Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
May 2024 5(5), 1531–1537

AN EXPLORATORY CASE STUDY ON OUTSOURCING PRACTICES AND GOVERNANCE MECHANISMS IN MAINTENANCE AND OPERATIONS: EVIDENCE FROM BHILAI STEEL PLANT

Suresh Kumar Panchbhai [1], Dr. Tripti Shastri [2], Dr. Bishwajeet Bhattacharjee [3]

[1] Research Fellow, School of Commerce & Management, ISBM University Mahasamund Raipur, CG, India
[2] Associate Professor, School of Commerce and Management, ISBM University Mahasamund Raipur, CG, India
[3] Associate Professor FMS, SSTC, Bhilai, India

Corresponding Author

Suresh Kumar Panchbhai,
panchbhai@yahoo.com

DOI
10.29121/shodhkosh.v5.i5.2024.5702

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ABSTRACT

The purpose of this exploratory case study is to examine the outsourcing practices and governance mechanisms in maintenance and operations at Bhilai Steel Plant, one of India's largest public-sector steel manufacturing units. The study aims to understand how the distinction between core-close and core-distant activities influences outsourcing decisions and how governance mechanisms, including supplier capability, contractual clarity, and performance monitoring, affect operational efficiency. Adopting a qualitative, case-based methodology, the research draws insights from existing internal practices, organizational reports, and industry literature without collecting primary data or applying statistical tools. The findings reveal that strategic outsourcing decisions at Bhilai Steel Plant are guided by operational criticality, vendor competence, and the need for robust governance frameworks. Core-distant tasks are more frequently outsourced, while core-close functions are retained in-house or governed under strict protocols to mitigate risk. This research contributes to the practical understanding of outsourcing in heavy industries and underscores the importance of tailored governance structures.

Keywords: Outsourcing Practices, Governance Mechanisms, Core-Close Vs. Core-Distant Activities, Maintenance and Operations, Strategic Decision-Making

1. INTRODUCTION

Outsourcing has become an essential strategy in modern industrial management, particularly within large-scale manufacturing units such as steel plants. As operational demands grow in complexity, organizations increasingly rely on third-party expertise to handle specific maintenance and operational functions. This research, titled "An Exploratory Case Study on Outsourcing Practices and Governance Mechanisms in Maintenance and Operations: Evidence from Bhilai Steel Plant", investigates how outsourcing decisions are made and governed in one of India's leading steel manufacturing facilities. Focusing on the distinction between core-close and core-distant activities, and the role of supplier capability and governance models, the study aims to uncover the practical considerations and frameworks that drive outsourcing efficiency and performance outcomes at Bhilai Steel Plant.

In today's competitive industrial landscape, outsourcing has become a pivotal strategy for organizations aiming to optimize operational efficiency, control costs, and enhance service quality. This is particularly true in capital-intensive sectors like steel manufacturing, where operational complexity and maintenance demands are substantial. Bhilai Steel Plant (BSP), one of India's foremost integrated steel producers, provides a compelling context to explore outsourcing decisions due to its extensive infrastructure and varied maintenance functions. However, the success of outsourcing initiatives largely depends on two underexplored dimensions: the strategic relevance of the activity being outsourced—whether it is core-close or core-distant—and the capability of the external supplier entrusted with the task. While many studies have addressed the cost and efficiency aspects of outsourcing, there is a pressing need to examine how core-relatedness influences the decision to outsource specific functions, and how supplier competence shapes the governance mechanisms adopted for these outsourced tasks. This research addresses this gap by systematically evaluating these two critical variables at BSP, offering valuable insights for both academic theory and industrial practice in outsourcing governance.

Outsourcing decisions in maintenance operations within capital-intensive industries like steel manufacturing require a nuanced understanding of strategic priorities and operational risk. At Bhilai Steel Plant (BSP), these decisions are shaped significantly by two critical factors: the core-distance of the maintenance function and the capability of the external supplier. Core-distance refers to how closely a task aligns with the plant's strategic objectives and technological competencies. Functions considered core-close, such as blast furnace maintenance or critical machinery upkeep, are typically retained in-house due to their direct impact on production continuity, safety, and technical know-how retention. In contrast, core-distant tasks—such as landscaping, routine facility upkeep, or non-critical repairs—are more frequently outsourced, allowing the organization to focus its internal resources on value-driving operations. However, simply outsourcing non-core activities does not guarantee efficiency or quality gains. The supplier's capability—defined by technical expertise, domain experience, workforce skill level, and responsiveness—plays a vital role in ensuring that outsourced tasks meet desired performance standards. BSP employs varying governance practices depending on the strength of the supplier; high-capability vendors are often engaged with trust-based governance models that rely on collaborative problem-solving, flexibility, and performance-linked incentives. In contrast, suppliers perceived as less capable are governed through rigid contracts, detailed service-level agreements, and tight performance monitoring to mitigate risks. This dual influence—of core-distance and supplier strength—ensures that outsourcing at BSP is not just a cost-reduction tactic, but a strategic decision integrated with long-term operational and organizational goals. The plant's adaptive governance framework provides a compelling model for other large-scale manufacturers navigating similar outsourcing challenges in complex environments.

2. REVIEW OF LITERATURES

Outsourcing decisions in the steel manufacturing sector are driven by a strategic intent to reduce costs, focus on core competencies, and leverage external expertise for non-core activities. Scholars such as Quinn and Hilmer (1994) argue that outsourcing non-strategic activities enables organizations to concentrate on areas of competitive advantage. In the context of steel plants, where operational complexity is high, McIvor (2005) emphasizes that outsourcing decisions must consider both the strategic importance of the function and the performance risk associated with external providers. Holcomb and Hitt (2007) further suggest that strategic outsourcing in manufacturing should be guided by a careful alignment between the outsourced task and the firm's overarching value chain. Specifically, in capital-intensive environments like steel plants, outsourcing decisions often hinge on the distinction between core-close and core-distant functions, a framework supported by Prahalad and Hamel (1990), who argue that firms must retain control over operations that contribute directly to core competencies. Empirical studies, such as those by Kakabadse and Kakabadse (2005), demonstrate that in large manufacturing firms, outsourcing is more successful when preceded by detailed task analysis and supplier capability assessment. These findings collectively underscore the importance of strategic alignment, risk evaluation, and internal capability benchmarking in making outsourcing decisions in steel manufacturing operations.

Effective governance practices in maintenance operations are critical to ensuring consistency, performance, and accountability, especially in capital-intensive sectors like steel manufacturing. Governance models regulate how responsibilities, controls, and communications are managed between the organization and external service providers. According to Williamson (1985), transaction cost economics provides a theoretical basis for governance, highlighting

that the choice of governance mechanisms—ranging from contractual to relational—depends on factors like asset specificity, uncertainty, and transaction frequency. In the context of outsourced maintenance, Heide and John (1992) emphasize the importance of relational governance, such as trust and long-term collaboration, in environments with high task complexity and performance ambiguity. Similarly, Poppo and Zenger (2002) argue that formal contracts and relational norms work as complementary mechanisms, especially when technical maintenance tasks require a combination of legal structure and mutual adaptation. Ghosh and Fedorowicz (2008) support this by suggesting that integrated governance, combining performance-based contracts and feedback mechanisms, is more effective in outsourced maintenance environments, particularly in manufacturing industries where service quality and equipment uptime are crucial. These findings suggest that governance effectiveness in maintenance operations depends not only on the structure of agreements but also on the ability to manage partnerships dynamically and responsively.

The concept of core-distance plays a pivotal role in evaluating outsourcing decisions, particularly in complex industries such as steel manufacturing. According to Prahalad and Hamel (1990), organizations should retain activities that are closely tied to their core competencies, while outsourcing those that are peripheral or "core-distant." This strategic segmentation helps preserve competitive advantage and internal knowledge assets. McIvor (2000) expands on this by introducing a value-based framework that categorizes activities based on their contribution to strategic goals, recommending outsourcing primarily for low-value, core-distant functions. Vining and Globerman (1999) further emphasize that the outsourcing of non-core functions can lead to cost savings and increased managerial focus, but caution against outsourcing tasks that, while not core, are tightly interlinked with other critical operations. Abele et al. (2008) also note that improper classification of functions can result in the loss of technical know-how and increased dependency on external suppliers. These insights collectively suggest that careful evaluation of core-distance—based on technological interdependence, strategic importance, and risk of knowledge leakage—is essential to making sound outsourcing decisions in operationally intensive sectors.

The influence of supplier strength—referring to a supplier's technical capabilities, reliability, and domain expertise—is a critical determinant in outsourcing decisions, particularly for high-stakes functions in manufacturing sectors. According to Levina and Ross (2003), firms prefer suppliers with strong domain knowledge and process maturity, as such partners can deliver not only efficiency but also innovation and process improvement. Williamson (1985) emphasizes that the presence of asset-specific investments and uncertainty necessitates choosing suppliers who are capable of adapting to dynamic operational needs, thereby reducing transaction costs and performance risk. Supporting this view, Ghosh and Scott (2009) argue that supplier competence enhances trust, enabling more flexible and collaborative governance models, which is especially important when outsourcing complex technical services like equipment maintenance. Furthermore, McIvor (2008) contends that supplier capability should be evaluated not just in terms of current performance but also in terms of strategic fit and capacity for long-term value addition. In the context of steel manufacturing, where downtime and quality lapses can have severe operational and financial implications, supplier strength becomes a key enabler of successful outsourcing.

The concept of core-distance significantly influences the selection and design of governance practices in maintenance operations, particularly in asset-intensive sectors such as steel manufacturing. Core-distance refers to how central a task is to the firm's strategic objectives and technological competencies. According to McIvor (2000), maintenance activities that are core-close—such as those impacting safety, production continuity, or proprietary technology—require tighter governance mechanisms, often through internal control or performance-based contracts. In contrast, core-distant activities, which pose less strategic or operational risk, are more amenable to flexible, loosely structured governance, such as relational contracts based on trust and service-level expectations (Williamson, 1985). Poppo and Zenger (2002) argue that in core-close functions, firms are more likely to deploy hybrid governance combining formal contracts with monitoring and collaborative arrangements to ensure quality and responsiveness. Additionally, Abele, Kluge, and Näher (2008) highlight that firms often misclassify the strategic relevance of maintenance tasks, leading to inadequate governance and performance failures. Thus, evaluating the core-distance of maintenance tasks is essential for selecting appropriate governance frameworks that balance control, cost, and adaptability.

Supplier strength plays a pivotal role in shaping governance practices in maintenance operations, particularly in industries where operational reliability is critical, such as steel manufacturing. Strong suppliers—characterized by technical competence, reliability, responsiveness, and the ability to innovate—enable more flexible and trust-based governance arrangements. According to Williamson (1985), governance structures are influenced by transaction attributes such as uncertainty and asset specificity, which are mitigated when suppliers demonstrate higher capabilities.

Levina and Ross (2003) highlight that supplier expertise fosters mutual trust and reduces the need for excessive formal control, allowing firms to adopt more relational governance mechanisms. Poppo and Zenger (2002) also support this by arguing that supplier strength enhances the effectiveness of hybrid governance models, where formal contracts are complemented by informal coordination. In the context of maintenance outsourcing, Ghosh and Scott (2009) suggest that capable suppliers are more likely to meet performance expectations under less rigid contractual arrangements, promoting collaborative problem-solving and continuous improvement. Thus, the presence of strong suppliers positively influences the design and success of governance practices in outsourced maintenance settings.

2.1. RESEARCH OBJECTIVES

- To examine how the distinction between core-close and core-distant maintenance/operation activities influences outsourcing decisions.

This objective aims to understand the strategic rationale behind outsourcing choices based on the criticality and proximity of tasks to the organization's core competencies (Prahalad & Hamel, 1990; McIvor, 2000).

- To examine the factors influencing outsourcing decisions in maintenance and operations at Bhilai Steel Plant.

This includes managerial perspectives, historical precedents, contractual obligations, and strategic priorities.

3. CASE BASED DISCUSSIONS

3.1. CORE-CLOSE VS. CORE-DISTANT OUTSOURCING DECISIONS AT BHILAI STEEL PLANT

Bhilai Steel Plant (BSP), a flagship unit of Steel Authority of India Limited (SAIL), is one of the oldest and most prominent integrated steel plants in India. With its vast operations covering coke ovens, blast furnaces, steel melting shops, and rolling mills, BSP has over the decades faced a growing need to optimize operations and increase efficiency through strategic outsourcing. The decision-making process behind outsourcing is deeply influenced by how the plant distinguishes between "core-close" and "core-distant" functions in its maintenance and operations.

At BSP, core-close functions are those that are directly linked to production continuity, safety, and plant uptime. These include activities such as blast furnace refractory maintenance, continuous casting machine alignment, turbine overhauling, and real-time equipment diagnostics in steel melting shops. Such operations require highly skilled personnel, real-time decision-making, and immediate control. Due to their strategic significance, BSP retains these functions largely in-house or under tight supervision even when outsourced. For instance, critical repairs during unplanned breakdowns in the Plate Mill or Hot Strip Mill are handled by plant-employed engineers and technicians, supported occasionally by vendor specialists under detailed service-level agreements (SLAs). The risk of downtime, production loss, and safety incidents associated with these functions is too high to allow complete external control.

In contrast, core-distant functions are those that, while necessary for operations, are not central to the steel production process and can be delegated with lower strategic risk. These include maintenance of township utilities, sanitation and housekeeping services, painting of non-operational areas, and upkeep of peripheral equipment such as cooling tower fans and air compressors. These activities have less impact on direct production outcomes and can be standardized or scheduled. Hence, BSP extensively outsources them to local contractors and service agencies. The contracts are typically awarded based on cost-effectiveness, vendor reputation, and past performance, with a defined scope of work and minimal requirement for plant-level supervision.

A specific example can be drawn from the mechanical maintenance department, where the lubrication of mill components is seen as a routine and predictable task. BSP classifies this as core-distant and assigns it to a third-party vendor with monthly performance monitoring. On the other hand, hydraulic maintenance of the blooming mill is considered core-close due to its impact on rolling precision and safety; it is either handled internally or outsourced only to highly specialized vendors with plant oversight.

The distinction also affects governance. Core-close activities require tighter governance models, including joint review committees, real-time data sharing, and clause-heavy contracts. For core-distant activities, governance is light-touch, with periodic inspections and invoice-based evaluations.

In conclusion, Bhilai Steel Plant's classification of activities into core-close and core-distant is a strategic approach that guides outsourcing decisions. It helps the plant manage operational risks, maintain quality and safety standards, and

allocate resources efficiently. The case highlights how a nuanced understanding of operational criticality informs outsourcing choices, ensuring that the plant remains productive and cost-efficient without compromising on strategic control.

3.2. FACTORS INFLUENCING OUTSOURCING DECISIONS IN MAINTENANCE AND OPERATIONS AT BHILAI STEEL PLANT

Bhilai Steel Plant (BSP), a unit of the Steel Authority of India Limited (SAIL), operates as a massive, integrated steel manufacturing complex in Chhattisgarh. With its scale, age, and range of operations, BSP faces continuous pressure to maintain high operational efficiency, meet output targets, and control costs. Against this backdrop, outsourcing of maintenance and operational tasks has become a critical strategy, but the decision to outsource is not arbitrary—it is guided by multiple interrelated factors.

One of the primary factors influencing outsourcing at BSP is cost-efficiency. Over the years, maintaining a large in-house workforce for all maintenance functions has proven to be financially unsustainable, especially for non-core activities. Outsourcing offers the advantage of reducing labor overheads, avoiding capital expenditure on specialized equipment, and ensuring predictable cost structures through fixed contracts. For instance, annual maintenance of auxiliary equipment like compressors and cranes is outsourced to avoid long-term payroll liabilities and to benefit from vendor economies of scale. Another major factor is technical capability and expertise. Certain advanced or infrequent tasks, such as vibration analysis, PLC system upgrades, or refractory lining in blast furnaces, require specialized knowledge and tools not always available within BSP's internal maintenance teams. In such cases, BSP relies on experienced external vendors with proven technical competence. For example, during the recent overhauling of its oxygen plant, BSP contracted a specialized private firm with domain expertise that could complete the work faster and more efficiently than in-house teams.

Resource flexibility and scalability also play an important role. BSP experiences fluctuations in maintenance workload—such as during annual plant shutdowns or major capital repairs—where outsourcing helps ramp up manpower and services without permanent employment. This is particularly evident in the outsourcing of tasks like structural fabrication, scaffolding, and insulation work during scheduled turnarounds in the coke ovens and steel melting shops. Performance accountability and risk-sharing is another influencing factor. Outsourced vendors are bound by performance-based contracts, which include penalties for delays or substandard work. This model encourages vendors to maintain high standards and allows BSP to transfer certain risks to the third parties. The plant's recent experience with outsourced conveyor belt maintenance is an example where the vendor's incentive structure led to better uptime than previous in-house efforts.

Moreover, compliance with safety and environmental norms also determines outsourcing decisions. Specialized vendors certified in safety standards and pollution control measures are preferred for high-risk jobs like effluent treatment or gas pipeline repairs. Outsourcing in these cases helps BSP maintain regulatory compliance without bearing the full cost of training and certification. Lastly, legacy systems and workforce resistance sometimes limit outsourcing in certain departments. In functions with strong trade union presence or long-standing internal expertise, full outsourcing may be politically or culturally sensitive, leading to hybrid models where vendors operate under plant supervision.

The outsourcing strategy at Bhilai Steel Plant is driven by a mix of economic rationale, technical considerations, risk mitigation, compliance requirements, and organizational dynamics. The plant's approach is carefully calibrated—outsourcing what is non-core or specialist, while retaining control over critical and strategic operations. This multifactor decision-making framework ensures operational reliability while achieving cost and performance goals.

4. RESEARCH IMPLICATIONS

The findings of this study hold significant implications for both theory and practice in the field of operations and strategic management. By exploring how Bhilai Steel Plant distinguishes between core-close and core-distant activities and aligns outsourcing decisions accordingly, the research offers a nuanced understanding of outsourcing frameworks within heavy manufacturing industries. Practically, the study provides decision-makers with a structured approach to assess outsourcing suitability based on operational criticality, supplier capabilities, and governance needs. It emphasizes the importance of context-specific governance models—such as contractual clarity and performance monitoring—in

achieving desired outcomes in cost and quality control. Theoretically, the research contributes to the limited empirical literature on outsourcing in the public-sector steel industry in India, particularly by integrating maintenance strategies with governance considerations. These insights can inform policy formulation, vendor engagement strategies, and risk mitigation practices in similar large-scale industrial setups across developing economies.

5. CONCLUSION AND DISCUSSION

The study on outsourcing and governance models at Bhilai Steel Plant reveals that outsourcing decisions are not merely cost-driven but are shaped by a strategic alignment of several operational, technical, and managerial factors. The case studies clearly illustrate that the distinction between core-close and core-distant activities significantly influences the extent and nature of outsourcing. Core-close functions, being critical to safety, production continuity, and plant reliability, are either retained in-house or governed under stringent supervision and high-performance contracts, while core-distant functions are outsourced to reduce overhead and enhance efficiency. Furthermore, the plant's outsourcing strategy is deeply influenced by vendor capabilities, especially in specialized maintenance areas such as automation, refractory work, and environmental compliance. Governance models, including trust-based coordination, contractual clarity, and performance monitoring, play a crucial role in ensuring quality control and cost effectiveness in outsourced operations. The discussions validate all the research objectives by showing how these factors interlink to form a practical and risk-mitigated outsourcing framework at BSP. These insights not only support existing literature but also offer industry-specific contributions to understanding outsourcing dynamics in large-scale manufacturing units.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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