

STUDY ON GOVERNMENT OF INDIA OIL AND GAS POLICY CHANGES, FIRMS' PARTICIPATION IN
AUCTIONS AND INVESTMENT DECISIONS



A THESIS

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Declaration

This is to certify that this research study has been conducted for thesis submission to the Executive Fellow Programme in Management, Indian Institute of Management, Indore only. I have not submitted this thesis in full or partially for any other degree or diploma. This is entirely my own work. The literature review and data were taken from research papers, articles, theses, MoPNG and DGH, and sources are cited wherever necessary and mentioned in the references also.



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Abbreviations

BP:	British Petroleum
BCM:	Billion Cubic Meters
BPRL:	Bharat Petro Resources Limited
CAPEX:	Capital Expenditure
DDW:	Deen Dayal West (Field Name)
DGM:	Deputy General Manager
DoIP&P:	Department of Industrial Policy and Promotion
DGH:	Directorate General of Hydrocarbons (MoPNG, Gol)
DWN:	Deep Water Field
E&P:	Exploration and Production
Exp:	Experienced Company
FDP:	Field Development Plan
GAIL:	Gas Authority of India Ltd
GITL:	GSPL India Transco Ltd - Gujarat State Petronet Limited
GM:	General Manager
Gol:	Government of India
GSPC:	Gujarat State Petroleum Corporation Ltd
HELP:	Hydrocarbon Exploration and Licensing Policy (OALP is a part of HELP)
HOEC:	Hindustan Oil Exploration Company Ltd
IEA:	International Energy Agency
INR:	Indian Rupee
IOCL:	Indian Oil Corporation Ltd
JV:	Joint Venture
KG:	Krishna Godavari
LNG:	Liquefied Natural Gas
LPG:	Liquefied Petroleum Gas
MD:	Managing Director
MMBtu:	Million Metric British thermal unit
MMSCM:	Million Metric Standard Cubic Meters
MMT:	Million Metric Tons
MMTOE:	Million Tons of Oil Equivalent

MoC&I: Ministry of Commerce and Industry
MPSC: Model Production Sharing Contract
MRSC: Model Revenue Sharing Contract
MoPNG: Ministry of Petroleum and Natural Gas (GoI)
NELP: New Exploration and Licensing Policy (Government of India)
NOC: National Oil Company
NPV: Net Present Value
OALP: Open Acreage Licensing Policy (Government of India)
OIL: Oil India Ltd
ONGC: Oil and Natural Gas Corporation
OPEX: Operating Expenditure
PEL: Petroleum Exploration Licenses
Pre-NELP: Policy before the introduction of NELP
PSC: Production Sharing Contract
PSU: Public Sector Unit
Pvt: Private firm
RSC: Revenue Sharing Contract
RIL: Reliance Industries Ltd
Round: It is the period; GoI conducts an auction of Oil and Gas blocks
RTI: Right to information Act
SVP: Senior Vice President
UN: United Nations
USA/US: United States of America
Vedanta: Vedanta Ltd (Cairn India is Oil and Gas division of Vedanta)
VP: Vice President

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References

- A, C., & Laury, S. K. (2002). Risk Aversion and Incentive Effects. *The American Economic Review*, 92(5).
- Ã, D. B. R., & Kolodziej, M. (2007). Institutions and the supply of oil : A case study of Russia. *Energy Policy*, 35, 939–949. <https://doi.org/10.1016/j.enpol.2006.01.028>
- Abdellaoui, M., Bleichrodt, H., Haridon, O. L., & Dolder, D. Van. (2016). 5. *Measuring Loss Aversion under Ambiguity.pdf*.
- Acquah-Andoha, E., Putrab, H. A., & Augustine O. Ifelebuegua, A. O. (2019). Coalbed methane development in Indonesia: Design and economic analysis of upstream petroleum fiscal policy. *Energy Policy*.
- Aggarwal, R. (2019). *Industrial Policies in India : Did They Work ?*
- Al-kasim, F., Soreide, T., & Williams, A. (2010). Shrinking oil Does weak governance and corruption reduce volumes of oil produced? *Anti Corruption Resource Centre, Www.U4.No, 3(U4Issue)*, 01–32.
- Al-Kasim, F., Sørreide, T., & Williams, A. (2013). Corruption and reduced oil production: An additional resource curse factor? *Energy Policy*, 54, 137–147. <https://doi.org/10.1016/j.enpol.2012.11.007>
- Araujo, F. C., & Leoneti, A. B. (2018). *GAME THEORY AND 2 x 2 STRATEGIC GAMES APPLIED FOR MODELING OIL AND GAS INDUSTRY DECISION-MAKING PROBLEMS*. 38, 479–497. <https://doi.org/10.1590/0101-7438.2018.038.03.0479>
- Arora, S. (2012). Investment Decision Making in the Upstream Oil Industry: An Analysis. In *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1983123>
- Arya, S., & US Commercial Services, U. (2014). *Indian Oil and Gas Industry*.
- Azhar, M. (2011). New exploration licensing policy (NELP) in India. In *OPEC Energy Review* (Vol. 35). <https://doi.org/10.1111/j.1753-0237.2011.00187.x>
- Babcicky, P., & Seebauer, S. (2019). Unpacking Protection Motivation Theory : evidence for a separate protective and non-protective route in private flood mitigation behavior Unpacking Protection Motivation Theory : evidence for a separate protective and non-protective route in private flood. *Journal of Risk Research*, 22(12), 1503–1521. <https://doi.org/10.1080/13669877.2018.1485175>
- Bazerman, M. H., & Samuelson, W. F. (1983). I Won the Auction but Don ' t Want the Prize. *The Journal of Conflict Resolution*, 27(4), 618–634.
- Bilal Abdi, Energyworld.com, & Energy News, E. E. (2020). Low crude oil prices cast a shadow on India ' s oil and gas E & P prospects. *March 23, 2020*, pp. 1–13.
- Birol, F. (2020). India 2020 Energy Policy Review. In *International Energy Agency* (Vol. 4). <https://doi.org/10.1007/bf03404634>
- Blunt, E. A. (2012). *Protection Motivation Theory and Consumer Willingness-To-Pay In The Case Of Post-Harvest Processed Gulf Oysters*. <https://doi.org/10.16309/j.cnki.issn.1007-1776.2003.03.004>
- Bogan, V. (2019). Risk Aversion vs . Loss Aversion : What is the Big Difference ? *Investor Behavior*, (February), 2019–2021.
- Brasil, E. U. R., & Postali, F. A. S. (2014). Informational rents in oil and gas concession auctions in Brazil. *Energy Economics*, 46, 93–101. <https://doi.org/10.1016/j.eneco.2014.09.002>

- Breton-miller, I. Le, Miller, D., & Lester, R. H. (2011). Stewardship or Agency ? A Social Embeddedness Reconciliation of Conduct and Performance in Public Family Businesses. *Organization Science*, 22(3), 704–721. <https://doi.org/10.1287/orsc.1100.0541>
- Chari, M. D. R., & David, P. (2011). SUSTAINING SUPERIOR PERFORMANCE IN AN EMERGING ECONOMY: AN EMPIRICAL TEST IN THE INDIAN CONTEXT. *Strategic Management Journal*, 1–4.
- Cheema, A., Leszczyc, P. T. L. P., Bagchi, R., Bagozzi, R. P., Cox, J. C., Dholakia, U. M., ... Zeithammer, R. (2005). Economics , Psychology , and Social Dynamics of Consumer Bidding in Auctions. *6th Triennial Invitational Choice Symposium, University of Colorado Boulder, June 2004 (Co-Chaired, Marketing(June 2004)*, 401–413.
- Chen, G., Ployhart, R. E., Thomas, H. C., Anderson, N., & Bliese, P. D. (2011). THE POWER OF MOMENTUM : A NEW MODEL OF DYNAMIC RELATIONSHIPS BETWEEN JOB SATISFACTION CHANGE AND TURNOVER INTENTIONS University of Maryland The University of Auckland www.nlvuaerence.sio.conrwwia.w.nlvuaerence.sio. *Academy of Management Journal*, 54(1), 159–181. <https://doi.org/10.5465/AMJ.2011.59215089>
- Cheng, C., Wang, Z., & Ren, M. L. X. (2019). Risk measurement of international oil and gas projects based on the Value at Risk method. *Petroleum Science*, 16(1), 199–216. <https://doi.org/10.1007/s12182-018-0279-1>
- Clubb, A. C., & Hinkle, J. C. (2015). Protection motivation theory as a theoretical framework for understanding the use of protective measures. In *Criminal Justice Studies*, 2015. <https://doi.org/10.1080/1478601X.2015.1050590>
- Conner, M., & Norman, P. (2005). *PREDICTING Health Behaviour*.
- Dasgupta, R. (2017). Behavioral Implications of Risk-Return Associations : An Application of Prospect Theory on CNX NIFTY Companies. *Australasian Accounting, Business and Finance Journal Article*, 11(3), 103–126. <https://doi.org/10.14453/aabfj.v11i3.8>
- Debrock, L. M., & Smith, J. L. (1983). Joint Bidding , Information Pooling , and the Performance of Petroleum Lease Auctions. *The Bell Journal of Economics*, 14(2), 395–404.
- DGH-India. (2010). *Model Production Sharing Contract, NELP-IX*.
- DGH-India. (2017). *Presentation for Workshop at New Delhi - Open Acreage Licensing Hydrocarbon Exploration Policy (OALP) under the and Licensing Policy (HELP) Presentation*.
- DGH-India. (2018). Directorate General of Hydrocarbons. *DGH India, Annual Issue*.
- Diane Kraal. (2019). Petroleum industry tax incentives and energy policy implications: A comparison between Australia, Malaysia, Indonesia and Papua New Guinea. *Energy Policy*.
- Dibyanshu, & Bhandari, P. (2020). *Oil and gas regulation in India : overview*. 5648(2016), 1–23.
- DoIP&P, MoC&I, G. (2017). Industrial policy 2017. In *A Discussion Paper*. <https://doi.org/10.1017/CBO9780511490828.014>
- Finch, J. H. (2002). Transferring exploration and production activities within the UK ’ s upstream oil and gas industry : a capabilities perspective. *Journal of Ev*, 12, 55–81.
- Florêncio, P. (2016). The Brazilian 2010 oil regulatory framework and its crowding-out investment effects.

- Energy Policy*, 98, 378–389. <https://doi.org/10.1016/j.enpol.2016.08.038>
- G William Zikmund, Babin, B. J., Carr, J. C., Adhikari, A., & Griffin, M. (2018). *Business Research Methods : A South-Asian Perspective with CourseMate*.
- Ghandi, A., & Lin, C. Y. C. (2014). Oil and gas service contracts around the world: A review. *Energy Strategy Reviews*, 3(C), 63–71. <https://doi.org/10.1016/j.esr.2014.03.001>
- Gibbons, R. (1992). *A Primer in Game Theory*.
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. In *Organizational Research Methods*.
- Haile, P., Hendricks, K., & Porter, R. (2010). Recent U . S . offshore oil and gas lease bidding : A progress report. *International Journal of Industrial Organization*, 28, 390–396. <https://doi.org/10.1016/j.ijindorg.2010.02.010>
- Hann, D. (1986). *The process of government and UK oil participation policy*. 253–261.
- Helm, D. (2002). Energy policy : security of supply , sustainability and competition. *Energy Policy*, 30, 173–184.
- Hendricks, Ken, Porter, R., & Tan, G. (2003). Bidding Rings and The Winner’s Curse: The Case Of Federal Offshore Oil and Gas Lease Auctions. *National Bureau Of Economic Research, Working Pa*, 01–53. Retrieved from <http://www.nber.org/papers/w9836>
- Hendricks, Kenneth, & Porter, R. H. (1989). Collusion in Auctions. *JSTOR -Annales d’Économie et de Statistique, No. 15/16, Dynamiques Des Marchés et Structures Industrielles / Market Dynamics and Industrial Structure*, (Jul-Dec), 217–230.
- IGNOU. (2017a). *Unit-6 Questionnaire Design and Development*.
- IGNOU. (2017b). *Unit 10Industrial Growth and Pattern*.
- IGNOU. (2017c). *Unit 11 Questionnaire Method*.
- IGNOU. (2017d). *Unit 14 Elements of Research design*.
- IGNOU. (2017e). UNIT 17 INDUSTRIAL GROWTH AND. In *Industrial Growth and Structure*. IGNOU.
- IGNOU. (2017f). *UNIT 17 SURVEY INSTRUMENTATION*. Retrieved from <http://marefateadyan.nashriyat.ir/node/150>
- IGNOU. (2017g). Unit 20 Productivity In Indian Industries. In *Procuctivity In Indian Industries* (Vol. 53, pp. 1689–1699).
- Indianpetroplus.com. (2020). Cluster 2 Fields Development, Block KG-DWN-98/2, Bay of Bengal. *Indianpetroplus.Com*, pp. 494–497.
- Jones, R. O., Mead, W. J., & Sorensen, P. E. (1978). Free Entry into Crude Oil and Gas Production and Competition in the U . S . Oil Industry. *Natural Resources Journal*, 18(Fall).
- Kessler, W. A. (2016). *Effectiveness of the Protection Motivation Theory on Small Business Employee Security Risk Behavior* (Vol. 10164688).
- Khan, A., Qureshi, M. A., & Davidsen, P. I. (2020). How do oil prices and investments impact the dynamics of

- firm value? *System Dynamics Review*, 36(1), 74–100. <https://doi.org/10.1002/sdr.1649>
- Kim, J. -B, & Lipka, R. (1991). Effects of Accounting Choice On the Explanation of the Market Risk In the Oil and Gas Industry. *Journal of Business Finance & Accounting*, 18(1), 61–84. <https://doi.org/10.1111/j.1468-5957.1991.tb00579.x>
- Klemperer, P. (1999). Auction theory: A guide to the literature. *Journal of Economic Surveys*, 13(3), 227–286. <https://doi.org/10.1111/1467-6419.00083>
- Kothe, E. J., Ling, M., Berne, R. D., Russell-head, I., & Mullan, B. A. (2019). *PMT and Intention to Reduce Fossil Fuel Consumption*.
- Kothiyal, A., Spinu, V., & Wakker, P. P. (2014). An experimental test of prospect theory for predicting choice under ambiguity. *Journal of Risk and Uncertainty*, 48(1), 1–17. <https://doi.org/10.1007/s11166-014-9185-0>
- L.N.Murthy, T. (2018a). Assets Portfolio Management for Sustainability of Oil and Gas Operating Company. *Texas Oil and Gas*, 6(1).
- L.N.Murthy, T. (2018b). Legal & Statutory Compliance for Commencing Oil & Gas Production. *OILMAN - The Magazine for Leaders in American Energy*.
- Laffont, J. (1997). *Game theory and empirical economics : The case of auction data 1*. 1–35.
- Leal, F. I., Rego, E. E., & Ribeiro, C. de O. (2019). Natural gas regulation and policy in Brazil: Prospects for the market expansion and energy integration in Mercosul. *Energy Policy*.
- Leland, H. E. (1983). Optimal Risk Sharing and the Leasing of Natural Resources , with Application to Oil and Gas Leasing on the Ocs. *The Quarterly Journal of Economics*, 92(3), 413–438. Retrieved from <https://www.jstor.org/stable/1883152>
- Li, H., & Xiaowen Lin, S. (2011). Do emerging markets matter in the world oil pricing system? Evidence of imported crude by China and India. *Energy Policy*, 39(8), 4624–4630. <https://doi.org/10.1016/j.enpol.2011.05.003>
- Li, Y., & Zhang, D. (2018). Dynamic multi-attribute decision-making method with three-parameter interval grey number based on the prospect theory. *Grey Systems: Theory and Application*, 8(4), 424–435. <https://doi.org/10.1108/gs-05-2018-0021>
- Li, Z. X., Ye, J., Luo, D. kun, & Wang, J.-J. (2020). Study of evaluation method for the overseas oil and gas investment based on risk compensation. *Petroleum Science*, 17(3), 858–871. <https://doi.org/10.1007/s12182-020-00457-7>
- Lorentziadis, P. L. (2016). *Optimal bidding in auctions from a game theory perspective*. 248, 347–371.
- Loretta J. Mester. (1988). Going, Going, Gone: Setting Prices with Auctions. *Business Review*, (March/ April), 1–11.
- Macmillan, F. (2000). Risk , Uncertainty and Investment Decision- Making in the Upstream Oil and Gas Industry Fiona Macmillan MA Hons (University of Aberdeen) October 2000 A thesis presented for the degree of Ph . D . at the University of Aberdeen.
- Marianoa, B. J., Souza, J. L. de, & Filhoc, N. N. (2018). Fiscal Regimes for Hydrocarbons Exploration and Production in Brazil. *Energy Policy*.

- Maxwell, J. A. (2012). Qualitative research design: An interactive approach. In *Book*.
- Merath, M. (2018). *Decision Making in Supply Risk and Supply Disruption Management*. Retrieved from <http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1147&context=cahrswp>
- Merazga, H., Sammari, N., Malik, A. A., Bin, K., & Noor, M. (2020). Exploring the Risk Perception and Work Environment Risk on Oil Refineries in Algeria. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 25(6), 18–24. <https://doi.org/10.9790/0837-2506061824>
- Miguel, M. M. de S. and P. L. de S., Brito, R. P. de, & Pereira, S. C. F. (2020). Supply chain resilience: the whole is not the sum of the parts. *International Journal of Operations & Production Management*, 40(1).
- Milgrom, P. (1989). Auctions and Bidding: A Primer. *Journal of Economic Perspectives*, 3(3), 3–22. <https://doi.org/10.1257/jep.3.3.3>
- Milgrom, P. (1998). *Game theory and the spectrum auctions*. 42.
- Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational and volitional interventions to promote exercise participation : Protection motivation theory and implementation intentions. *British Journal of Health Psychology*, 7, 163–184.
- Montobbio, F. (2002). An evolutionary model of industrial growth and structural change. *Structural Change and Economic Dynamics*, 13(4), 387–414. [https://doi.org/10.1016/S0954-349X\(02\)00006-1](https://doi.org/10.1016/S0954-349X(02)00006-1)
- Moody, C E, J., & W. J. Kruvant. (2019). Joint Bidding , Entry , and the Price of OCS Leases. *The RAND Journal of Economics*, 19(2), 276–284.
- MoPNG, G. of I. (2019). No Title MoPNG India Annual Report. *MoPNG, Government of India*.
- Nyre, Å. A., & Jaatun, M. G. (2013). Seeking risks: Towards a quantitative risk perception measure. *International Federation for Information Processing*, 8127 LNCS, 256–271. https://doi.org/10.1007/978-3-642-40511-2_18
- Osmundsen, P. (1999). Risk sharing and incentives in Norwegian petroleum extraction. *Energy Policy*, 27, 549–555.
- Pathak, K., Livemint, & 02-Nov-2016. (2020). GSPC may hive off Deen Dayal field to ONGC to avoid loan default. *Livemint*, pp. 3–7.
- Plotnikoff, R. C., & Trinh, L. (2010). Protection motivation theory: Is this a worthwhile theory for physical activity promotion? *Exercise and Sport Sciences Reviews*, 38(2), 91–98. <https://doi.org/10.1097/JES.0b013e3181d49612>
- Polyviou, M., Croxton, K. L., & Knemeyer, A. M. (2020). Resilience of medium-sized firms to supply chain disruptions: the role of internal social capital. *International Journal of Operations & Production Management*, 40(1).
- Reece, D. K. (1978). Competitive Bidding for Offshore Petroleum Leases. *The Bell Journal of Economics*, 9(2), 369–384.
- Rockwood, A. (1983a). The Impact of Joint Ventures on the Market for OCS Oil and Gas Leases. *The Journal Industrial Economics*, XXXI(4), 453–467.
- Rockwood, A. (1983b). The Impact of Joint Ventures on the Market For OCS Oil and Gas Leases. *The Journal*

- of Industrial Economics*, 31(4), 453. <https://doi.org/10.2307/2098341>
- Rodriguez, M. R., & Suslick, S. B. (2009). An Overview of Brazilian Petroleum Exploration Lease Auctions. *Thematic Contribution*, 6(1), 6–20.
- Ross, A. C. (1986). The United Kingdom 's Experience with North Sea Oil and Gas. *IDS Bulletin, Institute of Development Studies, Sussex*, 17(4), 42–47.
- Safarzadeh, S., Rasti-barzoki, M., & Hejazi, S. R. (2020). A review of optimal energy policy instruments on industrial energy efficiency programs , rebound effects , and government policies. *Energy Policy*, 139(February), 111342. <https://doi.org/10.1016/j.enpol.2020.111342>
- Schitka, B. B. (2020). *Applying game theory to oil and gas unitization agreements : how to resolve mutually beneficial , yet competitive situations*. 1–18.
- Scholten, M., & Read, D. (2014). Prospect theory and the “forgotten” fourfold pattern of risk preferences. *Journal of Risk and Uncertainty*, 48(1), 67–83. <https://doi.org/10.1007/s11166-014-9183-2>
- Service, M. M., & Agreement, C. (2006). Capital Investment Decisionmaking and Trends : Implications on Petroleum Resource Development in the U . S . Gulf of Mexico Capital Investment Decisionmaking and Trends : Implications on Petroleum Resource Development in the U . S . Gulf of Mexico. *U.S. Department of the Interior Minerals*.
- Seth, A., & Thomas, H. (1994). Theories of The Firm : Implications for Strategy Research. *Journal of Management Studies*, 31(2), 165–191.
- Sharma, S., & Sud, M. (2019a). Impact of regulatory framework on bidding behavior of firms : Policy implications for the oil & gas sector. *Energy Policy*, 131(May), 33–42. <https://doi.org/10.1016/j.enpol.2019.01.075>
- Sharma, S., & Sud, M. (2019b). Impact of regulatory framework on bidding behavior of firms: Policy implications for the oil & gas sector. *Energy Policy*.
- Shenoy, B. V., Outlook, & 30-Jan-2018. (2018). India's New Hydrocarbon Exploration And Licensing Policy A Spectacular Failure. *Outlook*.
- Shih-Chieh Hsu, J., & Shih, S.-P. (2015). When does One Weight Threats more? An Integration of Regulatory Focus Theory and Protection Motivation Theory. *Proceedings of the 10th Pre-ICIS Workshop on Information Security and Privacy*, 12–13.
- Shrivastav, U., Business World, & 28-Dec-2020. (2020). Hydrocarbon Exploration License Policy. *Business World*.
- Shuen, A., Feiler, P. F., & Teece, D. J. (2014). Dynamic capabilities in the upstream oil and gas sector: Managing next generation competition. *Energy Strategy Reviews*, 3(C), 5–13. <https://doi.org/10.1016/j.esr.2014.05.002>
- Soumeet Sarkar, & Bloombergquint.com. (2020). A Year Of Hope Turns Into Despair For ONGC in BloombergQuint. *March 09 2020*.
- Srivas, A., Thewire.in, & 12-Jul-2016. (2020). What Went Wrong with Gujarat ' s KG ' Deen-Dayal ' Gas Reserve Discovery ? *Thewire.In*, pp. 1–11.
- Stafford, J. (2019). Developmental Differences : The Role of Institutions in Oil and Gas Operations within the

- State of Colorado. *University of Colorado, Boulder CU Scholar Undergraduate Honors Theses*, (Spring).
- Stiglitz, J. E. (2017). Industrial Policy, Learning, and Development. In *The Practice of Industrial Policy: Government-Business Coordination in Africa and East Asia*.
- Sun, Y., Wang, N., & Shen, X.-L. (2020). Toward a Configurational Protection Motivation Theory Toward a Configurational Protection Motivation Theory. *Conference Paper*, (May).
<https://doi.org/10.24251/HICSS.2020.440>
- Sund, K. A. (2010a). Dynamic Resource Allocation Withself- | Interested Agents in the Upstream Oil & Gas Industry. *Journal of Operations and Supply Chain Management*, 3(2), 78–97.
- Sund, K. A. (2010b). Dynamic Resource Allocation Withself-|Interested Agents in the Upstream Oil & Gas Industry. *Journal of Operations and Supply Chain Management*, 3(2), 78.
<https://doi.org/10.12660/joscmv3n2p78-97>
- Sunley, E. M., Baunsgaard, T., & Simard, D. (2002). Revenue from the Oil and Gas Sector. *Post-Conference Draft*, (June), 1–29.
- Systems, C. A. (2014). *MAXIMAL PAYOFF STRATEGY FOR VICKERY AUCTION USING*. 66–71.
<https://doi.org/10.15308/SInteZa-2014-66-70>
- Thaler, R. H. (1988). Anomalies The Winner ' s Curse. *Journal of Economic Perspectives*, 2(1), 191–202.
- The_Financial_Express. (2018). Some relief: Move to cap oilcos' cost recovery dropped. *The Financial Express*, pp. 1–8.
- The_Hindu. (2012). Sticky issues in oil exploration. *The Hindu Business Line*, pp. 1–8.
- The Financial Express. (2020). Domestic oil and gas companies may soon get cess and royalty relief- Details. *May 27, 2020*, pp. 2–10.
- The Royal Swedish Academy. (2020). Improvements to auction theory and inventions of new auction formats. *The Royal Swedish Academy of Sciences*, 50005, 0–40.
- TheHinduBusinessLine. (2020). HOEC expects windfall from drop in oil eld service costs. *April 30, 2020*, pp. 1–3.
- Times, E., & 04-Aug-2017, O. (2020). ONGC completes Rs 7,700 crore acquisition of GSPC. *The Economic Times, India*, pp. 1–6.
- Tsai, H., & Luan, C. (2016). What makes firms embrace risks? A risk-taking capability perspective. *Business Research Quarterly*, 19(3), 219–231. <https://doi.org/10.1016/j.brq.2016.01.002>
- Tsai, H. Y. S., Jiang, M., Alhabash, S., Larose, R., Rifon, N. J., & Cotten, S. R. (2016). Understanding online safety behaviors: A protection motivation theory perspective. *Computers and Security*, 59(1318885), 138–150. <https://doi.org/10.1016/j.cose.2016.02.009>
- UN Conference Report. (2016). Module 2 Industrial policy: a theoretical and practical framework to analyse and apply industrial policy. In *VIRTUAL INSTITUTE TEACHING MATERIAL ON STRUCTURAL TRANSFORMATION AND INDUSTRIAL POLICY*.
- Universo, E., Brasil, R., Antonio, F., & Postali, S. (2014). Informational rents in oil and gas concession auctions in Brazil. *Energy Economics*, 46, 93–101. <https://doi.org/10.1016/j.eneco.2014.09.002>


- Vahid Hajiebrahimi Farashah, Z. S., & Hosseini, S. H. (2021). A dynamic model to formulate effective capacity expansion policies in Iranian petrochemical Industry to complete the value chain. *Energy Policy*.
- Walls, M. R., & Dyer, J. S. (1996). Risk Propensity and Firm Performance : A Study of the Petroleum Exploration Industry. *Management Science*, 42(7).
- Watkins, G. C., & Kirkby, R. (1981). Bidding for petroleum leases Recent Canadian experience. *Energy Economics*, (July), 182–186.
- Weijermars, R., Clint, O., & Pyle, I. (2014). Competing and partnering for resources and profits: Strategic shifts of oil Majors during the past quarter of a century. *Energy Strategy Reviews*, 3(C), 72–87. <https://doi.org/10.1016/j.esr.2014.05.001>
- Welbourne, T. M. (1997). Valuing employees: A success strategy for fast growth firms and fast paced individuals. *CAHRS Working Paper Series*, (February), 148. Retrieved from <http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1147&context=cahrswp>
- Whyte, G., & Saks, A. M. (2007). The Effects of Self-Efficacy on Behavior in Escalation Situations. *Human Performance*, 20(1), 23–42. <https://doi.org/10.1080/08959280709336927>
- Wongsuwatt, S., & Suntrayuth, S. (2019). The Influence Of Risk Perception and Proactive Behavior On Performance of Firms : The Moderating Roles Of Organizational Units and Types Of Firms. *The Journal of Risk Management and Insurance*, 23(2), 1–14.
- Yuan Kong, Chao Feng, & Yang, J. (2020). How does China manage its energy market? A perspective of policy evolution. *Energy Policy*.
- Zhao, J., Zhu, H., & Li, X. (2018). Optimal execution with price impact under Cumulative Prospect Theory. *Physica A: Statistical Mechanics and Its Applications*, 490, 1228–1237. <https://doi.org/10.1016/j.physa.2017.08.109>

Appendix -1 (Survey-1 Questions and Inputs)

Questions given in Survey-1

S No	Experts Opinion	Strongly Agree %	Agree %	Neutral %	Disagree %	Strongly Disagree %
1	In NELP firm had cost recovery and risk is shared by Gol , firm attracts to invest in NELP compared to OALP					
2	In NELP Gol has more control on firm for pricing and distribution of Natural Gas, which benefits the society compared to OALP					
3	Oil and gas exploration failures (investment loss) may cause fear to investing firm, and sometimes the existing firms may relinquish the fields					
4	Due to no-cost recovery in OALP firm not interested to invest and leave Indian oil and gas sector					
5	Highly experienced firms take risk in OALP than less experienced firms.					
6	Gol target depending on the OALP performance only; OALP performance depending on the blocks awarded firm's performance .					
7	With OALP Gol cannot achieve the target of increasing the domestic production and reducing imports					
8	There are three players in Oil and gas exploration, Government, Firm, and Society. Firm is the key player and firm only produces oil and gas. Gol and Society depend on Firm for oil and gas production.					

Following are written by six experts out of twelve experts participated in section “**Any other inputs to researchers**” (Each bullet point is from one expert).

-  In my opinion, NELP is a better system for promoting the investment in business, risk mitigation and controlling the prices with balanced rules and regulations for both the industry and society in general. Same time government must not limit themselves to audits and approvals of cost spent, they must participate in day to day activities in

business and oversee the capital is being spent in justified manner. There is a need to transform the processes for monitoring and controlling the budget.

- 🗨️ In the State run oil and exploration firms can do better with their potential but not up to the mark as compared to private Oil & Gas Explorers.
- 🗨️ There shall be carefully investment and government shall assure that there is protection for the investment so that the firm's can do the work more efficiently.
- 🗨️ Pricing of products is controlled by GOI. It should be linked to international pricing. Also, GST to be introduced for Oil & Gas sector
- 🗨️ The analysis of NELP Vs OALP should be made based on actual fiscal terms and contractual regime offered by the Government. In totality, Government has progressively improved fiscal terms under OALP and consequently Contractor take is not a deterrent under OALP. The biggest issue is the Hydrocarbon Prospectivity of Indian sedimentary basins.
- 🗨️ In my opinion NELP Should still continue for new field development where as OALP should apply for development of matured fields in which risk factor is less.






Appendix -2 (Survey-2 Questions and Inputs)

Primary data – Experts Opinions Survey Questions and Inputs (Survey 2)

Following are the replies from experts (Each bullet point is from one expert)

1. What are your views about the NELP and OALP policies of GoI?

Answers

-  OALP gives more advantages to Government than NELP as it follows revenue sharing mechanism than cost recovery mechanism. Also, under OALP operator shall create just adequate facilities for production of oil and gas whereas under NELP operator may create huge facilities and infrastructure. Under OALP, Government gets revenue as per free market whereas under NELP Government guidelines are to be followed.
-  Good
-  Both the NELP and OALP are having some merits and demerits. OALP is formulated latter to accelerate the Exploration & Production (E & P) activities in India. OALP is revenue sharing model, the government share accrues immediately on production, unlike in cost-recovery (NELP) where the operator first claims its costs before splitting leftover profits, if any. OALP model has full freedom of pricing which is definitely advantageous as depending upon expenditure operator can fix the price of the product. One drawback in NELP model is fluctuating oil prices can make the investors fear to invest in India if government policy is not favoring them and protecting their investments as Government had control of the distribution and pricing of produced quantities. In these firms were with limited freedom, but with the benefit of cost recovery for successful explorations. Due to tough difficult exploration fields, cost of exploration has increased tremendously, but in NELP model government fixes the pricing due to which profit margin may be much lower after recovery of the exploration cost. In NELP model, there is a risk to government if production quantity is very very less then cost recovery may not be possible to operator and government also may not get any profit sharing from the operator. As per my view Government should keep both policies applicable for E & P activities. Government can keep NELP for specific field and OALP for specific fields (tougher fields). Depending upon the type of field, government should decide requisite applicability of policy.
-  OALP enable bidders to bid for blocks on offer any time of the year unlike NELP which is an annual event i.e cyclic bidding.
-  NELP is helpful to attract more bid in unexplored basins as the risk is less compared to OALP, where as for proven fields OALP attracts investors.

- 👤 NELP was well appreciated when launched, but gradually fall out happened. OALP is also a good option for attracting foreign investors to start their business directly into E&P in India without any tie-up with local Oil and Gas majors in India.
- 👤 NELP: Cost recovery issue: There are the disputes with DGH on various costs. It starts with budget and work plan approval stage. Subsequently it continues at development stage as there will be deviations from the plan due to various reasons. Finally it gets escalated to never ending arbitrations. JV partners are also to be blamed as they try to show inflated costs to get more cost recovery and less payment of profit petroleum to GOI. Cess & Royalty issue: In one JV cess & royalty are constant throughout the contract period and in another it is variable and get changed from time to time leading to uncertainty. Products price issue: JV has to sell oil to GOI nominated refineries at international price. But gas price is controlled by GOI leading to uncertainty.

OALP: Being revenue sharing there won't be any cost recovery issue. Please check cess & royalty issue. Oil to be sold to GOI nominated refineries only at international price to avoid under invoicing by JV. Gas price minimum is required to be linked to international hubs to avoid uncertainty.

- 👤 NELP – Separate licenses for different types of hydrocarbons. Investment cost can be recovered before sharing the profits, there are various stages where government approval is needed for spending causing delays in overall process.
- OLAP – The contractor has freedom to choose the site and uniform licensing for conventional and unconventional, can choose any block in designated area.

- 👤 OALP: Administration of NELP was very tough. Too many process. Govt and Pvt companies will like OALP. Top line sharing.
India geology have not been proven. Inherent risk in Indian basin. Companies had issues in risk taking. Cost recover need to be taken then sharing of profit
Policy 1991 major policy, 1999. NELP implementation. Initial uphoria. National to Private company. Government offers had good areas. RIL, CAIN success. Private companies came.
OALP: India basin risk increased. learning came, data gap, pricing issues . Industry development. 2014 Oil prices went down. 2017 OALP launched. Global development, Indian learnings. CAIN took many blocks .
PSU are Ok to both, OALP ease of implementation.

2. Which of the two policies is likely to attract investors and why?

Answers

- 👤 NELP may attract investors as policies are more favorable to the firm as compared to OALP.
- 👤 NELP
- 👤 Depending upon the type of field, government should make NELP or OALP policy applicable to enhance E & P activities. In NELP policy, cost recovery is possible by the investor, if exploration has been done successfully before sharing profit to the government. For OALP policy there is no provision to recover the cost and if after exploration production is very less then cost recovery shall be difficult even though pricing shall be fixed by the investor. Also if imported oil/gas is cheaper then investor cannot keep selling price higher than imported one.
- 👤 The OALP has helped in removing red tapisam and brought in a quantum jump in the E&P sector. Data for the blocks will be made available to the bidders through the National data repository (NDR).
- 👤 NELP is likely to attract more investors in unexplored basins.
- 👤 Both has it's merits and demerits, the best is yet to come. There shall be a commitment to the investors about the min returns on their investment, through min price fixation or allowing them to work out fair price of the product based on the investment and at the same time looking to the international market price. The price shall be little less than the international price as a cap, which ensure there is check and balance and no unwanted exploitation on the price discovery.
- 👤 OALP is much superior as it addresses the issue of cost recovery. Please confirm cess, royalty & products pricing in OALP.
- 👤 OLAP will attract more investments as it gives operator to select the exploration blocks on its own, without waiting for formal bid round.
- 👤 Production sharing contract - from Indonesia . Rice cultivation . rice - remove some part expenditure and then divide the remaining equality .
Revenue sharing .
Usa: Royalty tax mechanism . Production tax .
Production mechanism. NALP is more user acceptance
Company see global rules .
High profit revenue sharing. Risk sharing in high risk block

3. What kinds of firms are likely to invest more in these policies?





Answers

- 👤 Firms having experience in exploration and production are likely to invest in these policies.
- 👤 Those who want to do business in oil & gas
- 👤 In both policies, big operators, experienced foreign investors can do the investment.
- 👤 GOI efforts to attract foreign giants like Peronas, Exxon Mobil, Chevron etc and private players into E&P business haven't been quite fruitful so far.
- 👤 Companies with adequate technical and resource capabilities can participate.
- 👤 Looking to the financial risks covered in E&P, well experience E&P companies or FI can only enter into this sector. Ideally it should be a private and government partnership will bring in better results in terms of development and price control mechanism.
- 👤 Any firms can invest. However lead operator requires experience in E&P operations.
- 👤 NELP: National Oil Companies (NOCs), OALP: International operators (IOCs).
- 👤 NELP : small firms would like to be in NELP hardy Hindustan exploration company
OALP: Money more. Cost recovery; deep pockets
Pricing mechanism by govt, RIL issue D6 field
Govt service tax was introduced. Extra burden on upstream company. Contract; fiscal stability is important . GST
BP RIL : experience of RIL
Exxonmobile

4. What are your suggestions for attracting the investors in oil and gas?

Answers

- 👤 In order to attract investors in oil and gas, we need to create culture for; Ease of approvals (single window), Ease of operations and Ease of government controls.
- 👤 NELP should continue for new fields and OALP should be implemented for development fields.
- 👤 For tougher identified fields, government should reduce duties, give higher prices and if possible government should make their own investment. To attract foreign investors, clear guidelines with better clarity, new policies should be formulated.
- 👤 Considering the enormous risk involved in this business by huge financial implications, apart from E&P business GOI has to provide further opportunities like exploration of minerals resources basis NDR.
- 👤 Firms are to be allowed to carry out their own study to access the potential of the proposed areas before participating in bids.

-  There shall be transparent and open book approach for the investors to have a model to recover their cost through the product produced from the respective block. There shall be freedom for price discovery to make it more attractive, this will allow the investors to come forward to invest in India. GOI shall provide transparent platform irrespective of any government in power, GOI shall also support the investors to get timely clearances and customs/ports cooperation strong legal frame work to see they are given fair chances as a local investors.
-  As E&P business is highly uncertain and capital oriented addressing issues mentioned above, timely decision, avoiding unnecessary interfering are required.
-  Reforms in pricing of petroleum products and subsidies for LPG, Kerosene. The under recoveries accounts for huge losses for marketing firms. Clear E&P policy and relaxing or simplifying the areas like pricing and allocation of resources, PSCs, clearances etc. Incentives / tax rebates for Oil field equipment manufacturers and Technology providers. More conducive regulatory environment for international players in technology dependent operations like deep water/ultra-deep water.
-  Fiscal stability criteria
 - Clarity on selling of produce Oil and Gas (No clarity in Gas) haziness
 - Service availability in India (SEZ to be created for service Industries, tax exemptions – GST rebate). Cost of working is lower
 - Data gathering and data availability. NDR. Government charge. Should make it free.
 - Maintenance of PC cost – running cost. Restriction. per day cost
 - Working level : profit sharing cap . Bid Technical bid, commercial part .
 - OALP : Profit sharing has to have cap . They will get three years to start the production.
 - Sit on silently and return the block. No penalty.
 - They go to the market : used signature bonus .
 - Eol, bid part.