

DEVELOPING THE EPC VALUE CHAIN IN THE UPSTREAM OIL & GAS SECTOR IN MIDDLE EAST

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This paper focuses on the strategic opportunities available in the upstream oil and gas sector. It analyses the current market structure in the Middle East and examines options for companies active in the mid-stream and down-stream sectors within the region to develop new business in the upstream sector.

This paper is essentially a corporate case study. The methodology adopted combines a literature review with sampling and information gathering approaches to a relatively small number of key industry players and opinion formers.

There are some specific low risk opportunities for medium sized engineering, procurement and construction (EPC) companies in upstream off shore area with some common options for organic growth and acquisition. Key acquisitions may form part of an overall growth strategy and companies pursuing this route need to prepare accordingly, especially for post acquisition integration.

This case study article draws upon qualitative primary data from a relatively small number of key people. It will have influenced the conclusion of this research. A broader study is recommended, however, this research has been conducted in areas that are highly sensitive for companies and in which relatively small numbers of key decision makers hold major influence.

Keywords: *engineering procurement and construction, value chain, oil and gas*

Purpose and structure of this research

A significant proportion of medium sized EPC (engineering, procurement and construction) companies that operate in the Middle Eastern oil & gas sector have no sizeable presence in the upstream oil and gas segment; however they may be well established in mid-stream and downstream sectors. There is potential there for some of these companies to be groomed and polished to gain access into the upstream oil and gas sector.

This research examines this market sector in the region and the opportunities for companies to add value. In doing so it analyzes aspects of mid-stream and downstream

companies including their existing company profile, systems & procedures, strengths & weaknesses, and generates options for how they can capitalize.

By its nature, a study such as this one touches on commercially sensitive areas and taps in to a relatively small number of key decision makers from project management companies. This necessarily lends itself towards qualitative approaches. The literature on value chain and business acquisitions are well established, but there is a growing need to add to the body of knowledge in the increasingly globally important areas of engineering, procurement and construction project management and specifically in relation to opportunities in the upstream oil and gas sector where there are vast commercial interests involve.

Research hypothesis

Initially a research hypothesis was set as “Current capabilities of many EPC companies in mid stream and downstream sectors can be capitalized upon for entry into upstream value chain”. However with exposure to the some EPC companies systems, practices, personnel and projects during the research, this primary hypothesis was modified as follows.

H1 – Many of EPC companies do not manage their projects in a strategic way in strict alignment with company business strategies.

H2 – Upstream Oil & Gas sector entry for many Mid / Downstream EPC companies may not be that difficult.

H3 – Off shore upgrade projects may be a low risk area for these companies to look into.

Research method

As previously stated, the approach adopted is a qualitative one. Structured personal interviews were the main method used in this study. Within these set of pre-determined questions were used in a specific order and form. Some questionnaire analysis was also undertaken to narrowly defined groups. The participants for these (structured interviews and questionnaire) were carefully identified based on their areas of specialization and size & complexity of the projects involved with.

Interviews were carried out with senior staff of some oil and petrochemical companies, EPC contractors and subcontractors in Middle East region. Interviewees were grouped into the following categories:

Category – 1 Country Managers/Subsidiary Heads

Category – 2 Functional Managers handling multiple countries

Category – 3 Project Managers/Project Control Managers

Category – 4 Functional Managers at Country Operation Level

Category – 5 Client / Subcontractor Project Managers

Category – 6 Oil Exploration & Production Company Personnel

Category 5, Project Managers of clients and subcontractors, made the research all the more interesting and meaningful, as it gave a totally different perspective for the areas investigated. Clients could give their views in comparison to their experiences with various Contractors, which included competitors.

Moreover, some of the questions in the questionnaires were developed based on the responses from the interviewees, and distributed to more people to test the validity of qualitative data. After some observations on the response to questionnaire, key factors boiled down were brought together in a dynamic perspective.

Due to limitation in the samples for interviews, a structured questionnaire was also used to reach more people in this sector. Focus was on personnel who lead or involved actively in projects as joint ventures. The reason was their opinions could give reliable limits on the preparedness if these companies for potential acquisition.

Though majority of the secondary data used in this study was external to these companies, the nature of the study required an emphasis on unpublished internal data also.

Research instruments for primary data collection

The research instruments were segregated broadly under two groups: interviews and a questionnaire. In the first group, there were six instruments and the second group had only one instrument. The questions in all these instruments were prepared based on a preliminary survey conducted within some senior personnel within EPC sector in Middle East. The basic objectives of these instruments were the following.

Research Instrument No. 1: This instrument was aimed at country and subsidiary managers who are involved with strategic decisions / moves of the companies. They also had good exposure at program level of country-wide / subsidiary-wide projects. Questions were focused on operational and strategic level aspects and potential growth opportunities in general and specific to upstream oil and gas sectors.

Research Instrument No. 2: This instrument was used to interview the regional functional heads who are at strategic level for Middle East Region. These interviewees had project and country level experiences, before their current assignments. Questions were focused on current strategic aspects and future growth prospects / options. Integration of functional capabilities at program level leading to more efficient and effective operation at project level was discussed.

Research Instrument No. 3: This instrument was used to interview project managers and project controls managers who are at operational level within a country. The questions were however, designed to get a feel of their understanding of the strategic objectives of the respective company and how these individual projects fit into the big picture. Opportunities for improving effectiveness and efficiency at project level were the main the main focus in this instrument. Furthermore, interviewees' opinions on some potential business lines for diversification were also discussed.

Research Instrument No. 4: This instrument was aimed at verifying the level of integration of various functional activities at project level and country level. Project managers' authority in the functional area has been a factor influencing the project success globally, and its dimension within Kentz Saudi Arabia was studied through this instrument.

Research Instrument No. 5: This instrument was used to track on outsider perspective about EPC Contractors, their strengths / weaknesses and opportunities for growth. This category was chosen as all other categories of personnel could knowingly or unknowingly give biased views on at least some of the questions. Some of the questions made to other four categories were modified to make it suitable for personnel outside client & subcontractor organizations. These interviewees were encouraged to compare with their experiences with various EPC companies operating in mid stream and downstream sectors.

Research Instrument No. 6: This instrument was different from the first five and the objective was to get first hand information about various activities in upstream oil sector (mainly offshore) and identify the areas where these companies can focus for organic growth or external acquisition. The target was few senior personnel from the exploration and production area of upstream oil sector. Despite best efforts only very few interviewees could be approached, for confidentiality reasons with many oil companies.

Research Instrument No. 7: This research instrument was a questionnaire distributed to companies' personnel working in this sector. Questions were prepared aiming qualitative data relevant to the topic of research. Some of the questions were based on specific observations made by some of the interviewees which required further analysis within a larger group than the interviewees under categories 1 to 5.

Some limitations should be noted. Although Eisenhardt (1989) argues that four-to-ten cases provide a sufficient range measure for analytic generalizations, one major limitation in this study was relatively small number of cases and previous data available within this sector. This study may also have suffered to some extent from a bias of views of a small sample of personnel available within this sector system with exposure to the subject of research. Many interviewees found some questions sensitive and felt uncomfortable expressing a strong personal view in depth.

Three important definitions and explanations

In framing the issues in this paper, it is worth defining value chain, oil and gas market sectors, and engineering, procurement and construction (EPC). These are further explored in a review of literature.

A value chain is a chain of activities. Products and services pass through all activities of the chain in order and at each activity the product gains some value. The chain of activities gives the products more added value than the sum of added values of all activities. It is important not to mix the concept of the value chain with the costs occurring throughout the activities. A diamond cutter can be used as an example of the difference. The cutting activity may have a low cost, but the activity adds to much of the value of the end product, since a rough diamond is significantly less valuable than a cut diamond (Porter, 1985).

Within the petroleum industry operations are typically divided into three main categories: upstream, downstream and midstream. Searching for, recovery and production of crude oil and natural gas are generally seen as activities relating to the upstream sector. Processing, storing, marketing and transporting commodities that include crude oil, natural gas, natural gas liquids (LNG's, primarily ethane, propane and butane) and sulphur are actions associated with the midstream industry. The refining of crude oil, and the sale and distribution of natural gas and derivative products of crude oil are associated with the downstream oil sector.

In defining EPC, the key differentiator from other types of project management contracts is not that it is a scope of work, not a form of contract, and requires a single responsibility. Normally a construction contractor taking on an EPC contract assumes responsibility including financial responsibility which brings an element of commercial risk which must be carefully considered (Kentz, 2008).

Returning to value chain, it can be argued that a company's profits are only as good as its ability to create value for its customers (e.g. Gibbon, et al, 2008). Porter (1985) defines it as a chain of activities through which a product passes through and gains some value. He has extended the concept beyond the individual organization to larger interconnected system consisting of firm's supplies (and sub suppliers), its distribution channels and the firm's client/customers. And under this analysis, two central questions arise under the choice of a competitive strategy:

1. Attractiveness of industry for long term profitability and the factors that determine it;
2. Determinants of relative competitive position within an industry (some industries are more profitable than others).

A firm needs to consider both the above questions. Competitive advantage grows fundamentally out of value a firm is able to create for its clients that exceeds the firm's cost of creating it. Three generic strategies are proposed, much covered in the management literature:

1. Cost Leadership – it is perhaps the clearest of the three generic strategies. Here a firm sets out to become the low cost producer in its industry. During the analysis of cost, due recognition should be given to linkages between individual activities;

2. Differentiation – here the firm seeks to be unique in its industry along some dimensions that are widely valued by customers. The firm is rewarded for this uniqueness with a premium price;

3. Focus – this strategy is quite different from others as it rests on the choice of a narrow competitive scope within an industry. Here the focuser selects a segment or group of segments in the industry and tailors its strategy to serving them to exclusion of others. The focus strategy has two variants. Cost focus and differentiation focus. In cost focus a firm seeks a cost advantage in the target segment while in differentiation focus; a firm seeks differentiation in its target segment.

It is in applying value chain concepts to the EPC sector that there is less published work to draw on and there are some significant issues to consider. With the very basic definition of project as a “temporary endeavor”, EPC value chain only exists for the duration of the project (Cherns and Bryant, 1984). This short duration makes it very important to have the systems effective and efficient at the first place, as the damage control is never fast enough to catch up with the project duration. Al Naqvi (2009) mentions that long periods of prosperity led to complacency as inefficient processes and lethargic strategies became acceptable ways to conduct EPC business. As the economy tightened, sectors restructured and competitive pressure mounted, the focus is now shifting from thriving to surviving. The uncertain times can offer promising opportunities to redefine the competitive landscape, to establish a long term winning strategy and to create a sustainable competitive advantage. For this, the process starts with analyzing and rethinking EPC value chain.

Value adding decision making during engineering phase of epc

Construction industry clients are increasingly demand documented evidence of the steps taken to deliver value. Although their understanding of value differs, the engineering team (designers) requires broad and flexible measures to justify design decisions in terms of value expectations of the project stakeholders. Saxon (2002) noted that: “the construction industry knows little of how it adds value to customers or society”.

Therefore, there is a need to understand what is meant by “value” within each project and reflect that into design decisions. The objectivist view of value embedded in traditional approaches such as value management must be complemented by a subjectivist view that accommodates the judgment of value that occurs within relationships between facilities (and their embedded design solutions) and people (Thomson et al, 2006). In the EPC sector, the value chain members (if at all there is a formal group in an organization) are often isolated from the engineering design. This hinders design solutions that could yield better stakeholder value. Austin et al (2001) proposed the concept of “design chain”, in which all value chain members are engaged in collaborative design problem solving.

Outsourcing value chain activities

A firm may specialize in one or more value chain activities and outsource the rest. A thorough value chain analysis can facilitate outsourcing decisions. A firm’s strengths and weaknesses in each activity in terms of cost and ability to differentiate need to be analyzed to arrive at outsourcing decisions. The following are some of the aspects to be considered for outsourcing decisions:

- whether the activity can be done cheaper and better by suppliers/subcontractors.
- whether activity is one of the firm’s core competencies from which stems a cost advantage or product differentiation.
- the risk of performing the activity in-house, if the activity relies on fast changing technology or product sold in a rapidly changing market, it may be advantages to outsource the activity in order to maintain flexibility and avoid the risk of investing in specialized assets.
- whether the outsourcing of an activity can result in business process improvements such as reduced lead time, higher flexibility, reduced inventory etc.

Construction value chain integration

Though the construction supply chain exhibits some characteristic differences from other sectors (Koskela, 1997) there remain no compelling reasons for industry’s continuing inefficiencies. Egan (1998) argued that construction industry needs to integ-

rate its processes and products to ensure that better value can be delivered to the client. This approach involves clients, designers, main contractors and sub contractors working together as a unified team, rather than disparate collection of separate organizations. Many construction clients appear to distrust their main contractors who in turn maintain an arm's length relationship with their subcontractors and suppliers (Geoffrey & Andrew, 2005).

Despite the difficulties that industry faces, it is essential that it develops its supply chain practices to deliver value to the client rather than simply seek to generate short term savings (Lockamy & Smith, 1997).

Harland et al. (1999) have shown how figures can more readily attain long term cost reduction by forming closer working relationships with key suppliers, which is highly relevant for construction supply chain. Compared to other industries, construction industry has been viewed as a slow learning industry.

Although many engineers, project managers and contractors do not consciously recognize a value chain, they all interact with it and make value chain management decisions on a daily basis. Having real time information available at any time can reduce lead time and increase accountability for tracking purposes. These decisions can strengthen the value chain if they are the very right ones.

Upstream oil and gas

The upstream oil sector includes exploration, drilling and production of crude oil. Therefore, upstream oil sector is also known as the Exploration and Production (E&P) sector. The upstream sector includes the searching for potential underground or underwater oil and gas fields, drilling of exploratory wells, and subsequently operating the wells that recover and bring the crude oil and/or raw natural gas to the surface.

The midstream includes transportation and trading of crude oil to refineries.

The downstream oil sector is a term commonly used to refer to the refining of crude oil and the selling and distribution of natural gas and products derived from crude oil.

Although the overall production of oil is driven by global demand, the value chain is producer driven and many companies are vertically integrated and have control over every level in the chain. The recent trend in the industry is for companies to merge to expand their upstream levels instead of downstream levels.

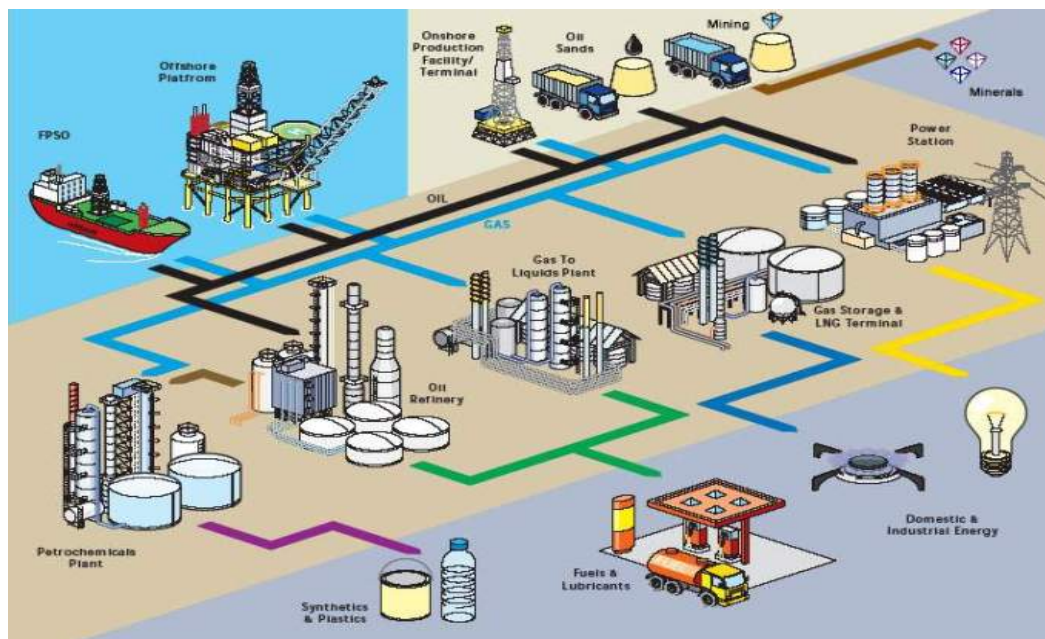


Figure 1. General Classification of Up-Mid-Downstream Oil Sectors (Source: AMEC)

Literature shows that there is less emphasis on increasing refinery capacity; and companies are now focused more on exploration and production segments of the value chain. According to an energy research firm John S. Herald Inc., worldwide upstream capital spending had been steadily increasing annually until the end of 2008. Though the current global recession impacted it adversely, the trend in the last decade gives enough reasons for EPC companies to focus more on upstream oil sector even though they may not have good presence in upstream sector now.

Significance of upstream oil sector in times of economic uncertainty

The credit crunch and economic downturn of 2008 and 2009 have made a deep impression across business sectors. Emirates Business (2008) reported that Gulf downstream oil projects are expected to be the main victim of the global financial crisis as strong Asian demand for crude could keep upstream ventures on track, according to a key Gulf investment bank.

This is mainly because of a decline in global demand, threat of oversupply of products such as, fertilizers, petrochemicals and refined petroleum products and a decrease in margins due to decline in prices and fixed feedstock prices.

On 23rd December, 2008, *Downstream Today* reported that, with global demand for chemicals falling faster than it has in 20 years, 2009 is going to be a challenging year for the petrochemical industry. It was a prediction that proved to be accurate.

Calling it "a massive footprint shift," Dow Chemical CEO Andrew Liveries announced his company is likely to restructure operations worldwide to deal with steep market declines and the global recession, *Downstream Today* reported. Liveries added that the market is "as bad as we have ever seen it in our lifetimes," and has never seen so many regions decline simultaneously in the world. "We could be looking at a couple years of tough and severe correction."

The downward trends in midstream and downstream sectors demonstrate how important it is for EPC companies to focus on upstream sector and diversify in every available opportunity.

The forecast for world oil demand in 2009 was set to continue to rise at moderate rate according to the International Energy Agency (IEA) Report that was released on August 12th, 2008. While the global economy is experiencing slowing demand and rising inflation, oil prices had remained firmly above US \$ 100/barrel level till third quarter of 2008. All major oil companies expected their capital expenditure for 2009 and 2010 to go up. However the subsequent recession in global economy will have some or even major impact on this. General feeling in the industry is that the situation will be clear by the first quarter of 2010.

Key question: what differentiates epc providers?

This point was specifically addressed in research instruments #1 to 4 covering a broad spectrum of key personnel in these sections. Differentiation is usually too costly, because uniqueness requires that the firm performs value activities better than competitors.

This is an area where many categories of the respondents were asked to give their views. Many of the interviewees mentioned that price is only one component in global value chain, and think beyond price. This gives more importance to the "Differentiation" than "Cost Leadership" as a suitable generic strategy from three strategies suggested by Michael Porter.

Some key differentiators highlighted by respondents were Client Servicing, Flexibility and Commitment (Never walking out of a project, however bad it may be). One functional manager stated that his company's client servicing is many times not affected by poor servicing it receives from its subcontractors and suppliers. This was an excellent demonstration of the company's commitment to the clients. However he could not answer if the company was successful in passing over this additional cost incurred at its end to the suppliers and subcontractors.

The significance of knowledge management

Knowledge management is the basis for significant competitive advantage (Dav-enport Prusak, 1998). Effective information flow is a vital aspect of this and a pre-requisite for an effective value chain. However, the majority of correspondents found significant difficulties and opportunities for improvement. One country level functional manager, who stayed with a company for two decades, mentioned that knowledge of many senior personnel in that company is not shared with others, which leads to "re-inventing the wheel many times". A project manager added to this mentioning that the 'savoir faire' (know-how) is perhaps to a large extent based with a fairly small percentage of the team.

One manager identified that, in many companies effective knowledge management system does not work because it hurts some, it takes power of some and it exposes some. He agreed with the interviewer's point that that knowledge management is a policy for the company; if it is not hurting anyone, it is not working; so we should not be worried about it. He added; these pains and hurts will heal with time and employees will realize value in the system. As a general rule, the most successful person in life is the one with best information. So logically, a successful company would be one with many successful persons.

Another country level functional manager pointed out that many EPC companies are not using information technology in the best possible way and this is weakening the knowledge management system. The company should be able to clearly differentiate between the cost of a system and the value in investing in an effective system. This point makes great sense and real value in line with Keon's (1998) views that, "if intelli-

gently utilized, Information Technology can be a catalyst for change and an engine driving rapid growth”.

Companies that address these difficulties will have significant advantages over their competitors.

Awareness among employees about company’s strategic growth plans

Categories of key personnel who were interviewed using research instruments 3 and 4 were encouraged to directly respond to this point surprisingly, most of the respondents were not well updated about company’s strategic growth plans. Only categories 3 and 4 were asked questions related to this area. None of the country level functional heads was very clear about their company’s strategic growth plans.

A project manager pointed out that:

“Strategies shall not be limited to paper and presentations; they got to be implemented and the results measured and verified and corrective actions taken, if necessary.”

Another aspect identified by this project manager was that once the company finalizes a strategy it needs to stick to it as much as possible. Many times he finds his company deviating away from the strategy when commercially attractive options in non-strategic areas come up. He added that, in today's age, if a company wants to keep the motivation level of its expert engineering staff high, their intellectual capacity got to be challenged through high end jobs and they should be made to capture new horizons. Then only the creativity level of the people can be spotted and a good team to take up ambitious growth plans can be put together.

Organic growth

This question was asked directly in research instruments #1 and indirectly discussed in research instruments 3, 4 and 5 during the interviews conducted with different categories of personnel participants in this study. Businessdictionary.com defines Organic growth as:

“Expansion of a firm's operations from its own (internally generated) resources, without resorting to borrowing from or acquisition of other firms. This excludes any

profits or growth acquired from takeovers, acquisitions or mergers. Organic growth represents the true growth for the core of the company and is a good indicator of how well management has used its internal resources to expand profits.”

Responses from some interviewees in many ways matched with the findings of literature, namely that companies should focus on those tasks for which it has particular talent. However, many others highlighted that this should not be limitation for growth plans. One country manager pointed that offshore business opportunities are there; and this area is not well explored till now by many medium sized EPC contractors.

Subcontract management

Research instrument 5, used to interview client and subcontract managers, addressed the area of subcontract management. It is an area which has direct and indirect impact on organic growth and acquisitions. Subcontracting is a key area in today’s EPC environment and effective management of it is highly essential for the project success. It directly influences the value chain in a big way. Analysis of the responses from the project managers of two of the subcontractors show that only few companies are doing well in this area.

From the research it is clear that subcontractors are concerned about their inability to work with a positive cash-flow, vital to their effectiveness. One subcontracting project manager summed up the problem in complaining that delayed payments are used by their clients to cover up their own inefficiencies and negative cash flows. Most of the delays caused by incorrect and incomplete engineering and procurement within EPC companies were unprofessionally charged on to the subcontractors. Thanks to the weaker management and financial muscle of most of the subcontractors, this approach has worked; though with some damages to all stakeholders on the project.

Opportunities in the upstream oil sector

All research instruments except number 5 handled this aspect. Instruments 1 to 4 focused on the company’s preparedness to enter this segment whereas instrument 6 addressed opportunities in this sector.

There was a clear consensus within responses that many medium sized EPC companies are not managerially mature enough to take up such challenges in this new area where the client expectations are way too high. A very detailed interview with a practicing senior project professional with one of the oil exploration and production companies gave a great insight to upstream oil offshore opportunities. However he cautioned that the capability in logistics management will be a real catalyst in some of these cases; and companies should challenge its strengths in this area, before moving forward with these opportunities.

This interview also gave some valuable inputs related to precautions to be taken for decision making within these opportunities. As clearly evident from the opportunities proposed above, main target needs to be in areas involving low or even almost no investment in major equipment including heavy lifts. The barges and/or boats required can be hired along with the crew to mitigate the risk and logistics management skills for these will be directly influencing the overall productivity.

He cautioned that offshore is a different business line and require different type of thinking and mindset, than that of a company operating mainly on onshore. Only meticulous planning can address the complexities, especially on logistics. All staff should be really skilled and dedicated which means a well and structured compensation system complemented by effective motivation. Though the Return on investment (ROI) is attractive, there are not many companies operating in this sector in small to medium sized projects and the big EPC companies operating in this area always subcontract small to medium sized slices of the main job.

Logistics management was identified as generally a strength, though there is good scope to improve. This is important in positioning companies to venture into the upstream offshore oil sector in the Middle East.

Company readiness for acquisition and change

Research instruments 1 to 4 were used to get the views from some key managers regarding potential acquisition and these companies' readiness for working in this direction. The discussions and analysis are related to the concept of outsourcing value chain

activities discussed elsewhere. Interviewees were asked to express their opinion on the risks of acquiring.

The results indicate that EPC companies need to work on a mindset change for catalyzing the organic growth and any post acquisition integration and this cultural change has to be led from top down. Against a backdrop of high employee turnover, greater engagement in the strategic process is needed by a broader range of employees in order to win hearts and minds for change.

One project manager highlighted that:

“Change achieved in mindset needs to be monitored and followed up to ensure that it’s sustained and is consistent across various projects.”

This is a more broadly recognized point, Welkingson and Fogarty’s (1996) for example, having found that a major difficulty in implementing and maintaining cultural change is ensuring that people do not go back to their old practices.

Some acquisitions in upstream sector can bring combined business opportunities with the existing capabilities of EPC companies operating in mid-stream and downstream sectors. However, the acquired company itself may not be very profitable. The company can improve on overall sales and returns through such acquisitions. The acquired company’s profile also improves and at some stage it can be sold off at premium price. That said, a seasoned project manager stated that:

“The acquisition of a company and sale in future for only financial gains may not worth the effort. It should add value to the system and the personnel at least in some levels and /or areas apart from building up the overall company profile.”

Recommendations

A close analysis of the primary and secondary data brings up some recommendations which would improve the readiness of medium sized EPC companies operating in midstream / downstream at sectors to move on from the current level to higher volume, and upstream sector irrespective of the pattern of organic growth or acquisition. These practical conclusions can be drawn.

1. ***Look for differentiators other than safety and flexibility:*** Though these two differentiators are highly valued by most or even all of the clients in oil and gas sectors, EPC companies should not be surprised if a study in this area reveals that there are pos-

sible differentiators which can give value addition to its own productivity and profitability apart from the value addition to the client. This initiative can be progressed through the ideas brought in by new employees with rich experience with competitors and even companies operating in non-oil and gas sectors.

2. *Orienting Project Managers more to Company strategies:* The survey response was highly surprising in terms of the lower level awareness of key personnel about the corporate strategic plans of the companies. This can slow down the growth plans and in the worst case even retard the growth to some extent. However with the rich experience these key personnel carry, it may not be a Herculean task to orient them more to the company strategies. Formal orientation programs stressing the expected outcome/value addition of various strategic plans can help them to relate their projects or functional areas to the big picture at country, regional or global level for their employees.

3. *Formal and more effective knowledge management system to quickly capitalize on any upcoming opportunities:* As the old saying goes, opportunities seldom knock our doors again and in today's global economic slowdown compounded with tighter competition only better preparedness can help medium sized companies to capitalize on opportunities when they knock at its doors for the first time. The response from almost 80% of the interviewees highlighted that companies have to improve in this area to a large extent. It may be even worth considering a high level committee to strengthen and streamline and knowledge management systems. Is these companies.

4. *More effective integration of functional areas for faster organic growth:* More than 50 % of the respondents cautioned about poor integration of key functional areas in these companies. This forces the system to operate in the traditional way in many occasions if not all; and modern project management methodologies sometimes face bottlenecks in the system. Majority of the respondents however recognize that most of these companies do have systems and procedures in place for effective integration of all contributing functions to overall project management; and the companies need to only motivate their employees to religiously practice them with total commitment.

Recommendations highlighted in the previous section need the highest level of commitment from senior management for effective implementation. Primarily a condu-

cive environment needs to be created within all divisions and subsidiaries of the company. Continuous monitoring and evaluation need to be done in a very conscious and formal manner.

Though each of these recommendations requires a different approach and implementation plan, one aspect common for all these is the senior management's commitment and fearless/open minded participation of the employees. Heterogeneous culture among various nationalities among the employees in Middle East emphasizes the need for a well knit plan so that sincere participation can be ensured at all levels of employees. It should be noted that apart from the first recommendation of looking into new differentiators, all the other three recommendations will expose many or all sections of the company to some level of change. This can lead to potential resistance, at least from some layers of the employees. This needs to be looked into well in advance so that necessary precautions can be taken before launching the specific drives to implement these recommendations. Periodic and effective feedback systems must be put in place to make necessary changes during the implementations phase, if found necessary. It is advisable to hold some brain storming sessions including key personnel to develop an implementation plan.

Technical and human aspects of these recommendations

Any business is a blend of technical and human elements and EPC is no exception. Therefore, overall improvement on efficiency and/or effectiveness can be achieved only through improving on technical and/or human elements. A close study of the recommendations leads to the following dependency matrix for the success for implementation of each of these (see table 1).

This demonstrates that comprehensive interventions involving total organization will be required to address the cultural change associated with these recommendations. Though these comprehensive interventions cover some generic structural interventions, specific focus will be needed on structural interventions for implementing recommendations 3 and 4.

Periodic feedback facilitates the effectiveness of any plan during implementation. However feedback is only one part of the evaluation. The evaluation exercise will

be complete only when the plans are modified based on the feedback and further evaluated based on the modified plan.

Table 1

Dependency matrix for success in implementing the recommendations

Sl. No.	Recommendation	Technical	Human
1	Look for differentiators other than safety and flexibility	X	
2	Orienting Project Managers to Company policies		X
3	Formal and more effective knowledge management systems to quickly capitalize on any opportunity	X	X
4	More effective integration of functional areas for faster organic growth	X	X

Employees will require motivation for the change especially for recommendations on project manager's orientation to company strategies and integration of functional areas. The transitions need to be managed effectively to ensure smoothness so that the change is hardly felt. Another important aspect in the implementation is that these recommendations cannot be implemented swiftly. So sustaining the momentum throughout the effort is all the more important to avoid the system slipping back to the earlier position. This is applicable for both the technical and human components.

The ultimate objective of the implementation of the recommendations of this study must be a better fit of technology, structure and social interactions which could take these companies many steps ahead in the preparedness for growth in current operating sectors and extending its value chain into upstream oil sector.

Conclusions

Detailed analysis of the primary and secondary data collected during this study has lead to the following three main conclusions.

1) There are some specific low risk opportunities for medium sized EPC companies in upstream off shore area.

Though the general feeling of most of the respondents was that their employer need to mature more to enter into upstream oil sector; the data collected from a senior manager of oil company clearly pointed out specific low risk areas for these companies to enter upstream offshore sector. This can give these companies the right type of exposure to build up the maturity and techno-commercial capability to penetrate more into this sector and finally establish through organic growth or acquisitions of other companies.

2) There are some common options for organic growth and acquisition.

It was very interesting to observe from the primary data collected there are some common areas where organic growth can be attempted as well as acquisition. Growing into high end process engineering capabilities and diversifying into new construction capabilities are good opportunities projected for organic growth as well as acquisition. Construction capabilities in mechanical and civil areas call for high investment in terms of people and equipment and organic growth may be time consuming, which can potentially increase the risk on return on investment (ROI). So acquisition can be a prudent alternative.

3) Companies need to prepare themselves for acquisition, especially for post acquisition integration.

Though many fast growing companies have professional management with good level of maturity in business and project/program/portfolio management, they need to formally prepare themselves for acquisition. Experience in working with other companies as alliance or joint venture partners is a valuable asset in this area. Moreover, it is very significant to be very correct on the decision on post acquisition integration of the Company. If one chooses to integrate the acquired company after a period of time, a heterogeneous expertise bank need to brainstorm, deliberate and identify the risks and steps involved.

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