ABSTRACT
Innovation in industrial business-to-business (B2B) services is becoming increasingly important for companies that want to compete and grow in a globalized market. Innovation in services is a process of creating new and novel services as well as improving existing services with respect to content, delivery and quality. However, in the existing service agreements, the innovation process may be influenced by the contractual agreement between the service provider and receiver. Based on the case study in the Norwegian oil and gas industry, the paper identifies the needs for innovation and various types of contracts in use as well as discusses the influence of contracts on innovation. The paper suggests that contracts should encourage and support innovation through various compensation mechanisms and contractual clauses in order to allow growth and increased competitiveness.

KEY WORD
Industrial Services, Innovation, Contracts, Norwegian Oil and Gas Industry, Business-to-Business Services

1. Introduction

Business-to-business (B2B) industrial service industry is growing and becoming increasingly important due to globalization, opening of new markets and increasing opportunities in the existing markets. New B2B services are being created as industrial companies increasingly are choosing to focus on core activities and outsource non-core activities to specialized service providers. Many companies also insource services to compensate for lack in internal competence or as an alternative to hiring personnel in peak periods. These services are often based on knowledge, competence and skills, or on specialized technology as a part of the service content or as tools in the service delivery process, as well as a combination of both.

The content of many services is decided based on operational needs, collaboration and interaction between the service provider and the customer, and often requires constant adaptations and improvements. The process of improvements and/or developing new services can be termed as innovation in services and often happens ad-hoc and/or incrementally. Innovation in services is a continuous process and considered as a source of creative competitive advantage for the companies delivering business-to-business industrial services (Salavou, 2004; Kuczynski, 2003; Johannessen et al., 2001).

The service processes that require constant adaptations and improvements become a complex process with respect to framing the contracts. It sometimes becomes difficult to define a clear scope, performance parameters, and/or agree on incentive schemes linked to different milestones (Karmakar and Pitblado, 1995). The desired quality is that a service contract should facilitate closer cooperation between the service provider and receiver, and create a win-win situation.

The creation of new services and/or the improvement of existing services often happen in existing projects. This is especially true in long-term industrial projects. However, if a new service is created or a service is improved within an existing contract, a conflict may arise with respect to motivation for creating new services/improvement of existing services, ownership, as well as compensation and sharing of commercial value (see also Ribeiro, 1996). The service receiver may claim ownership of the service innovation due to the fact that it happened in a project they pay for, whilst the service provider would argue that the innovation should belong to them as it happened using their competence and creativity. The service receiver would like to have free user rights for usage of the innovation in later projects and with respect to other service providers, who can copy the innovation to their own advantage. The service provider would use the innovation to grow and to improve their competitiveness. This can create a conflict in the contractual agreement negotiations. In general, vaguely defined contractual responsibilities can cause disputes, delays, reduced quality and financial losses (Lai et al., 2004).

Various types of contracts are in use and serve as a mechanism for the business-to-business relationship. In the Norwegian oil and gas (O&G) industry a similar trend
is observed, but many of the service companies find that contractual agreements do not encourage and support innovation. To improve the effectiveness of the service process the contract clauses should provide enough flexibility to manage and control innovation processes. Furthermore, industrial service innovation also to some degree depends on what types of contracts are used as this may influence innovation.

Based on a case study in the Norwegian O&G industry, the paper identifies needs for innovation, various contract types and scope and discusses contractual influence on innovation.

2. Case study – Contractual Influence on Innovation in The Norwegian O&G Industry

2.1 Case study methodology

The purpose of the case study was to map the need for innovation, mechanisms of innovation, and influence of contracts on innovation. This paper reports the preliminary findings with respect to needs for innovation, contracts used and their influence on innovations. The needs for innovation identified in the case study is also partly based on recent studies reported and experience from other ongoing projects related to the O&G industry.

A total of 50 face-to-face guided interviews were conducted in the Norwegian O&G industry. 24 of the interviews were conducted with top level and middle level management of five international O&G operators. 22 of the interviews were with top and middle level management of service provider companies such as well maintenance and completion services, well drilling services, maintenance and modification engineering services, as well as subsea engineering products and services. Four of the interviews were conducted with the employer's association for oil and supplier companies (one senior manager specialist and legal advisor), petroleum regulatory authority (three senior specialists on O&G regulatory issues), and one university (one professor who is a specialists on contracts and one professor who is a specialist on subsea drilling services). A questionnaire was developed for guiding the interviews. Most of the interviews lasted for one to two hours. The replies of each participant were noted and the summary of conversation was prepared and sent to each participant for approval.

In addition, two commonly used types of contracts were studied with respect to innovation, namely:

- One engineering, procurement, commissioning and installation contract for maintenance and modification services between a large engineering contractor and an O&G operator
- Two work package contracts for maintenance program development between a maintenance specialist service provider and an O&G operator

The findings from the guided interviews were compared and analyzed with the findings from the study of the three contracts.

2.2 Needs for Innovation in the O&G Industry

The Norwegian O&G industry is capital intensive using advanced, complex and integrated technological products as well as employing specialized knowledge and support services. For example, the design, construction, installation, commissioning, operation, maintenance and removal of complex O&G production facilities involve large projects and the collaboration of many specialist service providers. The industry is gradually stepping into a new stage of development, as many O&G fields are reaching a mature stage (tail-end phase). The decline in production on the NCS (Norwegian Continental Shelf) has been documented as 10% in 2004 and over 12% in 2005 (Report, 2007; Kumar et al., 2006). Although it has been estimated that only 40% of oil resources have been produced and 60% of oil resources remain to be exploited yet, the decline had been gradual (3i Report, 2004; NPD, 2006). To meet the challenges of declining production, the operators and service providers needs to innovate new and improved solutions to operational and exploration challenges.

Some of the older production equipment and machinery which were installed in the nineteen seventies, eighties and nineties are reaching the last phase of their life cycle with an increasing failure rate. There also is overall shortage of finding the matching spare parts for existing facilities as the machines have been upgraded and/or the manufacturer has shifted their focus considering market needs. This creates a need for innovative solutions with respect to production effectiveness, efficiency and HSE (health, safety and environment) requirements, as well as maintenance and modification challenges.

They also face challenges related to extending the service life of the existing O&G fields and developing marginal fields, as well as fields located in the remote areas. At this stage operators seek to improve recovery and prolong the field service life at lowest cost without compromising health, safety, environment (HSE) and quality. One report highlights that “Operators’ ambitions are to reduce the OPEX [operational expenses] to an acceptable level by applying new technology and new organizational structures” (DNV Report, 2003). This development results in a need for more innovation, a need for new
technological solutions, organizational changes as well as an increasing use of specialized service providers.

There are many service companies that provide solutions to challenges faced by the O&G operators. The challenges are related to the operation, maintenance, and support of the production facilities, including drilling of wells, well maintenance, operational logistics, as well as modification and modernization of ageing facilities (Kumar and Markeset, 2007; Panesar and Markeset, 2005). Many of the services are capital intensive and customized to meet individual customer requirements. This necessitates an innovative approach to design the services with emphasis on technical expertise, innovation capability with respect to the technical solution, quality, safety and cost-effectiveness.

An increasing trend has been observed in the O&G industry to outsource core and non-core activities to service providers (Kumar, 2005). Facility operation, maintenance, modification, modernization, etc., have been outsourced to specialist service providers for many years. Moreover, the industry is currently going through a new development called integrated operations, which result in a much closer collaboration process between the operators and service providers. In this kind of collaboration the focus is on integrating production facility work processes and support activities using information and communication technology. This indicates that the O&G industry is adopting a new and innovative approach to organize production facility management. Accordingly, the focus and scope of contracts need to be modified to accommodate these requirements.

Furthermore, there is an overall scarcity of competent and experienced people in the market, due to the fact that many of the competent and experienced personnel already are engaged in ongoing projects. Therefore, there is a need to look for innovative organizational solutions using improved technology to reduce manpower requirements and to innovate approaches to involve less experienced people in new projects. The clauses related to particular competence and experience levels need to be modified to accommodate these requirements.

Innovative solutions that improve overall process effectiveness and efficiency, reduce operational and support costs, improve quality, as well as reduce HSE risks, are considered important in the Norwegian O&G industry. However, this is often not reflected in contractual agreements, and therefore some clauses are needed to encourage and motivate service providers to use their competence, technology and experience to find much needed innovative solutions. For instance, many of the contracts are long-term contracts with low margins. In addition, they often have rigid termination clauses, which results in that the service provider has to continue to provide services even if the profit margins are low. This can result in that the service provider would like to reduce focus on innovations and reinvestments, which may reduce the growth and competitiveness of the service industry (see also ECON Report, 2006).

2.3 Contract Types and Scope

Various types of contracts used in the industry are shown in Figure 1, and can be broadly grouped as performance based, work package and facilitator type of contracts (Martin, 1997; Donaldson, 1996). The work package contracts based on the modes of payment can be grouped as: (a) time, material and labor and (b) fixed price contracts. The time, material and labor contracts can be cost reimbursable, guaranteed maximum, and marked-up wages contract types.

Figure 1: Types of Contracts

In the following, the scope of Work package contract (Time, material and labor; Fixed price) and the Performance based contract types are discussed.

2.3.1 Work package contract

*Time, material and labor contracts*

This type of contract is generally followed where the scope of work is not absolutely clear (see also Betty, 1993). The service contract is framed in a manner that allows the customer to control activities and resources. The service providers are paid on pre-decided rates for time, material and labor. Generally, three different arrangements are used in this type of contract; namely
Cost reimbursable contracts; Guaranteed-maximum contracts; Time and material/ marked-up wage contracts.

- **Cost reimbursable contracts**: The service providers are paid according to the work executed and the milestones achieved. A fixed price is not negotiated at the start of the project. The service receiver pays the service provider as work is completed and/or milestones are met.

- **Guaranteed maximum contracts**: This type of arrangement assures a minimum fee to the service provider for being committed to provide services on need basis during the entire duration of the contract. In this case the service provider is paid and/or reimbursed for the cost of work executed and an additional fee as negotiated at the start of the contract. However, the total sum of the two costs cannot exceed the established guaranteed maximum price. The agreed maximum price can be changed if there is change in the scope.

- **Time and material/marked-up wage contracts**: This type of contract is similar to the cost reimbursable type of contract. The main difference is that the payments are linked to the time taken to execute different activities in the contract. The service provider bills the service receiver for the time taken. The rates on an hourly basis are negotiated at the start of the contract. The rates include profit and all overheads.

**Fixed price contract (Lump sum contract)**

These types of contracts are generally given to the service providers where the scope is clear and the service receiver has full confidence in the capabilities of the service provider. The risk related to time and cost overruns and controlling other project activities is transferred to the service provider. The service provider is responsible for unforeseen overruns, variations and escalations. Therefore, knowing the service provider’s capabilities and past performances is very important for the service receiver before any contract negotiations.

**2.3.2 Performance based contract**

The aim of such a type of contract is to improve the value of contracted services by defining clear objectives, the performance measurement system and measuring the performance of the service provider. The expectations of the service provider are to perform according to the agreed performance criteria. Defining performance base levels, a system of measuring results and linking the rewards and penalties, is a challenge. The rewards and penalties are linked to the performance of the service provider. The focus in this kind of contract is on the deliverables and not on the delivery process. The payments are linked to the milestones and not to the fixed schedules and dates.

**2.4 Influence of Contracts on Innovations**

The case study indicates that the work package type of contracts (Time, material and labor contracts; Lump sum contracts) is most commonly used in the O&G industry in Norway. Some companies have tried performance-based contracts, whilst the facilitator types of contracts are not very common in the O&G industry in Norway, and are therefore not considered in the discussion.

**2.4.1 Work package contract**

**Time, material and labor contracts**

The initiative for innovations in this kind of contracts lies with the service receiver. The service receiver controls the work quality and the total budget for the project. Therefore, the personnel responsible for execution of the contract in the service receiver’s organization assume significant importance in initiating innovation. In general, the service receiver profits from savings as a result of better planning, improved use of resources, improved service delivery process, quality, etc. Mostly, the compensation or motivation to the service provider cooperating in reducing resource and number of activities in the contractual agreements is the possibility of developing a professional relationship with the service receiver. The encouragement to the service provider can be in terms of renewal of contracts, increased work volume, etc.

The rigid structuring and too much reporting are often barriers to creativity in such contracts. The administrative director of one of the service companies and an engineering manager of another company argue that the service receiver puts too tight a control on the contract activities and gives too little flexibility, which results in there being little room for innovation. The service providers are unable to use their experience, knowledge and technology in improving the service content, the delivery process or the service performance.

The business development manager of a well services company mentioned that there is need for the service receivers to look for opportunities to integrate service providers vertically in the project management and put more responsibility on the service provider to optimize performance based on trust. The service receiver continuously puts considerable emphasis on cutting costs to become more competitive. However, sometimes cutting costs to too low levels can result in compromising service quality as well as innovative capability and motivation.

In the guaranteed maximum price limit contracts, the control also remains with the service receiver. The service provider has to be very careful and evaluate the scope of work before submitting the final bid. The service provider
shares the risks and is equally responsible to keep the costs within the agreed upper limits. This is a driver for finding cost-effective innovative solutions. Generally, a mechanism for sharing the savings due to improved performance is agreed during contract negotiations. Therefore, the service provider has some motivation to use its competence and resources to optimize the service content quality and delivery process. However, there is limited flexibility for alterations of contractual content after an agreement is reached.

In case of time and material/marked-up wage contracts, the payments are linked to the time taken in project activity execution. Also in this type of contract the service receiver controls the activities. There is a possible threat that the service provider will use less competent people to save expenses. The innovation potential is similar to the other types of work package contracts.

**Fixed price contracts (Lump sum)**

The interviews with the contract managers indicated the service providers prefer this type of contract to the time, material and labor contracts. The service providers prefer to keep initiative to improvement of the content, service delivery or service performance. The service provider profits from savings due to improved performance (e.g. delivering the results before the agreed time, reduced use of resources, innovative solutions, etc.). This motivates the service provider to innovate and improve effectiveness, efficiency, productivity, and quality.

The service receiver in this case has little control over the service process, except exercising rigidity on agreed fixed prices and performance milestones. The service receiver also has little control on the service provider’s project activity manning levels. The fixed scope in such contracts may have a negative impact on innovation opportunities. It is often difficult to agree on alteration of the service product and delivery as a result of innovation unless it creates a win-win situation.

**2.4.2 Performance-based contracts**

In the performance-based contracts the performance parameters motivate the service provider to be innovative and improve the service processes. The service provider has to actively pursue opportunities to keep the performance level above the agreed performance baseline and achieve the milestones to get paid. In principle, this contract type is considered to encourage service innovations and improve the service process’ effectiveness and efficiency.

However, the cases study revealed that the experience with performance-based contracts was not very positive. One of the explanations is related to the close collaboration between various service providers in the Norwegian O&G industry due to the large, complex, integrated and capital-intensive projects. For example, on an offshore facility there are teams of different service providers working together to assist the operators in the production and support processes. The performance of one service provider is linked to and influenced by the activities of other service providers. It has been observed that the service companies start blaming each other if they are penalized for less than agreed performance level.

3. Discussion

In the various contracts studied in the case study, the initiative for innovations in most of the cases was with the service receivers. However, operators (service buyers) have to look for ways and means to make the contracts attractive so that the service providers consider themselves as a part of the team and work with aligned goals. For example, compensation could be linked to incentives mechanisms that reflect the value of creation through innovation.

The service buyer is interested in the highest possible quality of work at the lowest possible rates, and in transferring maximum risks and responsibility to the service provider. The service providers are interested in obtaining as many contracts as possible and to reap maximum profits at minimum risk. However, they are also interested in making the work processes as effective and efficient as possible using minimum of resources, as well as taking minimum possible responsibility. It is a challenge to create an ideal relationship where these different interests converge. Moreover, it would be an advantage to develop value-based compensation models in contractual agreements which contribute to the growth and development, and which recognize the service providers’ efforts to innovate.

The scope and the challenges of many of the development projects where innovation is required often cannot be defined at the contract negotiation stage. Moreover, as the development process progresses the challenges are identified and solutions are found. This implies that the contracts should support openness to innovative solutions, contingency measures and compensation mechanisms to allow for alternative solutions, transparency in project execution, as well as trust and confidence. At the same time, both the service receiver and provider should have the capacity to accept failures with respect to performance goals and outcome.

The managers should consider the aspects of innovation in developing service and contract strategies in their
companies. Small improvements in the contracts may trigger innovation and novel solutions.

4. Concluding Remarks

The paper addresses some of the timely issues related to innovation and contract strategies faced by the Norwegian O&G industry as well as other capital-intensive industries such as the mining, energy, process, etc. The industry is facing challenges, which demands innovative solutions. However, the contractual agreements are often not reflecting this need and often contain clauses that discourage innovation.

The study and analysis in this paper is performed on the background of the Norwegian O&G industry, but we believe similar challenges are found elsewhere and other industries as well. The paper highlights the need for new, improved or innovative contractual agreements that encourage, motivate and allows industrial service innovation and growth.

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