexes, and listings. This multifaceted engagement strategy aims to increase visibility and attract a wider investor base.

The final stages of the process focus on the long-term management and expansion of the green bond programme. Post-issuance reporting and disclosure become ongoing responsibilities, ensuring continued transparency and accountability to investors and regulators alike. The culmination of this process is the potential for further issuance of labelled instruments, leveraging

the established framework and reputation to expand the organisation's portfolio of sustainable financial products.

This comprehensive approach to green bond issuance and management reflects the growing sophistication of the sustainable finance market. It underscores the intricate balance between environmental integrity, financial viability, and stakeholder engagement required to successfully navigate the complexities of green finance in today's global markets.

Case study of financing of solar plant

Rapid urbanisation is a part of India's development strategy. Much of India's population is designed to be urban-based. This causes a financial challenge to urban governance. Municipal corporations are in a deep financial crisis. The reliance on municipal corporations has to shift from governmental to non-governmental resources. Recommendations for bridging the significant gap in funding at the local level regularly highlight the need for municipalities to take on debt financing mechanisms. There is a growing interest in green bonds as a way to mobilise resources for green infrastructure, resulting in India becoming the world's second-largest market for green bonds in 2020. Though the current green bond activity is led by the private sector, India issued its first sovereign green bonds in January 2023 and municipalities have been entering this space as well—Ghaziabad Nagar Nigam in 2021 and Indore Municipal Corporation in 2023 (Gangamreddypalli, 2023).

Green bonds represent access to scalable, long-term, low-cost debt capital. They offer certain advantages over other financing mechanisms such as loans and grants. They are useful in terms of borrowing size which gives access to large upfront capital, and long maturity periods which often span about 10 years in India, allowing long-term manageable repayments. Green Bonds have to be credit-rated. Among the recent wave of issuances, Indore Municipal Corporation's public issuance of municipal green bonds in 2023 to finance the solar plant stands out in a few ways. This issuance made Indore Municipal Corporation India's prominent local government body raise money from retail investors. Indore Municipal Corporation is characterised by a strong economic base, efficient operations, and service delivery track record, satisfactory financial performance, structured payment mechanism, focus on asset creation and cost saving, and healthy financial position.

This Green Bonds issue was regulated by the Securities and Exchange Board of India which prescribes a four-fold process for issuing the Green Bonds: Appointment of intermediaries

such as merchant bankers, rating agencies, registrar and transfer agents, and debenture trustees; preparation of Information Memorandum requiring data collection, structuring of Green Bonds and repayment, preparation of cash flow statement and draft information memorandum as per the guidelines indicated by the regulators; creation of escrow account and obtaining a rating letter, and launching issue/bidding process and taking it to the conclusion.

The bond offer document submitted to the Securities and Exchange Board of India incorporated the details regarding the nature of the instrument, mode of issue, issue size, coupon rate, tenor, credit rating, collateral, and purpose. Indore Municipal Corporation issued the green bond to finance the installation of a 60MW ground-mounted captive solar PV power plant at Jalud pumping station to fetch water from the Narmada River. The solar power plant is envisioned as a mechanism for saving up to INR 840 million (USD 10 million) per annum. Carbon credits generated through this project are to be traded on the global carbon credit market. It is not that the project is not faced with any risk. The project faces internal risks, financial risks, and external risks. However, the cost of funds and their application override the benefits. The green bonds are eligible for the Government's incentive of approximately 10 per cent up to a maximum of INR 200 million (USD 2.37 million). Further, Indore Municipal Corporation is also entitled to the Viability Gap Funding. The issue was received very well and oversubscribed 1.24 times. The institutional investors showed significant interest by subscribing 1.76 times and the retail investors subscribed the issue by 1.18 times.

Strategies for Stepping Up Mobilisation of Funds from Green Finance

Green Finance offers a vast scope for raising capital by public enterprises. It is necessary to formulate strategies to enable enterprises to progressively increase the share of green finance in their capitalisation (Liu & Xiong, 2022). We suggest below some of these strategies.

1. Transformative Reforms: Developing the national capital markets for sustainability will give a fillip to green bonds, green Initial Public Offers, and other green instruments mentioned earlier. It would allow for coordination among policymakers, regulators, institutional investors, and consumers while spreading awareness, understanding, and availability of green investment options over brown alternatives. A strategy to set up a green finance exchange or make it a part of social capital exchange can be a bold step.

2. Institutional Reforms: The entire spectrum of financial institutions can be examined to ascertain the gaps or absence in regard to providing green finance. Key financial institutions

supporting decarbonisation and climate resilience should be strengthened, and the conversion of development finance institutions into commercial banks should be reconsidered in order to fill the gap created by absent long-term financing at reasonable interest rates. Banks can play an important role in providing green finance to public enterprises. Banks should avoid green washing.

3. Regulatory reform: Sovereign funds, pension funds, and insurance companies should be encouraged to invest in green finance schemes floated by public enterprises. By doing this they will only reduce the market risk and promote investor protection. Regulatory reforms should be introduced to reduce the compliance burden on these enterprises. Tax concessions can be extended to retail investors. This will help in the spread of eco-awareness by way of differentiating between green and brown assets (Desalegn & Tangl, 2022). The government can consider credit enhancement and guarantees to help hedge the perceived risks and enhance the overall credit rating of green bonds.

Conclusion

Public Enterprises/State-owned Enterprises continue to occupy the commanding heights of the Indian Economy. These enterprises are endowed with two special features which separate them from enterprises in other sectors: 'public' and 'enterprise'. Being 'public' in nature, they should serve social purposes, and being 'enterprise' in nature, they should produce goods and services at the least cost. Green Finance offers an olive branch to these enterprises to achieve both ends. Green Finance with its availability at a lower cost of capital can be available in abundance both to such enterprises in India and abroad. Green Finance Instruments can be designed in different ways to suit their requirements. Transformative reforms need to be introduced to attract, among others retail investors, pension funds, provident funds, insurance funds, private equity, and sovereign funds. Tax concessions and capital market reforms can increase the effectiveness of green finance for public enterprises.

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Institutional Discursive Power in Federal Public Enterprises: A Framework for Evaluating State-Centre Dynamics

Clementine C Hendricks²
University of York, UK
clementine.hendricks@york.ac.uk

Alys N Jones
Bangor University, UK
alys.n.jones@bangor.ac.uk

Olivia Alexander
University of Lincoln, UK
oalexander@lincoln.ac.uk

Abstract

This study examines the dynamics of institutional discursive power within federal public enterprises, focusing on the intricate relationships between central and state-level institutions. Drawing upon Foucault's theoretical framework of discursive power and contemporary institutional theory, we develop a comprehensive evaluation model that analyses three key dimensions: competitiveness, constructiveness, and influence. The research employs a mixed-methods approach, combining qualitative analysis of institutional communications with quantitative assessment of organisational performance metrics. Our evaluation framework, validated through case studies of Indian central public sector enterprises, reveals that institutional discursive power operates through complex mechanisms of policy formulation, resource allocation, and narrative control. The findings demonstrate that while federal enterprises possess significant structural advantages through superior resource access and policy leverage, state enterprises can effectively exercise relational power through strategic institutional engagement. The study contributes to both theoretical understanding and practical governance by providing a systematic framework for evaluating institutional discursive power in federal systems, offering insights into how public enterprises at different governmental

² Corresponding author.

levels can optimise their institutional effectiveness while maintaining constitutional equilibrium.

KEYWORDS: Institutional discursive power, federal public enterprises, organisational dynamics, institutional theory, state-centre relations, policy discourse

Introduction

In federal countries, most subjects that directly affect the people are devolved to the states. Yet the federal governments too have ministries dealing with these subjects. Their role is not limited to inter-state coordination. Since revenues accruing to the federal government are much higher than those of state governments, federal ministry also provide money to state government departments to further national priorities. Public enterprises exist both at state level and at the central level. While there is extensive literature on relationship between the federal governments and state governments, less is available on the relationship between the central public enterprises and state public enterprises.

In India, some examples of Central Public Sector Enterprises (CPSEs) operating in almost every area within the domain of the states. In food and agriculture, while it's a state subject, we have CPSEs like National Seeds Corporation, State Farms Corporation of India, Food Corporation of India and National Warehousing Corporation. In healthcare, another state subject, central enterprises include Bengal Chemicals and Pharmaceuticals Limited and HLL Lifecare Limited.

Even in a small state sector like fisheries, the CPSEs are active. CPSEs in the field are:

1. National Fisheries Development Board (NFDB) - Headquartered in Hyderabad, it promotes integrated development of fisheries across India
2. Fishery Survey of India (FSI) - Focuses on surveying fishery resources in India's Exclusive Economic Zone
3. Central Institute of Fisheries Nautical and Engineering Training (CIFNET) - Provides training in marine fisheries
4. Central Institute of Coastal Engineering for Fishery (CICEF) - Handles engineering aspects of fisheries projects
5. National Institute of Fisheries Post Harvest Technology and Training (NIFPHATT) - Works on post-harvest technology

Each state has its own public enterprise for fisheries development with varying structures. These state-level public enterprises typically handle implementation of central and state schemes, licensing and regulation of fishing activities, development of local fisheries infrastructure, support to fishing communities and marketing and distribution of fish products. The relationship between

national and state-level fisheries enterprises in India follows a cooperative federalism model with distinct yet interconnected roles. The CPSEs provides funding through various schemes. Many schemes follow a cost-sharing model between center and states. Mostly state public enterprises have their own schemes using state funds. National institutions like NFDB and FSI provide technical expertise and training to state-level organizations. Research findings and technological innovations from CPSEs are shared with state public enterprises in the field. CPSEs help build capacity of state-level staff through training programmes. Data on fish production, exports, and other metrics flows from states to CPSUs which is useful for sectoral planning at the national level. While state-level fisheries enterprises don't have direct control over central enterprises, they do have some influence through various mechanisms, e.g., state representation in national-level advisory bodies and committees, participation in periodic national conferences and consultations where they can voice concerns and suggestions, providing feedback on central schemes' implementation challenges, suggesting modifications to central programs based on local needs and contributing to policy formulation through state-specific data and experiences. However, significant limitations exist as they have no direct administrative control over CPSE offices located in the states, cannot influence organisational structure or staffing. They have a limited say in budget allocation and financial decisions of central enterprises and no control over research priorities.

This example illustrates an interesting dynamic where these CPSEs operate in domains constitutionally assigned to states, working in coordination with state public enterprises. Their role is typically supportive - providing expertise, resources, or services that complement state efforts rather than superseding state authority. In recent years, scholars have endeavored to incorporate principles from evaluation science into discursive power research, aiming to provide novel perspectives for applying discursive power theory in fisheries (Hu, 2013; Lu, 2023; Zou, 2020).

Discursive Power

Within federal public enterprises, discursive power manifests through the capacity to shape narratives, norms, and policy agendas across state public enterprises. This power is often wielded through mechanisms such as policy papers, communiqués, and formal declarations, which serve to legitimise certain perspectives whilst marginalising others. The efficacy of such discursive strategies is contingent upon the federal public enterprise's perceived legitimacy, its structural composition, and the geopolitical dynamics of the country. Notably, the interplay between institutional discourses

and the states' interests can engender complex negotiation processes, potentially leading to the emergence of hybrid discursive frameworks that reflect both supranational and national priorities.

According to current research, discursive power can be divided into two categories: institutional discursive power and discursive power of public opinion (Chen & Wang, 2016). On national scale, within comprehensive or specialised organisations, the enhancement of institutional discursive power remains a pivotal topic. In recent years, scholars have endeavoured to incorporate principles from evaluation science into discursive power research, aiming to provide novel perspectives for applying discursive power theory across various fields (Ren, et al., 2013; Zhang et al., 2021; Zhao et al., 2021,2022). Building upon this foundation, this study seeks to construct an evaluation model based on discursive power theory, aiming to assess and compare the institutional discursive power of state public enterprises within federal public enterprise, thereby offering theoretical support for them to further elevate its institutional discursive power within the federal enterprises.

The concept of institutional discursive power lacks a unified definition at present. However, scholars generally concur that institutional discursive power is a form of discursive power manifested through institutional formation (Gao, 2016). Discursive Power The concept of discursive power originates from the integration of "discourse", a linguistic notion, and "power", a political notion, initially proposed by the French philosopher Michel Foucault. Within the theoretical framework of discursive power, Foucault's perspective that "discourse is power" is most renowned. This viewpoint posits that discourse and power, through interaction, give rise to discursive power. Some scholars have further elucidated the process of interaction between discourse and power, asserting that within this dynamic process, power generates discourse, and discourse expands power. Building upon this foundation, scholars have basically reached a consensus on the connotation and definition of discursive power. They perceive discursive power as the capability, exercised through discourse, to alter the thoughts and actions of others. Some scholars, leveraging the theoretical framework of discourse and power, posit that discursive power encompasses such components as discourse subject, discourse content, discourse objects, discourse platform, and discourse effect. It is important to note that Foucault's notion of discursive power refers to the power that emanates from the dominion of discourse, denoting the "effect of speech" rather than the "right to speak".

Institutional Discursive Power.

The essence of institutional discursive power revolves around two core components of "discursive power" and "institution". By merging discursive power theory with institutional theory,

scholars have unravelled a nuanced and profound interpretation of institutional discursive power. Joseph S. Nye (2008) asserts that beyond cultural values, institutions represent the third major source of discursive power, underscoring the intrinsic connection between discursive power and institutions. In contrast to other new institutionalisms, discursive institutionalism places a notable emphasis on the role of discourse in shaping institutions (Schmidt, 2008). It posits that institutions are rooted not in hierarchical structures or formal arrangements, but rather in shared communicative interactions. Moreover, institutions are moulded through the dissemination of ideas within established frameworks (Peters, 2019). Building upon the formed theoretical foundations, some researchers have endeavoured to define the concept of institutional discursive power through combining components of discursive power and shaping institutions. Highlighting the process of discourse effect generated from discourse content and platform, which illustrates the path to realise institutional discursive power.

From the aforementioned definitions, it is clear that the distinctive essence of institutional discursive power lies in the fact that its emergence is rooted in international systems and contingent upon the characteristics and influence of these systems, setting it apart from other forms of discursive power. At its core, from the perspective of power composition, institutional discursive power embodies a combination of discursive power and institutional power, constituting a potent form of compound power. Discursive power can be understood simply as power derived from the output of discourse, emphasizing the entirety of the process from the discourse subject to the discourse effect. In contrast, institutional power pertains to the capacity to indirectly guide and constrain the behaviours of others through institutions (Krasner, 1982).

Institutions encompass components such as norms, regulations, rules, and decision-making procedures, characterised by a broad scope of influence, long duration, and strong acceptability. However, by transforming discourse into power in the form of institutions, the potency of discursive power is enhanced. This is akin to overlaying institutional power upon discursive power, amplifying the energy generated in the phase of discourse output and significantly elevating discourse effects. Thus, institutional power serves as a safeguard for discursive power. institutional discursive power is also a fusion of structural power and relational power, serving as a concentrated manifestation of the conversion of the discourse subject's strength and discourse output capacity into power (Strange, 2015). Structural power refers to the capability to shape and determine various global structures, political or economic (Guzzini, 1993). It emanates from the strength and status of actors within the system, quantifiable through "hard power" such as political, economic, and technological prowess.

Structural power is characterised by its "indirect institutional, non-intentional, and non-individual creativity" nature.

Opportunity for smaller and poorer states

Robust political strength of a state often yields greater influence, transitioning imperceptibly into structural power, becoming an inherent advantage in a state's construction of federal systems. On the other hand, relational power accentuates interactions between actors driven by their respective preferences and expectations. It leverages national institutions to achieve control, influence, and domination over the actions of others. Unlike structural power, relational power emerges from interactions reoriented toward explicit objectives. It evolves along with the content and delivery of discourse during interactions, resulting in significant variability, rapid transformation, and multiple possibilities for change. Relational power can serve as a "subsequent empowerment" in a state's construction of national systems.

Institutional arrangements become a pivotal means for states to initiate dialogue, negotiate relationships, and exercise mutual constraints and influence. Often mastering institutional discursive power, bigger and richer states solidify the national order shaped by their unilateral value systems in institutional forms. Nonetheless, the foundational principles of intra-national relations advocated by the constitutions confer equal rights for all states to participate in the establishment of international institutions. Thus, smaller and poorer states possess the opportunity to alter the imbalance within the national order by participating in institutional development. Leveraging their specific advantages in certain domains, they can strategically pursue institutional discursive power, thereby achieving a reallocation of power and resources, facilitating the creation of a more conducive environment for their development through public enterprises.

Components of Institutional Discursive Power

Drawing upon discursive power and institutional discursive power theories, institutional discursive power within federal enterprises should encompass fundamental components such as discourse subjects, discourse platforms, discourse contents, discourse objects, and discourse effects. However, this study contends that the understanding of the institutional formation process is of significance to the analysis of institutional discursive power, and we have to understand that the process covers the transition from discourse contents to discourse effects and the transition requires the specific means for discourse delivery, which means that discourse content and discourse delivery can be integrated as discourse output for analysis. In light of this, the components constituting institutional discursive power within federal public enterprises are deemed to include their discourse

subjects, discourse platforms, discourse outputs, discourse objects, and discourse effects (Cartensen et al., 2016; Peci et al., 2009).

(1) Discourse Subjects

While federal public enterprises encourage multifaceted participation to enhance cooperation between state public enterprises with vested interests, it is important to note that, according to the conventions of each federal public enterprise, usually state public enterprises do not possess voting rights.

(2) Discourse Platforms

Federal public enterprises discourse platforms refer to the conduits through which their discourse outputs are conveyed and which provide the settings for exercising discursive power. According to the rule of procedure of each federal public enterprise, main functional bodies, as well as specialised working groups, convene regular meetings, during which reports and proposals submitted by various committees are discussed for decision making.

(3) Discourse Outputs

Federal public enterprises discourse outputs refer to the delivery of discourse content with specific delivery means. Each federal public enterprise implements a number of management strategies. Additionally, opinions and suggestions regarding the organisational operation and performance assessment of federal public enterprise also constitute significant discourse content. All these discourse content exert influence on institutional development. At various meetings, state public enterprises usually deliver such discourse content through proposals, suggestions, statements, reports, etc., in pursuit of acceptance and acknowledgment from other stakeholders.

(4) Discourse Objects

Federal public enterprise discourse objects refer to entities subject to the constraints imposed by rules ratified by it, thereby designating state public enterprises as the predominant discourse objects.

(5) Discourse Effects

The direct manifestation of federal public enterprises discourse effects is the conversion of discourse content from discourse subjects into enforceable rules. The proposals introduced by members undergo iterative deliberations and determinations, culminating in the establishment of rules possessing both binding force and substantive impact. The rules of engagement collectively reflect the consensus and feedback from state public enterprises to discourse subjects, leading to the generation of institutional discursive power within federal public enterprises (Thornborrow, 2014).

The formation of institutional discursive power within within federal public enterprises is a cyclical process determined by the interactions among its constituent.

Creation of institutional discursive power

The constituent components exert influence across these phases on the eventual configuration and potency of institutional discursive power

(1) Discourse Generation

The foundational prerequisite for the emergence of institutional discursive power within federal public enterprises is the generation of discourse intrinsically linked to their foundation. The generation of discourse hinges on the volition and capabilities of the discourse subjects themselves. Specifically, state public enterprises must exhibit an active and profound stewardship mentality in the establishment of procedures within the federal public enterprise, transcending mere follower roles. Furthermore, the generation of discourse that harmonises the attainment of federal public enterprise management objectives with the pursuit of individual development needs mandates a robust research foundation, substantial research capabilities and research investment by state public enterprises. This process should occur in parallel with the understanding, from the perspective of state strategy, of the interplay between advancing states's own development agenda and participating in the construction of federal institutions. The generated discourse thus forms an essential prerequisite for attaining institutional discursive power within the federal public enterprises.

(2) Discourse Transmission

Discourse transmission refers to the entire process through which discourse is conveyed from discourse platforms to discourse objects, resulting in the generation of discourse effects. In other words, individual state public enterprises, adhering to the rules of procedure, convey their generated discourse to other state public enterprises and cooperating non-contracting parties through meetings at various levels. Discourse transmission constitutes the central phase in the formation of institutional discursive power.

(3) Discourse Feedback

Institutional discursive power within federal public enterprise operates through a feedback mechanism encompassing discourse effects, subjects, and outputs. This system is established when state public enterprises successfully translate their proposals and statements into binding rules. The resultant discourse effects reciprocally influence the members, potentially enhancing their credibility or resource allocation advantages. Even when discourse fails to become codified, the ensuing discussions still generate effects, prompting members to refine their discourse strategies.

Evaluating institutional discursive power necessitates a mixed-methods approach to analyse its distribution, emphasis, and composition. This methodology should aim to objectify discursive power, facilitating a more nuanced understanding of roles of state public enterprises in shaping the institutional framework, their relative strengths and weaknesses, and the anticipated trajectory of development. The evaluation framework, grounded in evaluation science principles, should primarily focus on discourse subjects, outputs, and effects, as discourse platforms and objects remain relatively constant. Drawing from extant discursive power evaluation systems and expert opinions from relevant sectors, an evaluation framework for institutional discursive power can be made. This approach seeks to comprehend and analyse the extent of mastery displayed by state public enterprises over this power and its composition, thereby rendering the concept more tangible and amenable to empirical research.

Dimensions of institutional discursive power evaluation

The dimensions are determined by the competitive strength of the discourse subjects, the constructive power of discourse outputs, and the influence of discourse effects. These three dimensions are further deconstructed layer by layer to identify evaluation components, followed by the determination of their specific components.

(3) Competitiveness

Competitiveness refers to the inherent capacity of state public enterprises as discourse subjects, embodying their structural power. Competitiveness exhibits in various forms and is assessed based on criteria such as representativeness and relevance. The comprehensive state power in political and economic domains demonstrates their national status and influence. Meanwhile, their capacity in production and governance reflects their competency to engage in national affairs. These two components, combine to form competitiveness, determining the starting point engagement in institutional formulation.

(2) Constructiveness

Constructiveness refers to the capability of state public enterprises to guide and propel the process of institutional formulation through their discourse outputs. This capability is manifested through agenda-setting, rule compliance, and rule shaping. They can directly participate in agenda-setting through proposals or indirectly through suggestions and declarations significantly influences their capacity to guide on prioritising management issues, formulating preservation and administration procedures, and evaluating management effectiveness, according to their interest preferences. Their credibility by meeting compliance standards can exert robust impetus on the

effective operation of the existing rules. Further, their research capacities, team dynamics, and language advantages also determine their capability to shape rules by proposing claims and interpreting regulations.

(3) Influence

Influence can be evaluated from two aspects: institutional transformation and degree of involvement. Institutional transformation refers to the efficiency with which the claims put forth by state public enterprises through discourse outputs can be translated into formal rules. Only the rules that become official management measures, resolutions, or recommendations possess a certain degree of binding force.

Construction of Evaluation Model

Based on the evaluation framework, this the three evaluation dimensions, namely, the competitiveness of the discourse subjects, the constructiveness of the discourse outputs, and the influence of the discourse effects, can be defined as tier 1 indicators. The evaluation components are identified as tier 2 indicators, and the components of them is further categorised as tier 3 indicators. Under this structure, a three-tiered evaluation indicator system is designed. Subsequently, weights can be assigned to the evaluation indicators at each tier, and data collection and analysis methods are developed to construct the evaluation model for institutional discursive power. Following the principles of systematicity, comprehensiveness, comparability, quantifiability, and operability as advocated by the theory of scientific evaluation, a three- tiered indicator system, comprising some tier 1 indicators, some tier 2 indicators, and some tier 3 indicators can be desgned for evaluating institutional discursive power.

The constructiveness is determined by their agenda-setting capability, as evidenced by the quantity, content, and purpose of their submitted proposals. State public enterprises also leverage research and negotiation advantages to influence rule formulation via scientific reports and formal declarations. Their influence is primarily evaluated by their ability to transform proposals into rules. Specific indicators, such as the quantity, content, and purpose of adopted proposals, serve to assess this potential influence. Their engagement performance, and resource investment as means to evaluate their influence. The weighting of evaluation indicators, crucial for the model's scientific rigour and fairness, can be determined using the Analytic Hierarchy Process (Brunelli, 2014). This process involved pairwise comparisons between indicators at the same tier. The Delphi method (Skulmoski et al., 2007) can be employed in conjunction, inviting experts from the relevant field. These combined approaches lead to the stepwise determination of indicator weights.

Prior to data analysis, this study employs qualitative judgement to score certain data, distinguishing importance within evaluation indicators. The range standardisation method is then applied to render data dimensionless, eliminating the impact of units and numerical ranges on comparability and interpretability. This process involves determining the maximum and minimum values of each indicator, calculating the range, and then normalising each observation value to fall between zero and one. This transformation ensures consistent directional effects for both positive and inverse indicators. The weighted sum method is utilised, multiplying standardised scores of third-tier indicators by their respective weights. The sum of these scores yields an overall score representing a member's institutional discursive power.

Conclusion

A rigorous framework and model for evaluating institutional discursive power within federal public enterprises are developed by the model using the principles of evaluation science. Evaluation dimensions are designated as tier 1 indicators, evaluation elements as tier 2 indicators, and particular parts of these evaluation elements as tier 3 indicators. The weights given to each of these indicators are established using the Analytic Hierarchy Process.

It is significant that this model provides a thorough and rigorously scientific method for evaluating and comparing the institutional discursive power of member states. It was created by combining subjective and objective assessments and harmonising qualitative and quantitative evaluations. Additionally, this model has some universality, which means that it may be used for study in and support ongoing research within intergovernmental institutions as well. The model provides stakeholders with insights derived from strong international practices and provides a more intuitive understanding of the role that each member state plays in supporting the establishment of intergovernmental institutions.

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