

NMDC's Forward Integration Strategy: The Make-or-Buy Dilemma in Pellet Production

¹John A. Gonsalvez, ²Dr. Mahesh M.V, ³Dr. Rajkumar S

¹Research Scholar, Xavier Institute of Management & Entrepreneurship, A recognized Research Centre of the University of Mysore

Email: john@xime.org

²Professor, Xavier Institute of Management & Entrepreneurship, A recognized Research Centre of the University of Mysore. Email: mahesh@xime.org

³Associate Professor, Xavier Institute of Management & Entrepreneurship, A recognized Research Centre of the University of Mysore. Email: rajkumar@xime.org

Introduction:

National Mineral Development Corporation (NMDC), being the leading iron ore producer, sought to enhance its value chain by integrating into iron ore pellet production. Being a producer of iron ore, NMDC never faced any difficulty in sourcing iron ore for the production of pellets. This forward integration is aimed at enhancing value realisation from iron ore, strengthening long-term profitability, and laying the foundation for NMDC's eventual entry into steel manufacturing.

Iron ore produced by NMDC is a raw material for iron ore pellets, which is consumed by Steel Plants as a raw material. Since iron ore pellet is a value-added material, priced high in the market, and NMDC has huge reserves of iron ore, it was decided to set up its own Pellet Plant with a capacity of 1.2 million tons per annum. As Pellet Plant is a forward integration to iron ore mining, NMDC's vision was very clear to establish itself in the field of iron ore pellet production before venturing into setting up a Steel Plant to maximise its profit. However, they faced a critical challenge of technical expertise required for pellet production, a process that mandated specialised operational knowledge and advanced maintenance systems.

The strategic dilemma was:

Should NMDC invest capital and time to develop in-house capabilities, or should it outsource operations to an experienced service provider capable of offering immediate operational efficiency?

About NMDC

NMDC, a Navratna Public Sector Enterprise under the Ministry of Steel, Government of India, established in 1958, is the largest producer of iron ore in India. It owns and operates highly mechanised iron ore mines in Chhattisgarh and Karnataka. NMDC is considered as one of the low-cost producers of iron ore in the world.

The Company produces over 45 million tons per annum of iron ore from its major iron producing units at Bailadila Sector in Chhattisgarh and Donimalai in Bellary-Hospet region in Karnataka. NMDC envisaged to have an iron ore production capacity of 100 million tons per annum by FY'30.

NMDC is only a pioneer in the field of mining of iron ore, and they do not have the necessary expertise in the production of iron ore pellets. As such, NMDC invested in setting up a Pellet Plant with an option to outsource the operation and maintenance activities of the plant. Hence, they needed to identify the outsourcing partner for the operations of the Pellet Plant.

The matter was deliberated with the Ministry of Steel, Govt. of India, by NMDC for their directive in identifying the outsourcing partner.

Role of Ministry of Steel, Govt. of India

Ministry of Steel suggested that KIOCL Limited (Kudremukh Iron Ore Company Limited), a Miniratna Central Public Sector Enterprise under the Ministry of Steel, a pioneer in the field of iron ore pellet

production, with excess manpower to run another Pellet Plant, collaborate with NMDC to exemplify the synergy between two Government entities.

KIOCL Limited

KIOCL Limited, a Flagship Company under the Ministry of Steel, Govt. of India, was formed in 1976 for mining and beneficiation of low-grade iron ore at Kudremukh, Karnataka, India.

KIOCL has been a pioneer in the operation of mining, beneficiation, and production of iron oxide pellets in the Country with over four decades of experience. KIOCL has facilities to operate a 3.5 million tons per annum iron oxide Pellet Plant, a Blast Furnace Unit to manufacture 2.16 lakh tons per annum pig iron at Mangaluru, Karnataka, India.

KIOCL successfully undertook the following outsourcing contracts:

1. Operation, repair, and maintenance of Chrome Ore Beneficiation Plant (COBP) & manpower supply to Orissa Mining Company, South Kaliapani.
2. Operation & maintenance of Coke Plant, MRPL, Mangalore.

Consideration of KIOCL as a Service Provider

Consideration of KIOCL as a service provider for the operation and maintenance of NMDC's Pellet Plant was beneficial to KIOCL, and it was agreed in principle by KIOCL. Subsequently, discussions were held between KIOCL & NMDC, keeping in mind the interest of both organisations and the following objective in mind:

"Provide all operations and maintenance services necessary and advisable to efficiently operate and maintain the plants, including all associated and necessary mechanical and electrical equipment, and fire-water system (as integrated with the plant)"

Structuring the Outsourcing Relationship

Negotiations were held between NMDC and KIOCL, which culminated in the signing of the final outsourcing contract in September 2014. Several rounds of rigorous review and deliberation by technical, financial, and legal experts from both organisations were held under the supervision of the Ministry of Steel.

The contract consists of:

- **Service Level Agreements (SLAs):** Include specific targets of operation, standards of maintenance, and production goals.
- **Performance-Based Rewards:** Specific indications of penalties for underperformance and bonuses for exceeding targets.
- **Periodic Reviews:** Details on conducting performance evaluations on a daily, weekly, and quarterly basis.
- **Risk Management Mechanisms:** How to mitigate risk and various provisions for handling supply disruptions and technical contingencies.
- **Governance Structure:** A senior officer from both companies was appointed for coordination and issue resolution.

This framework exemplified **contractual governance** — upholding accountability, clarity, and transparency.

Execution and Trust-Based Collaboration

Even though operations commenced smoothly, early challenges soon surfaced in the form of variations in ore quality, equipment inefficiencies, and technological issues tested the strength of the partnership.

KIOCL demonstrated remarkable flexibility and initiative beyond the scope of the contract:

- Commissioned the Beneficiation Plant as the OEM failed to respond.
- Fabricated critical spare parts locally to eliminate operational downtime.
- Redesigned the pressure filter system by modifying a single-cylinder system to a four-cylinder configuration, significantly improving productivity.

As such, these proactive measures stabilised operations and deepened mutual trust between NMDC and KIOCL. Over a period of time, NMDC & KIOCL evolved a **hybrid governance model** — one that effectively blended formal contractual mechanisms with informal collaboration and mutual respect.

The Dilemma

At the end of 2017, the plant had met all performance metrics and achieved full capacity utilisation. The outsourcing model was widely hailed as a public sector success story.

However, NMDC's leadership faced a strategic dilemma:

Should NMDC extend the outsourcing contract to KIOCL, leveraging its partnership success and proven expertise, or develop operational capability in-house for greater control and self-sufficiency?

The decision would shape NMDC's long-term strategy, organisational learning, and governance posture.

Epilogue

The NMDC–KIOCL partnership is a benchmark for inter-PSU collaboration, illustrating how public sector enterprises can achieve efficiency to the tune of private-sector levels through a balanced integration of reliable governance and mutual trust. The case prompts managers to reflect on a critical question: Does success in public sector outsourcing stem primarily from formal governance mechanisms, or from the strength of the relationships that sustain them?

Discussion Questions

1. What strategies influenced NMDC's decision to outsource plant operations?
2. How did the outsourcing contract ensure mechanisms for control, performance monitoring, and accountability?
3. How did mutual trust and relational governance complement the formal contractual framework?
4. Should NMDC build long-term capability internally, or continue outsourcing to sustain efficiency?
5. What lessons does this case render for governance and relationship management in the public sector?

Exhibits (Suggested)

- **Exhibit No.1:** Key Features of NMDC–KIOCL Outsourcing Contract
- **Exhibit No.2:** Production Targets, Penalty, and Bonus Clauses

Exhibit No. 1:

Key Features of NMDC–KIOCL Outsourcing Contract

Scope of outsourcing contract:

The General Scope of Work is Operation & Maintenance (O&M) of Beneficiation and Pelletisation Plants, including the operation and maintenance of the common Main Receiving Sub-station, along with the associated facilities as per the respective Operation & Maintenance Manuals, including carrying out necessary enabling works, to (a) beneficiate iron ore slimes as per the quality and quantity as agreed upon; (b) produce pellets from the beneficiated ore as per the quality and quantity as agreed upon; (c) maintain the Plants to ensure their capability and efficiency; (d) advise the Owner on possible

improvements that can be carried out on the Plants; and (e) carry out such improvements as approved by the Owner, as per terms to be separately agreed by the Parties.

Obligations of Owner

1. Provide all relevant reports, studies, operation & maintenance manuals of equipment, data and drawings which are reasonably available to NMDC, relating to the facilities and the Project and which are deemed necessary to suitably plan and carry out the Services. Owner shall also provide all printed materials/stationery, for the Operator to maintain all operational/ maintenance log-books, records, reports as per the formats provided by the Operator, in time.
2. Make payment of electricity bills, water charges and any other statutory payments for the units to the respective bodies.
3. Provide all raw materials (as per design specifications – i.e. average Fe not lower than 58% for Slime & 63.2% for IOF) proposed by Operator & utilities like Slimes & Iron ore fines, additives, consumables, spares, water, power, all tools & tackle. Slimes, iron ore fines, additives, etc., shall be as per the feed grade as projected in the Beneficiation flow sheet of the Owner.
4. Medical facilities at Project hospital to be provided on a subsidised charge basis. However, provide a first aid facility at the site. The Medical charges payable by the Operator/ their employees shall be billed by the Owner on monthly basis.
5. Any Mechanical fabrication, Machining jobs, or any other major repair work, such as motor rewinding, bearing replacements, repair of electrical transformer, repair of electrical & electronic components, repair of hydraulic components, major structural fabrication works, etc., which are required to be outsourced, will be taken up by the Owner in consultation with the Operator. The decision of the Engineer-in-Charge/Owner is final regarding the outsourcing of jobs. Additionally, the Owner shall arrange for OEM experts, if required, at no cost to the Operator during any major overhaul work undertaken by the Operator.
6. Engaging “Other Contractor” in firefighting and engaging the “Other Contractor” to meet emergencies shall be the responsibility of the Owner. Also, safety equipment/ kits shall be provided by the Owner.
7. Engage another contractor for providing/ operating the Sprinkler water system/ tankers, for environmental management purposes.
8. Arrange the spares as and when required, to ensure that there is no downtime due to the non-availability of the required spares. However, the Operator will provide the necessary inputs on time to the owner for planning & taking advance action for procurement.
9. Obtain the clearance from the Central Electric Authority, Chennai, before commissioning the plant and charging the MRSS. Subsequent renewal should be carried out by them in case the Beneficiation Plant does not come under the jurisdiction of the DGMS Authority. If it comes under the jurisdiction of DGMS, then clearance from the concerned DDMS is a must before commissioning the plant.
10. Permitted for safe access to the SITE as and when required during the contract.
11. Provide logistics, stacking of additives, consumables, spares, tools and tackles, raw material movement equipment within the plant premises, including mobile cranes, Front-end loaders, etc., Evacuation of Pellets and pellet fines & feeding of concentrate up to the feed hopper.
12. Emergency power supply.
13. Separate storage of off-spec products from Beneficiation and Pellet Plants till the plant achieves stabilisation.

14. All Commercial functions, including General Administration, Finance & Accounts, Purchase & Stores, procurement & stock management of raw material, additives, spares, tools & tackles, Mobile-cranes, Sale of products, HRM, Building Maintenance/ Housekeeping of the Plant other than Beneficiation & Pelletisation units /premises, security, etc.
15. Arrange all Legal and statutory requirements clearances from the Statutory & Regulatory authorities, as and when required.
16. The Operator's employees, deployed for the O & M work, during the contracted / extended period, will neither be absorbed nor hired separately by the Owner, during the period, so as to avoid the operational difficulties in executing the obligations of O & M contracted work by the Operator.
17. Liaisoning with outside agencies.
18. Arrange furnished office space and office equipment as available at or near the SITES with all necessary utilities.
19. Provide communication services like telephone, walky-talky, etc., at the SITE to the extent available;
20. Provide Canteen facilities on a chargeable basis at the rates as applicable to the Owner's employees
21. Provide logistic & stacking of raw material (Slimes, iron ore fines) and consumables, spares, tools and tackles, material movement equipment within the plant premises, including mobile cranes, Front-end loaders, etc. and feeding up to the Hopper and construction of dyke-wall, support-structures, etc. at the Tailing dams and identification of space for the discharge of lean-tailings in the tailing dam are in the scope of NMDC.
22. School & College education facilities to be provided on a chargeable basis for the dependent children of Operator's personnel at the project site at par with the rates as applicable to the Owner's employee, subject to School/College rules.
23. Provide residential quarters to accommodate all of the Operator's site-staff. In case the Owner is not in a position to provide the residential quarters to the Operator's site staff, Owner shall reimburse the cost towards accommodation as per the contract.
24. Ensure the timely availability of personnel for providing training by the Operator.
25. Sprinkler water system/tankers to be provided & operated by the Owner.

Obligations of Operator

1. Pre-commissioning and Commissioning services are required to be undertaken by the Operator before commencement of the O&M contract period.
2. Perform operations and maintenance of the Beneficiation and Pelletisation units as set forth. Execute the work prudently and efficiently in line with the following:
 - a) Maintain compliance with the manufacturer's and system designer's specifications, the Plant's Annual Operating Plan, and all relevant operation and maintenance manuals.
 - b) Ensure implementation and adherence to all applicable laws and regulations of the land, including but not limited to those relating to environmental protection, pollution control, sanitation, employment, and occupational safety (collectively referred to as the 'Government Rules').
 - c) The Operator shall use reasonable efforts, technical expertise, and sufficient staff to perform the services effectively.
 - d) To maximise plant capacity utilisation,
 - e) To optimise the useful life and performance of the plant's equipment.

- f) To minimise plant downtime and ensure continuous, efficient operations.
 - g) To achieve the specified performance levels as stipulated in the contract
 - h) To follow the safety standards and norms with proper supervision
 - i) The operator has to comply with all the statutory obligations under labour law regulations.
3. The Operator shall fulfil the following obligations before assuming responsibility for the Operation and Maintenance (O&M) activities:
- a) Prepare a detailed **Resource Mobilisation Plan** in consultation with **NMDC**.
 - b) Provide the services, personnel, and other resources as specified in the approved **Mobilisation Plan**.
 - c) Prepare, in consultation with **NMDC**, the **initial Annual Operating Plan** for the Plant.
 - d) Develop and implement comprehensive **plans and procedures** covering, inter alia:
 - Maintenance planning, procurement, and inventory control of stores and spares;
 - Plant safety systems and protocols;
 - Assistance to the Other Contractor in firefighting operations and emergency preparedness; and
 - Any additional facilities, systems, or measures necessary for the commencement and continuity of the Operator's responsibilities.
 - e) Develop and implement plans and procedures, including those for maintenance planning, procuring and inventory control of stores and spares, plant safety; Assisting the "Other Contractor" in firefighting, assisting the "Other Contractor" plan to meet emergencies, and such other facilities and systems as may be necessary to commence Operator's ongoing responsibilities.
 - f) Development & implementation plan for training and induction of NMDC's O&M Personnel
4. Upon taking over the Operation and Maintenance (O&M) activities of the Beneficiation and Pelletisation Units, the Operator shall be fully responsible for the operation and maintenance of the Plants and shall perform all necessary services, including, but not limited to, the applicable services listed below:
- a) The Operator shall employ only personnel who are suitably qualified, trained, and experienced in the operation and maintenance of the Beneficiation and Pellet Plants. The Operator shall ensure that such personnel are present and on duty at the Plant at all times — twenty-four (24) hours a day, seven (7) days a week — commencing from the date on which the Owner hands over the Plant to the Operator for O&M activities.
 - b) Provide all operation and maintenance services necessary or advisable to ensure the efficient and reliable functioning of the Plant, including all associated mechanical and electrical systems, as well as the integrated fire-water network. These services shall be executed in line with the operational objectives and performance standards implemented under the Agreement.
 - c) Maintain complete, accurate, and up-to-date operating logs, monthly reports, and maintenance records at the Plant. All relevant aspects of operation and maintenance activities, including but not limited to: production output, key process and performance indicators, breakdowns and repairs, modifications undertaken, and the operational status of equipment, shall be documented.
 - d) Establish, periodical review, and implement a comprehensive equipment repair, replacement, and preventive maintenance program that fully adheres to the manufacturers' specifications, technical recommendations, and applicable safety standards.
 - e) Carry out periodic preventive maintenance of the Plant in accordance with the manufacturer's recommendations, and promptly attend to any breakdowns or other maintenance requirements to ensure uninterrupted plant operations.

- f) Provide necessary technical and engineering support to identify and resolve operational and maintenance issues as and when required.
- g) Assist in the management of spare parts and equipment, including procurement, inventory control, and replacement, as required for the efficient operation and maintenance of the Plant.
- h) Carry out major overhauls of assemblies and sub-assemblies, including but not limited to refractory maintenance, Ball Mill maintenance (replacement of liners and lifter bars), replacement of rotors and motors in process fans, repair of wind boxes and ducts, alignment and overhauling of the travelling grate, replacement of product screen mats, thickener maintenance, and other similar works necessary to operate and maintain the Plants in accordance with the recommendations of the respective Original Equipment Manufacturers (OEMs).
- i) To carry out any improvement/ modifications to achieve the availability of the plant and guaranteed parameters.
- j) Operate and maintain the Plant's fire-water and fire-alarm systems in compliance with the requirements of the Directorate General of Mines Safety (DGMS) and other applicable statutory authorities. The Owner shall, however, provide other safety equipment and kits as required.
- k) The Operator shall arrange, secure, and maintain appropriate insurance or group insurance coverage for all its employees deployed at the site, in accordance with applicable laws and best industry practices.
- l) If any claims are made or actions brought against the Owner by third parties for compensation of damage or loss arising out of any act, omission, or negligence of the Operator or its personnel, the Operator shall fully indemnify and hold the Owner harmless from and against all such claims, damages, losses, and associated liabilities.
- m) The Operator shall fully indemnify and hold the Owner harmless from and against any losses, damages, or liabilities arising out of, or resulting from, any act, omission, misconduct, or gross negligence of the Operator or its representatives.
- n) The Operator shall indemnify, keep indemnified, and hold harmless the Owner from and against all actions, claims, damages, losses, and expenses arising from, or incurred due to, any infringement of laws, rules, regulations, or intellectual property rights by the Operator, its employees, agents, or subcontractors.
- o) The Operator shall maintain detailed records of machine availability to assess equipment performance, including condition monitoring data, spare parts requirements, and other parameters necessary for effective maintenance planning and operational efficiency.
- p) Safety rules/aspects in the plant to be followed as per DGMS/Statutory bodies;
- q) Environmental management in Plant Premises.
- r) Training to NMDC Personnel on O&M and striving to ensure their induction as per the agreed programme.

General conditions

- a. Operator to consider all aspects like process parameters, instruction manuals, and electrical & controls related to operation & maintenance of Pelletisation and Beneficiation units.
- b. The Operator is responsible for ensuring quality, safety and meeting the objective of the work as detailed below:
 - (i) In the event of any shortfall in production targets or equipment availability arising from reasons attributable to the Operator, the Operator shall be held fully responsible for such shortfall.
 - (ii) Should any of the desired results not be attained or redoing arise in the works already done due to errors/omissions in the services rendered under this contract by the Operator, the Operator shall be responsible for the same.

- (iii) The responsibility to obtain the required information/data/drawings/ spares, etc. from the “Other contractor” lies with the Owner. However, Operator shall assist the owner in preparing the spare list required to operate the Plant efficiently.
- (iv) Upon the expiry of the term or any approved extension thereof, the Operator shall hand over the Plant to NMDC in good and operable condition, subject to normal wear and tear. At the time of handover, the Operator shall also deliver all technical documents, equipment literature, operation and maintenance manuals, lists of spare parts, tools and tackle, along with all relevant records, reports, and documentation maintained during the contractual period.
- (v) Based on the vendor/supplier’s documents provided by Owner and based on the expertise & experience of the Operator, the Operator shall prepare & submit a comprehensive unit-wise O & M manual to Owner.

Training and induction of NMDC personnel

Impart Training & Induction of NMDC employees progressively, including: Preparation of skill-wise Training Plan in consultation with the Owner. Conduct and organise both classroom and on-the-job training programs. Arrange visits for trainees to the Operator’s Pellet Plant located in Mangalore, as required. Assess the effectiveness of the training provided and submit a detailed report to the Owner regarding the trainees’ performance, competency development, and readiness for deployment/induction into Plant operations.

Payment:

1. Progressive Payment:

80% of the fee as specified in the Price Schedule shall be paid on a monthly pro-rata basis, based on a certificate issued by the Engineer-in-Charge confirming that the Operator has deployed the required manpower during the integrated commissioning period. Under no circumstances, the cumulative payments exceed the ceiling amount specified in the Contract.

2. Final Payment:

The remaining 20% of the lump sum fee specified in the Price Schedule shall be released upon successful completion of integrated commissioning of the equipment/Plant, duly certified by the Engineer-in-Charge.

The following clauses were also part of the contract:

a. Suspension of work

The Owner reserves the right to suspend, in whole or in part, the execution of the work at any time and to subsequently resume such work, without such suspension or resumption being deemed a breach or invalidation of any provision of the Contract.

b. Force majeure

c. Termination of contract

d. Amendment to contract

e. Confidentiality

f. Settlement of dispute & arbitration

g. Subletting or transfer of agreement

Neither party shall sublet, assign, or otherwise transfer its rights or obligations under this Contract, in whole or in part, to any third party without the prior written consent of the other party. However, this restriction shall not apply to specific items or services expressly identified in the Contract as permissible for outsourcing.

- h. Recovery of sums due
- i. Governing Laws
- j. Patent infringement & secrecy, and intellectual property rights
- k. Designated representatives

Exhibit No. 2: Production Targets, Penalty, and Bonus Clauses

Minimum guaranteed production:

Minimum guaranteed production year-wise, subject to Owner fulfilling all of their contracted obligations, including, adequate availability of raw materials (with quality as per design specifications – average Fe – not below 58% for slime & 63.2% for Iron ore fines (IOF)), additives & consumables, spares, power supply and on commencement of the 'Effective date of O & M Services', is given below:

Year of Operation	% of rated capacity or capacity proven during the PG Test, whichever is lower, (on a yearly basis)
1st (yr. of stabilisation)	70%
2nd year of stabilisation	90%
3rd year of stabilisation	100%
4th year of stabilisation	100%
5th year of stabilisation	100%

Penalty & Bonus:

Even after meeting un-interrupted supply of raw-materials (as per design specifications, Average Fe not below 58% for Slime & 63.2% for IOF), additives, consumables and after continuous power supply and in excess of contract demand by Owner, in the event of operator not achieving the Minimum Guaranteed Pellet production level (in terms of quantity only) calculated on yearly basis, the penalty leviable will be as under:

Shortfall in % of the Year's Minimum guaranteed production	Penalty in % of the Year's O & M Fee
Up to 5%	Nil
Over 5% & up to 10%	2.5%
Over 10% & up to 15%	5.0%
Over 15% & up to 20%	7.5%
Over 20%	10%

Bonus:

Increased Production in % over the Year's Min. guaranteed production	Bonus in % of Year's O & M Fee
Up to 5%	Nil

Over 5% & up to 10%	2.5%
Over 10% & up to 15%	5.0%
Over 15% & up to 20%	7.5%
Over 20 %	10%

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