Identifying key success factors in upstream sector of oil and gas industry in Iran

Mehdi Sheikhzadeh*, Mohammad Reza Arasti and Rouzbeh Kotobzadeh

Graduate School of Management and Economics, Sharif University of Technology, Tehran, Iran.

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In today’s global economy, to remain competitive, firms often concentrate and excel at only a few factors as primary determinants of success, known as key success factors (KSF). KSF are specific to industry, sector of an industry, and geography. As such, scope of our study is about identifying KSF of the upstream sector of oil and gas industry, due to global attentions to limited natural resources and importance of efficiency in the oil and gas value chain. Furthermore, we considered the case of Iran as one of the oil and gas suppliers in the Middle East. In this research, we employed a hybrid approach to identify KSF. Specifically, we tried to identify KSF based upon perception of managers and experts in the industry at the same time that we investigated the competencies of successful firms in the industry. Among other findings, results indicate that top three KSF are: competency of human resources, sufficiency of financial resources and adequacy of technological capabilities. The results of this study have been also contrasted to the findings of Fries and Baumgartner (2008). Findings of this explorative study provide a basis to propose some hypothesis which could be subject of the further research.

Key words: Key success factors, oil and gas industry, theoretical framework, comparative analysis.

INTRODUCTION

Global statistics on the world natural resources indicate that countries in the region of Middle East and North Africa possess about 60% of oil resources and 40% of gas resources (EIA, 2008). Despite of enjoying such rich resources, the mentioned countries are merely producers and do not play a more effective role in the value chain of oil and gas industry. For instance, ranking of top players in this industry (based on revenue level, net profit and value of stock) published by Platts (2008) shows that Exxon Mobil is on top of the list followed by Royal Dutch Shell, Total, and Chevron, respectively.

The point is that, producing companies of such countries, or member countries of OPEC, have no presence in the mentioned list. That is, after about forty five years since establishment of OPEC, leading companies in the industry belong to non-member countries. It is astonishing as how such leading companies possess no natural resources while making revenue from their business in the value chain of oil and gas industry. This is the case even for latecomers such as Perochina in China or Petronas in Malaysia.

However, the producing countries are themselves deprived from such capabilities and are not involved in more value added activities in the value chain. One can come up with the answer by considering lack of attention of such countries to KSF.

Industry experts believe that, for firms in any industry, there exists some limited number of factors that can be critical in leading companies toward success. Such a few factors as primary determinants of success for firms in an industry are known as key success factors (KSF). Identification of KSF is highly rewarding as it can improve competitive advantage of firms and provide them a secure position in the competitive environment. For instance, based upon set of expert panels in the six industries, Vasconcellos and Hambrick (1989) have indicated that “firms profitability depends on having strengths that match the industry’s particular Key Success Factors”.

*Corresponding author. E-mail:shiekhzadeh@sharif.edu. Tel: (+9821) 660-22756. Fax: (+9821) 660-22759.
In the recent decades, identification of KSF has consequently gained special attention amongst practitioners and researchers in strategy domain within management science. In particular, it has become a common practice for strategists to employ relevant KSF while developing strategy for companies. From another perspective, KSF are sometimes viewed as minimum required capabilities for firms to be developed in order to survive in the competitive market. In other words, success of firms can be related to the degree that internal capabilities are aligned with industry KSF.

KSF have conditional nature as they are highly dependent on industry situations (Vasconcellos and Hambrick, 1989). Specifically, KSF are industry specific and within an industry are sector dependent. Yet, even within a sector of an industry, KSF are geography specific and vary from time to time due to changes in industry environment such as competition level, rate of technological innovations and maturity level of industry, etc. As such, companies should continuously monitor the market to trace changes in KSF which is not an easy task (Thompson and Strickland, 2005, Grant, 2010).

This study is an attempt to identify KSF of the oil and gas industry as one of the most critical industries in driving the global economy. Due to global attentions to limited natural resources and importance of efficiency in exploration and production in the oil and gas value chain, in this study, we concentrate on the upstream sector of the oil and gas industry.

In fact, the upstream sector of the oil and gas industry encompasses exploration and production stages including activities such as reservoir studies, seismic, exploration, drilling, operations, installation of production platform, design and engineering, and assembly and installation of wellhead equipments. Given the fact that in the upstream of the industry firms are mainly project oriented while in the downstream are process oriented, the upstream sector of the industry has completely different nature and challenges in comparison with the downstream sector of the industry. For instance, the upstream sector of the industry is facing with some unique uncertainties at the begging of any project that calls for a careful management of the project for time, cost, and risk aspects. However, such firms often enjoy having high profitability in an unsaturated market.

In contrast, the downstream sector of the industry including petrochemical sector is facing with a highly competitive market so that investment in that sector is considered often quite risky (Kwak and LaPlace, 2005). As such, it is expected to have KSF in the upstream sector of the industry totally different from the downstream of the industry. Finally, we consider the case of Iran, as one of the oil and gas suppliers in the geopolitical region of the Middle East, and access to industry data was feasible to the authors.

In the rest of paper, first, we briefly review the relevant literature. Then, we provide a conceptual framework upon which we present methodology of the research. Results are presented next, including a comparative analysis with results of Fries and Baumgartner (2008). In the summary, we review key findings and areas to extend this research in future.

LITERATURE REVIEW

We first review the main concepts and related literature needed for the conceptual framework.

Success

Oxford dictionary defines success as “The accomplishment of an aim or purpose”. Some theoreticians have defined success as achieving the business objectives (Kenney, 1999), which leads to a superior position in the market. Clearly, based on an SWTO analysis, business objectives vary from one company to another.

However, from strategic viewpoint; it is possible to define some generic objectives based upon which degree of success can be assessed – regardless the type of business, products, and market conditions.

Kaplan and Norton (2000) believe that most companies often consider profitability and growth as two business objectives; or success criteria. They also believe that more successful companies are those who have pursued both mentioned business objectives simultaneously. Of course, depending on business conditions, relative priority of profitability and growth may vary.

Furthermore, profitability and growth can have specific performance indicators depending on type of industry. For instance, net profit is indicator of profitability in the auto industry while in the software industry relative size of revenue from support with respect to overall revenue is the primary performance indicator.

Similarly, growth performance indicator is industry specific. For instance, market share is a primary indicator of growth in the auto industry while number of new customers is a key indicator of growth in the software industry. Thus, success is a relative concept and its perception can be assessed differently, from one industry to another.

Success factors

As mentioned in the introduction, companies should pay special attention to some environmental factors in their industry to be successful, known as success factors.

Success factors are common across all firms in an industry. For instance, to offer a rather low price car to market, one of the success factors in the auto industry is having economies of scale. To be profitable, automakers
do their best to reduce their costs, which can be achieved through high throughput.

**Key success factors**

A few factors among set of the success factors of an industry are so significant that a firm may be forced to go out of business and lose the competition in case of not paying sufficient attention to those.

Number of such KSF does not typically exceed five (Thompson, 2005; Ketelhohn, 1998). In fact, one of the imperative activities in planning and strategic management is identification of KSF toward which appropriate response should be taken (Thompson, 2005, Grant, 2010).

**Necessity of identification of KSF**

A careful analysis of external environment, along with analysis of internal environment, has been recognized as common denominator across all approaches in developing strategies at the enterprise level (Mintzberg et al., 1998).

However, there is no consensus among different approaches that exist between external environment and internal environment which one is the leading one. In this debate, different approaches can be categorized as either “Inside-out” or “Outside-in” perspectives (Dewit and Meyer, 2004).

The main related question is: “Should an organization adapt itself to its environment or should it attempt to adapt the environment to itself? What should be the dominant factor driving a firm, its strengths or the opportunities?” (Dewit and Meyer, 2004). In other words, a firm can either develop her resources based on market opportunities or adapt a market position based on her competitive advantages. Which one is the primary driver; outside opportunities or internal strengths? No matter which approach is employed by a firm, analysis of external environment and identification of KSF is one of the core pillars of strategic planning, especially if mentality of “Outside-in” is dominant among strategists of a firm.

Initial studies related to KSF in strategy related research can be traced back to study of Vasconcellos and Hambrick (1989). They believe that performance of a firm depends upon consistency of strength points of a firm with KSF. That is, a firm should develop her strengths according to KSF, as shown in Figure 1.

KSF have conditional nature as they are highly dependent on industry situations (Vasconcellos and Hambrick, 1989; Grunert and Ellegaard, 1992). Specifically, as stated before, KSF are specific to industry, sector, geography, and time. Therefore, companies should continuously monitor the market to trace changes in KSF, which has become a common practice.

**Approaches in identifying KSF**

There two general approaches in identifying KSF:

1. Conducting a survey to collect perception of managers and specialists, as field expert
2. Assessing capabilities and characteristics of successful companies in an industry opinion, in an industry.

First approach is based on this theory that KSF are mainly perception of managers from external environment in an industry which has intangible nature. Consequently, to identify KSF, one should directly search what perception exists in the minds of managers with respect to KSF (Jing-jing, 2006). Thus, a consensus can be formed to identify KSF by conducting such a survey, whose method could be either quantitative or qualitative (Cooper, 2006; Grunert and Ellegaard, 1993).

In the second approach, KSF are identified indirectly through assessment of capabilities and characteristics of successful companies with this hypothesis that success of such companies is result of appropriately responding to KSF in the industry. Of course, in this approach, other capabilities of successful companies could be included as well.

Therefore, against any of common capabilities and characteristics some external factors should be then identified. For instance, investment of successful companies in technology development could be related to technology as one of KSF in that industry (Vasconcellos and Hambrick, 1989).

There are advantages and disadvantages for any of the
two approaches. As primary advantage of the first approach, KSF are identified directly. But, as a main disadvantage, it relies on perceptions and it could be too subjective. In fact, it is challenging to identify perceptions of intangible items in industry experts to gain a better understanding of different aspects of success. Then; we identified successful companies from which we looked for more closely to strategies and focus of successful companies with respect to potential KSF.

**THE MODEL AND METHODOLOGY**

**Conceptual framework of research**

Overall, literature on KSF related to models and conceptual frameworks is rather limited in public. Perhaps, a profound understanding of KSF can offer competitive advantage and from this perspective practitioners in industry are willing to keep them in secret.

At the same time, limited literature on KSF can be justified by considering the fact that researchers in academic environments have limited access to industry data.

To the best of our knowledge, the most relevant study to our research was conducted by Fries and Baumgartner (2008). Fries and Baumgartner studied KSF of successful companies in the upstream sector of the oil and gas industry. Consequently, for our study, we adopted framework of that research.

**Figure 2** shows a schematic representation of the framework, developed based on our understanding. As shown, strategy as a strategy to achieve future success is in junction of KSF and core competencies of the firm. On one hand, KSF and core competencies of a firm have a bilateral relationship. That is, firms coordinate their core competencies and capabilities according to KSF at the same time that they try to position themselves in the market based on their internal capabilities. As shown, both components can be considered as a subset of larger set of success factors of the industry and strength points of firm.

The statistical population of this study is active firms in the upstream sector of the oil and gas industry in Iran. Results of this study can help such firms as which success factors of the industry are highly important to focus on. Also, the comparative analysis with international firms would help such firms as how they can address their gap with successful firms at the national level and play a more critical role in the value chain of the industry.

**Research method**

After an extensive search in all available databases, it was confidently concluded that no similar study has been carried out in the oil and gas industry of the country. Based upon the literature review, after finalizing the conceptual framework, methodology of research was determined as an explorative study.

In such studies, due to lack of sufficient past research, primary objective is achieving a better understanding by which a more precise problem statement, theory, or hypothesis can be formed for future research (Cooper and Schindler, 2006). Hence, consistent with explorative studies, this research was conducted to gain some insights about KSF and have a better understanding of its different aspects.

First, a series of semi-structured interviews was carried out with industry experts to gain a better understanding of different aspects of the problem, after reviewing all available data and literature based upon the conceptual framework (Grunert and Ellegaard, 1992). Then, based upon results of the interviews, a questionnaire was developed to collect industry data.

At this step, due to similarity with research of Fries and Baumgartner (2008), their questionnaire was carefully reviewed and was modified according to unique situations of the industry and different influencing environmental factors.

The finalized questionnaire consists of five sections to collect all related data along with some financial and operational performance indicators from each of the companies. The first section is related to viewpoint and perception of success. Then, success factors and
Table 1. Specifications of the sample data.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Firm</th>
<th>No. of respondents</th>
<th>Manager</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>10</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>11</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>6</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>6</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>J</td>
<td>16</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td>K</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>89</td>
<td>19</td>
<td>70</td>
</tr>
</tbody>
</table>

In this section, we first review identified KSF based on the first approach; directly extracted out of perceptions of the industry experts. Then, we present notion of success from perspective of industry experts. Accordingly, we identify successful companies based upon which we look more closely at their strategies and their areas of focus, limited to top identified KSF. Finally, we offer a comparative analysis of identified KSF with those identified at the international level, provided by Fries and Baumgartner (2008).

Identifying KSF

In the first step, the industry experts were asked about their perception about seven potential KSF, identified by Fries and Baumgartner (2008). Those KSF are: competency of human resources, sufficiency of financial resources, technological capabilities, capacity of reserve, effectiveness of organization, richness of culture, and satisfaction of stakeholder.

Not to mention that in one part of the questionnaire, respondents were also asked to add some other KSF, if they believe there are some other ones beyond the seven potential KSF provided to them. However, no new factor was formed by respondents and the mentioned seven potential KSF was used for the rest of research.

Table 2 shows results of perception of the industry experts with respect to the potential KSF. As seen, the table has been sorted in descending order of Mean, which is from the most important to the lowest important. The order shows human resource is on top of the list while Stakeholder is at the lowest level.

The coefficient of variation (Mean/Std. deviation) shows that it is almost in reverse order of Mean; ascending toward the end of the list so that human resource has the smallest variation and stakeholder has the highest variation. This implies that results become less consistent among the industry by moving toward the end of the list.

1 Semi-private firms are those firms whose CEO is assigned by government; however, the rest of characteristics are the same as private companies. That is, similar to private companies, semi-private firms have profitability objectives and as such do their best to meet financial objectives, gain customer satisfaction, pursue sustainable growth, etc.
Therefore, in the rest we primarily focus on the KSF as the most reliable figures.

The potential KSF can be clustered into three categories; first group as true KSF, second group as success factors, and finally stakeholder as the factor not part of success factors. First, note that 95% confidence level of Mean shows that the largest upper bound of success factors is not greater than the lowest lower bound of KSF. This shows there is a meaningful difference between the two clusters. Within each category,

95% confidence intervals have overlap. Although Mean of factors is different, the difference between factors of each cluster does not seem significant. Secondly, that stakeholder factor is not identified among success factors can be intuitively justified as the active firms in the upstream of the oil and gas industry are not private companies and stakeholder does not sound as critical as private companies.

In fact, preservative production seems the pillar of justifying identified KSF. Specifically, to meet a preservative production, a firm should enjoy having technological capabilities at the same time that it requires sufficient financial resources to economically utilities the reserve and having effective maintenance.

That objective cannot be achieved if competency of human resource of a firm is not able to leverage provided financial and technological resources.

The Bi-vitate correlations matrix was also investigated and the results indicate that between financial capabilities and capacity of reserve there is a significant negative correlations.

This may imply that perception of the industry experts is such a way that higher capacity of reserve is associated with less criticality on financial resources and vice versa. Similarly, between organization and human resource factors are negatively correlated as if stronger human resources make the organization factor less critical and vice versa.

**Identifying successful firms**

In the second step, industry experts were asked about their definition of success. The results show that there is a consensus on definition of success, which is considered as combination of having low operational costs and business growth.

Given the fact that such firms are mainly price taker; having not much influence on oil price, the low operational costs can be viewed equivalent to profitability. Then, considering combination of profitability and growth, it can be seen that this definition of success is consistent with typical definition of success; including studies at the international level.

At the first glance, profitability could be unexpected for non-private companies. However, since all projects are evaluated based on return on investment (ROI) and all rewards are based on profitability of projects such a definition can be justified. As another supportive fact, ministry of oil and gas has also accentuated on profitability and growth part of objectives of long-term vision.

With respect to growth, the second component of success, production growth has been expressed by industry experts as the main driver of growth. Furthermore, the respondents highlighted that production growth can be achieved via preservative production out of natural reserves.

This can be achieved by producing at an optimum point; having relatively maximum production through approaches yielding minimum damage to the life cycle of the reserve. In fact, such a preservative production out of a reserve can guarantee production growth as the second critical component of success for companies in the upstream sector of the oil and gas industry.

Next step after determining profitability measured by ROI and growth measured by production growth rate as the two components of success, corresponding baseline levels should be determined beyond (below) which is position of (un-)successful firms. As a practice in analysis of industrial project, projects having ROI less than the free risk interest rate of banks are regarded as unsuccessful investment.

Therefore, we consider 17% as the baseline of ROI, which has been long-term free risk interest rate of banks in the country in the recent years (Central Bank of Iran, 2010). With respect to production growth rate as a member country, Iran should follow target levels determined by OPEC. Based on linear regression of actual data of five previous years and estimate data of five next years, annual production growth rate should be ideally about 4.74% (OPEC, 2009), as shown in Figure 3. Therefore, 4.74% is considered as baseline of production growth.

Having determined baselines for profitability and production growth, position of firms can be determined now on the map of success and successful firms can be identified. Figure 4 illustrates position of firms where only 2 firms among 11 firms are identified as successful firms; that is, firm A and J. Note that production growth rates for the firms rely on estimation. This means their exact position on X-axis is not accurate; however, we have confidence that their relative position to be above or below the baseline is quite valid.

For a better visibility, Figure 4 also shows relative size of proved reserves. As seen, successful company A has a dominant position where ROI and production growth rate are both above the rest of firms in the industry.

The second successful company J is in the positive quadrant, though a few other firms have a better ROI than firm J.

Number of respondents from successful firms is 26; about 30% of total respondents. This number is
Table 2. Perception with respect to KSF.

<table>
<thead>
<tr>
<th>Perception with respect to KSF</th>
<th>Descriptive Statistics</th>
<th>95% confidence</th>
<th>Clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. deviation</td>
<td>Coefficient of variation (%)</td>
</tr>
<tr>
<td>Human resource</td>
<td>5.08</td>
<td>1.532</td>
<td>30.13</td>
</tr>
<tr>
<td>Finance</td>
<td>4.88</td>
<td>1.596</td>
<td>32.70</td>
</tr>
<tr>
<td>Technology</td>
<td>4.86</td>
<td>1.336</td>
<td>27.51</td>
</tr>
<tr>
<td>Reserve</td>
<td>4.11</td>
<td>1.913</td>
<td>46.56</td>
</tr>
<tr>
<td>Organization</td>
<td>3.61</td>
<td>1.931</td>
<td>53.42</td>
</tr>
<tr>
<td>Culture</td>
<td>3.43</td>
<td>2.148</td>
<td>62.56</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>2.01</td>
<td>1.589</td>
<td>78.96</td>
</tr>
</tbody>
</table>

Figure 3. Iran oil share (Mb/d) in OPEC using 5 years actual and estimated data.

Figure 4. Identifying successful firms in map of success.
sufficiently large to statistically compare their inputs as representative of successful firms with the rest of respondents as rather unsuccessful firms.

Although assessment of the responses as how respondents’ firms are generally successful could be subjective and therefore it is less reliable, analysis of their results can still offer some insights. For instance, the 95% confidence interval obtained for the mean of respondents with respect to the assessment of how their firms are successful generally indicates that the mean for successful firms is \[3.65,4.20\] and that for unsuccessful firms is \[2.58,3.07\].

This can indirectly validate that our previous analysis for identifying successful firms is valid as there is a meaningful difference between assessment of experts for being generally successful between our identified successful firms and the rest of firms.

Furthermore, to narrow down root cause of being generally successful, it was observed that there is a significant difference in their assessment with respect to production growth rate and ROI. Specifically, for production growth rate of successful firms has an average rating of 3.88 and 95% confidence interval of \[3.48,4.28\] while the rest of firms have average rating of 1.69 and 95% confidence interval of \[1.23,2.15\]. With respect to ROI, successful firms have an average rating of 4.41 and 95% confidence interval of \[4.05,4.78\] while the rest of firms have an average rating of 3.24 and 95% confidence interval of \[2.96,3.53\].

**Successful firms and KSF**

The three factors of competency of human resources, adequacy of financial resources, and capability of technologies were identified as KSF. Also, the two firms of A and J were identified as successful firms.

It is now good to examine discrepancy between the successful firms and the rest of industry regarding different aspects of each of KSF.

With respect to human resource factor of KSF relative comparison of successful firms and the rest of industry indicate that there is a significance difference in terms of following a long-term policy in training and education of human resources in the successful companies versus the rest of the industry who follow more short-term policy by recruiting more from spot market, when needed.

However, across the board, technical staff forms about 30% of all staff, salary has rather low dependability on profitability level of the firm and satisfaction of employees are measured to some extent.

In average, human resource of all the firms has 18 years of experience and it increases to 25 years for companies active more in exploration stage. Of course, human resource with longer experience could be very effective if they are empowered with the latest knowledge and advanced technology of the field.

Regarding to financial factor of KSF, there is a meaningful difference between successful firms and the rest of industry with respect to preference on financing the projects based on debt capital. Specifically, successful firms have high preference on financing on debt while the rest of industry has low preference to some extent. This observation was consistent with the meaningful difference between the two categories of firms in terms of sufficiency of their financial resources to attend in tenders. That is, while the successful firms indicating that their financial resources are not sufficient, the rest of industry seemed to be less desperate on such financial resources to attend in tenders. Furthermore, results are implying that successful companies are leaning more toward strategy of financial reserve than investing strategy. However, for all the firms, it is uniformly important to manage costs.

Finally, with respect to technology factor of KSF, it was observed that the difference between successful firms and the rest of firms with respect to diverse aspects of technology is insignificant; indicating that all the firms are highly demanding advancement in technology to which they have limited access by considering international sanctions. Yet, it was surprising to observe that successful firms rely less on in-house developed technologies. With respect to technology, more or less, all the firms have low level of cooperation with universities, are far away from position of technology leaders, believe on high impact of technology on exploration related projects to be successful and on-time completion of development projects.

**Comparison of KSF at international level**

To conclude this section, we analyze discrepancy of the identified KSF and the identified KSF at international level; studied by Fries and Baumgartner (2008). Both studies highlight importance of human resource as one of the top KSF in the upstream sector of the industry. Of course, there are some discrepancies between the results of the two studies in terms of characteristics of human resource.

For instance, the results of Fries and Baumgartner show that technical staff of international firms has in average 20 years of experience; forming about 40% of staff. International firms have also done a great job in maintaining their talented resources. But, our results show that technical staff has in average 18 years of experience; forming about 30% of staff.

As opposed to international companies, most firms are suffering from departure of talented resources, perhaps due to economical and political environment. No doubt, the young talented and quality resources can take good positions with higher financial benefits either in the region or at the international levels.

In particular, the departure of competent resources...
could be quite harmful in case of geophysicists and geologists who should ideally remain the same along the life cycle of reserves since familiarity with history and background of a reserve is critical in achieving preservative production. Of course, the non-immigrant portion of human resource has good years of work experience; however, they may not be able to update themselves with the latest knowledge and technology.

This reduces effectiveness of such talented resources. Therefore, due to high demand in the two other identified KSF, priority of having quality human resources is much more significant than international level. In other words, having high competency in human resources can be invaluably beneficial to the industry that has limited access to financial resources while simultaneously suffering from lack of access to the latest technology. Clearly, this is not the case at international level.

As opposed to the competency of human resources, for international firms neither financial resources nor technology capabilities are that much critical. Regarding the sufficiency of financial resources KSF, given capital intensive nature of the projects in the upstream sector of the industry, financing projects is highly significant. Yet, in comparison with international firms, higher level of financing is more demanding since ROI of projects are worse due to higher costs in projects.

There are a variety of factors leading to higher cost. Having access to rather large reserves in producing countries such as Iran has led to inefficiency in operations of the firms; yielding a higher cost. Also, employing older technology results in higher cost of exploration and production.

Furthermore, renting equipment in the market is often more expensive for non-leading firms when price of oil increases. Obviously, such a KSF is not urgent at international level as firms have often easier access to financial resources. By the same token, Iran is more consumer of technology as opposed to the international firms who have a better access to the latest technology. That is probably why technology is the lowest rank at international level.

Fries and Baumgartner (2008) have indicated that international firms are willing to outsource their technology related needs to specialized companies rather than developing in-house. We similarly observed that the successful firms rely less on in-house developed technologies.

**SUMMARY AND CONCLUSIONS**

In this study, we focused on identifying KSF of the upstream sector of the oil and gas industry in Iran. Based upon a conceptual framework adopted from Fries’ study, we conducted a tailored survey and extracted perception of the industry experts about KSF. We observed that the top three KSF are: competency of human resources, sufficiency of financial resources, and adequacy of technological capabilities. Then, profitable growth was identified as notion of success for firms, consistent with most of studies in this topic.

We provided two performance indicators to practically recognize firms having profitable growth; requiring minimum level of both 17% ROI and 4.74% annual production growth. In this way, we could position the firms on the success map and out of eleven firms we identified two firms as successful firms.

In the next step, we looked more closely at a wide variety of parameters related to the top identified KSF and searched for those having a meaningful difference between successful companies and the rest of the industry. In particular, we found that successful firms follow a long-term policy in improving competency of human resources. With respect to financial resources, we observed that successful firms are more desperate on financial resources than the rest of industry.

Furthermore, we realized that successful firms rely less on in-house developed technologies. Finally, we contrasted our findings with results of the study by Fries and Baumgartner (2008); at international level.

Despite of some discrepancies, it was examined that human resource is more or less a common KSF in both geography. However, as opposed to international level, access to financial resources and advanced technologies are very critical especially for the industry suffering from international sanctions and limited access to such resources.

This study can be extended from different perspectives. First, within the scope of the upstream sector of the industry, one direction is to conduct a more profound analysis by decomposing the upstream sector further into exploration and production subsectors; each having its own unique characteristics.

Another direction could be diving deep into details of each identified KSF to seek primary related drivers of each KSF through factor analysis or other analytical techniques. For instance, next level of competency of human resources could be focusing on managerial skill sets which has been emerged out of response of respondents and deserves a detailed investigation. Second, by moving beyond the scope of this study, a similar study can be conducted to the downstream of the industry as well. Given different nature of the upstream and the downstream, contrasting such KSF could offer more insights as which identified KSF are more sector dependent and which ones are more industry dependent. Also, as stated before, KSF vary from time to time and our study was carried out in one point in time. Ideally, one should scrutinize KSF over a timeframe to examine which KSF remain constant over time and which ones have transient nature.

Finally, due to the political environment and international sanctions, case of Iran has some unique characteristics by lack of access to financial resources
and latest technologies. Therefore, further studies across other oil supplier countries either in the region of Middle East or beyond can offer a more accurate set of KSF to our ultimate objective that how firms of oil supplier countries can reduce their gap with the leading firms in the oil and gas industry.

REFERENCES