A Cogitation On Necessity Of Exploration & Exploitation Of Smallfields in South East Asia (Sea)

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Abstract: At the end of 20th century, most countries in South East Asia (SEA) found difficult to fulfill their domestic hydrocarbon demand by its own resources. Till date, the resources with less complexity is exploited in large scale leaving the smaller resources and highly challenging resources in both onshore and offshore regions of SEA. This leads to more import of hydrocarbon from the Gulf countries and Middle East which have negative impact in the economic growth of a country. To overcome this, the small fields in SEA has to be operated to meet out its own demand.

IndexTerms– Exploration, Investment, Net Present Value, Portfolio, Production, Rate of return, Small fields

1. INTRODUCTION
In the recent years, SEA has been the production and consumer hub for the foreign countries which leads to the expansion of its domestic infrastructure. These development leads to the energy demand. Petroleum consumption has grown by 4% CAGR and is projected to be 2% CAGR upto 2025 [4]. Even though the Oil and Gas companies in SEA have been challenged to cope with domestic demand through its own hydrocarbon resources since 1990’s. [7] To obviate this, companies have continued to discover new fields and deploy newer technology to increase the production but it is insufficient to meet the increasing demand. For the past 10 years, the proven reserves have declined by 12% [3]; [14]. This leads to the companies to look into the challenged resources such as small fields and deepwater reservoirs to meet the energy demand [10].

2. SMALL FIELDS
In 1970’s a reserve having a capacity of <100 MMBOE is called as small fields. With the technological advancements, now the reserve with a capacity of <35 MMBOE is said to be a small field. Currently, SEA has 69 small fields ranging from 0-500 MMBOE reserve with a total capacity of >3700 MMBOE [1].

3. Constraints in Small Fields
The development cost required for small fields is very high [6]. If it is trimmed by 10% it could open up >200 MMBOE of Oil & >500 MMBOE of gas resources. A 20% reduction in development cost leads to production of >350 MMBOE of Oil & >950 MMBOE of gas resources. Each 10% reduction in development cost will increase the rate of production.

3.1 How to minimize development costs
During the time of bidding itself, the government has to fix low acreage to the small fields and also recommends the banks to offer loans at minimal rate of interest for meeting development expenses. The government can give incentive & subsidy when the production commences [12]. The production from small fields will reduce the burden on foreign bill and indirectly supporting the government by offering jobs to the locals both technically & non-technically.

3.1.1 Increasing the number of investors for developing small fields in SEA
The investor always has the problem of exploring new fields through various geophysical methods. To avoid this, the government itself gives the 2D & 3D data of the small fields. Registered Micro, Small & Medium scale enterprises are preferred over the front runners during the allocation of small field [6].

3.1.2 Investor need for Short-cycle & High-Profit projects
In general, the investor invests money and wants to earn a high-profit in a shorter time span. So the enterprise can invest it in another project. The small fields investors in SEA needs to minimize the exploration and capital expenditure costs, development teams of small fields has to find a cost efficient technique to extract hydrocarbon in a shorter span of time [11]. A study shows that, the Net Present Value (NPV) & Capital Expenditure (CAPEX) of a small field is 5 million USD and the profit obtained is 1.5 times higher than that of the larger field for the same period of time [12]; [13].

4. A Novel plan for small field
The strategy of extracting more hydrocarbon from a small field requires a basic modification in operating plan. The concept is to increase boundaries, instead of recovery and production. To attain this, an unconventional approach is needed which targets faster & inexpensive extraction of hydrocarbons from small reservoirs before shifting onto the next reservoir [9]. It leads to less production and shorter
field life, it can be counter balanced by standard operating procedures and repeatability of development in the asset [15]. It can be accomplished in 3 steps [5].
1. Incur a hawk-eyed view of the portfolio
2. Marking the total project cost as blowdown scenario
3. Rationalize development costs to obtain the target rate of return

4.1 Incur a hawk-eyed view of the portfolio
High resolution portfolio management is a methodological workflow for a dynamic portfolio analysis. It is an overview model which looks deep into the operators to capitalise on premium locations within their portfolio. This type of portfolio management is usually designed for a country & basin level but here we deploy it to small reservoirs and is developed based a four valuable actions [9].
  ❖ Recognise the reservoir: Analyse the past performance and concentrate on small field, reservoir level performance.
  ❖ Specific acreage: Small fields have bunch of high and low degree acreage and it is wiser to invest capital flexibly based on expected revenue.
  ❖ Disseminate the knowledge: Speed up the well-by-well learnings to improve key cost and production operations through improvised use of real-time data acquisition, processing & interpretation.
  ❖ Concentrate on core: Wipe out the projects having alternate methods and take up fields which can be produced quickly.

High resolution performance visibility is particularly applicable to small fields, which provides the economic challenges. Operators cannot get higher profit from small fields in comparison with larger fields and they must look deeper into their reserve portfolio to improve asset performance and boundaries [11]. This implies the detailed study of individual reservoir zones is needed to localize sweet spots for faster action. High resolution portfolio management gives faster, data-driven and execution plan in investment policy which will finally open up the way to increase the productivity and full cycle breakeven cost – even at the rate of low production. But being selective with asset development will eventually improve capital investment and its flow, by reducing the risk associated with it, all these parameters will meet out the expectations of investors to invest in SEA [10].

4.2 Marking the total project cost as blowdown scenario
A blowdown scenario is the mirror image of a conjectural situation, where a field is operated to maximum profit at minimum investment [11]. In hydrocarbon industry, the production at a field comprises of two stages viz., development and production. In blowdown scenario, at development stages minimum investment is needed and during production stages, operation cost is minimum. Once the rate of return declines below it, the field is decommissioned. After carrying out a high resolution analysis, identification and prioritisation of drilling location for an asset is finalised. A blowdown model can be designed to layout the ultimate baseline of asset value and return. This is in contradiction with the conventional approach, where investment options are screened and categorized by net present value (NPV) & internal rate of return (IRR). Here the options are chosen accordingly versus the blowdown baseline [7]. Implementation of this model to a small field in SEA could ironically declines cumulative production by 70% but cuts time to first oil by 50%, Unit cost by 40% and doubles IRR in comparison with conventional concept [13].

4.3 Rationalize development costs to obtain the target rate of return
Later on constituting the blowdown model as a baseline and distinguish the extent of disposable perimeter of the project, the operators can then look into the incremental investment of the asset periodically until the acceptable rate of return is attained [9]. Incremental investments can increase the rate of production. This can be accomplished by tracking the identified sweet spots by high resolution portfolio approach for in-fill wells (or) incorporating newer technologies to unlock more barrels of oil. Even so, the operators can equally focus on minimizing operational costs and increasing profit.

For Operators, the necessity for drilling small fields with minimal expenditure is the key, as was the case with North American shale, where operators successfully reduced the operational costs almost by 50% from 2010, by applying newer operational models & updated technologies [4]. Small field operators must be flexible, quick & nimble by teamwork, innovating newer methods in organisational and commercial models that are more associated with technology start-ups.

5. RESULTS AND DISCUSSION
In brief, the exploitation of small fields is necessary for SEA operators and Government to ascertain continuous and low-cost hydrocarbon supply in an upsurging economic condition. During the development of small fields, cost cutting practices are highly desirable, as each 10% cost reduction in development cost will leads to exploitation of a new small field. To increase profit and capital value of small fields, it needs a robust methodology that encompassing technology:
  1. Incur a hawk-eyed view of the portfolio
  2. Marking a total project cost as the blowdown scenario
  3. Rationalize development costs to obtain the target rate of return

To enforce this methodology efficiently, Operators must increase their speed and versatility; Formulate standardised methods to increase cashflow & rate of return and amend joint-venture projects across the
production process. This will be a major change in the outlook for most exploration & Production companies and especially for State owned National Oil Companies. While considering the scenario with SEA countries, this alone is the one & only way to increase the rate of hydrocarbon production and its' economic benefits before getting things late.

REFERENCES