

011-0138

ALLIANCES AND LOGISTICS PERFORMANCE: A CASE STUDY OF THE UK UPSTREAM OIL AND GAS LOGISTICS OPERATIONS.

M .Dauda^{1*} and Yahaya Yusuf²

¹Logistics Institute, Hull University Business School, Hull, HU6 7RX, UK.

²University of Lancashire Business School, Preston, PR1 2HE, UK.

*[*M.Dauda@2005.hull.ac.uk](mailto:M.Dauda@2005.hull.ac.uk), YYusuf@uclan.ac.uk*

POMS 20th Annual Conference
Orlando, Florida U.S.A.
May 1 to May 4, 2009

Abstract:

The upstream oil and gas industry operation is mainly concerned with oil extraction. However within this industrial sector there exists a diverse and complex network of organizations, representing a wide range of industrial cultures and expertise. Although the industry is often seen as a single industry, this is far from the reality as it is serviced by firms from diverse industrial backgrounds. Furthermore, most of the activities which take place in this environment are project driven and involve diverse complex product systems which are highly customized, large scale and engineering intensive products which tend to be produced as one-offs or in small tailored batches. A further complicating factor is the high number of suppliers – several thousand firms subcontract and supply the offshore industry – each of which may be highly specialised and involved in complex networks. The main players in the oil and gas industry are broadly classified into Oil operators, contractors and major oil service companies. These players undertake tasks in diverse areas such as: oil and gas exploration, development and construction and supply of industrial goods and catering services. Within the UK North Sea oil and gas region there is a constellation of firms that has grown around the exploitation of the oil reservoirs of the North Sea. Indeed this cluster of small technology based oil-related industry has been recognised as one of the existing clusters and industrial districts as attested to by Scottish Enterprise - the regional development authority. This paper reports a case study of oil and gas operating company alliances to maximise logistics

management and performance within the Aberdeen region of the UK upstream oil and gas industry. The study involves the organisation and arrangement involving the main players in the oil and gas extraction activity. The alliances involved some of the global oil majors operating in the UK upstream oil and gas industry was aimed at exploiting scale economy within the supply chain as well as be in tandem with Cost Reduction in the New Era (CRINE) initiative of the UK government directed at optimising the operations of the industry so as to enhance the revenue accruals to the government. Findings from the case study reveal the conceptual interplay between transaction cost, geographic proximity and scale. Success factors in the alliance were found to be contingent on the Commitment, Co-operation, and Communication.

Keywords: Alliances, Logistics operations, CRINE, UK North Sea, Oil and gas industry, Team marine.

1. Introduction:

The existing business environment is characterised by dynamism and reorganisation orchestrated by constant change in customer needs as well as by the customer demand for more customised products and services. This has then made the providers of goods and services to choose appropriate strategic, tactical and operational arrangement to deliver the needed flexibility and responsiveness required to satisfy the needs of the customer. A couple of theories that attempt to explain the changes in the business environment include Transaction Costs, Supply chain management as well as market or hierarchical set ups. In this research a case study was carried out to assess the impact of alliances among competitors in order to reduce the level of waste within their supply chain as well as increase the value creation of the supply chain. The dominant reason for alliances and partnering is the issue of transaction costs. Transaction costs include the costs associated by searching for information, bargaining, monitoring and contractual enforcement. Thus transaction costs will be greatest where competitive forces cannot be relied upon to ensure performance (Stapleton et al., 2001). Accordingly in the case where the transaction cost increases as a result of the dynamism in the operating condition the type of commercial transaction that will take place between organisations will not be entirely market based. Rather a different type of commercial transactions between organisations will take place. The choice of appropriate commercial between organisations will be contingent on the need to reduce the transaction costs. Stapleton et al (2001) defined transaction costs as the cost of running commercial systems that is distinct from market. The driver for transaction costs could be the need for cost reduction within and between organisations or the need for access to specialist knowledge, market or services.

The impact of cooperation among supply chain members in order to enhance efficiency of their operations has long been established (Womack et al, 1990). However most of the

empirical studies carried out on this study have dwelled mainly on the discrete manufacturing industry with automotive sector benefitting the most. However accounts of other industries needs to be stated, in order to shed light on the advantages of the established working practices as well as enrich the theory.

2. Literature review

2.1 Clusters and Competitive Advantage

The basis of clusters as a factor in competitive advantage was espoused by Porter (1990) in his seminal book, "*The Competitive Advantage of Nations*". Some of the competitive advantages derivable as a result of geographical proximity are reduced input costs, development of a common supplier base, availability of skilled labour, spill-over of technical know-how and the diffusion of the working knowledge of a particular industry into individuals and firms (Porter, 1998a). Porter's view in part was supported by Carrie (1999) who stated that an important part of any cluster is the network of supporting firms that supplies inputs and provides sub-contracting functions. Some researchers point to the improved competitiveness within clusters in terms of increased productivity of cluster firms and industry, the capability to innovate more, and new enterprise formation (Lin et al., 2006). What the cluster concept underlines as a source of competitiveness is that within the cluster there is enhanced productivity and innovation and accordingly this is a source of competitive advantage (Porter, 1990).

Clusters and industrial districts lead to competitive advantages by generating a number of benefits that are not available to non cluster based firms. Some of the benefits of being in clusters and industrial districts include:

- Reductions in transaction costs

- Innovation and technological development
- Reduction in costs as a result of effective learning - learning by imitation and emulation.
- Benefits provided by localised external economies (specialised labour market, specialisation led by the increased local division of labour, and competent specialised suppliers).
- Advantages related to being customer driven organisations and to product diversification.

Lublinski, (2003; 456) highlights the competitive advantages that can be derived from being in an industrial cluster. The benefits of being in industrial clusters can be summarised as follows:

Labour market pooling - Labour costs savings due to a privileged access to specialised skills especially in an environment where firms have non-positive correlations in the temporal variations of their demands

Accessibility to a great variety of specialised intermediate goods and services - privileged access to a local supplier base that has great product variety and a high degree of specialisation

Knowledge spillovers - access to tacit knowledge in geographic proximity by means of both fashioned transmittal processes as well as through informal channels such as knowledge leakages made possible by causal inter-firm interactions, workers changing jobs, etc.

Complementarities - privileged sales opportunities of firms due to search cost savings of buyers of complementary products offered in proximity and privileged opportunities for cooperation (sales, marketing etc) between nearby suppliers of complementary products.

Transportation and transaction cost advantages

Transportation cost advantage - transportation cost savings due to geographic proximity especially in the case of just-in-time delivery of contracts

Trust - transaction cost savings due to a geographically proximate environment that enhances trust-building processes.

Carbonara (2002; 2004) contends that industrial districts base their competitive advantages on two distinct aspects: 1) the inter-networking processes and 2) the speed and ease of circulation of information and knowledge. It was asserted that for competitive advantage to function at the cluster level, knowledge must be shared among the firms in the regional cluster (Tallman et al., 2004). However Tallman et al. (2004) point to a paradox in clusters by stating that competitive advantage at the firm level requires some knowledge to remain private. Wilson and Popp (2003) stressed the importance of networks as key institutions of governance in clusters and industrial districts. While providing insight into several of England's industrial districts, they contend that networking is responsible for their growth and development. Extending Wilson and Popp's (2003) assertion, Casson (2003) identified "good" and "bad" networking in clusters and industrial districts. Good networking is "open, transparent and entrepreneurial...Bad networking is typically closed and opaque...[and] is exemplified by *rent-seeking* in which...weak clusters [are protected] against external competition (Casson, 2003; 24, emphasis in original).

Critiques of clusters point to the proliferation of ICTs, and indicate the potential of ICTs to create a virtual world such that factors of production – such as capital, goods, labour – can be sourced easily (Porter, 1994). However, Porter (1994; 1998a) argues otherwise and goes on to assert that the economic landscape – all over the world – is dominated by what he calls “*clusters: critical masses*” in distinct locations showing unusual competitive success in one particular field. For example, world-class mutual funds are found in Boston, much more than in other places, textile-related industries in North and South Carolina, high-performance automobiles in southern Germany and fashion shoe companies in northern Italy. Competitive advantage rests on making more productive use of inputs. This requires continuous innovation in process and product characteristics. It was argued that the capacity to innovate and upgrade draws on the proximate environment in which a business resides (Porter, 1994). Moreover, not only what happens inside a company but equally what goes on outside it plays a significant role in its innovativeness. The immediate business environment contributes to the innovativeness of an organisation. Firms within the cluster share resources that give them competitive advantage (Porter, 1998a). Thus, innovation and competitive success is location-based. That is why we associate entertainment with Hollywood, finance with Wall Street or consumer electronics with Japan (Porter, 1998a).

Productivity affects competition much more than the access to inputs or the level of integration of an organisation (Porter, 1998a). In other words, how companies compete affects productivity, but the specific industry in which the competition is taking place is immaterial. For example companies can be highly productive in any industry – automotive, oil and gas, electronics – if they employ advanced manufacturing technology and offer differentiated products and services. However, the former is not unique, as all industry can access technology or means of differentiation – indeed services can be outsourced to distant suppliers or technology licensed or sourced elsewhere. What is unique is the local business

environment, because the ability of a location to have the infrastructure to support a particular production technology differs. For example companies cannot employ advanced logistical techniques without a high quality transport infrastructure. Nor can companies compete in knowledge-intensive products or services without well-educated employees. The ability to source these critical inputs depends on locational attributes. Therefore clusters affect competition through (Porter, 1994; Porter, 1998a):

- increasing productivity of companies based in an area – local sourcing of inputs reduce transaction costs (Hallwood, 1991). Indeed, even where inputs are sourced from a distance, clusters offers advantage (Porter, 1998a) as a result of prevalence of complementarities (Richardson, 1972) in the cluster. It is the differences between firms in the same trade that cause them to be complementary in developing capabilities of the industry to which they belong (Loasby, 1998).
- driving the direction and pace of innovation (Carbonara, 2004) which underpins future productivity growth – clusters make innovation opportunities visible and provide capacity and the flexibility for time-based competition (Gehani, 1995) at lower cost. Furthermore, competitive pressure, peer pressure and constant comparison which occur in clusters all spur innovation (Porter, 1998)
- stimulating the formation of new businesses which expands and strengthens the cluster itself – new suppliers thrive within clusters to take advantage of the concentrated customer base which lowers risks and makes it easier for them to spot market opportunities (Porter, 1998a). The business risk in this case is mitigated by the level of demand for an innovation as a result of concentration of potential users in a specific location.

Clusters and industrial districts offer the benefit of “externalities or nontraded interdependencies”, contributing to the “superiority of this form of organisation over mass production and vertically integrated companies” (Molina-Morales 2001, 279). These benefit individual firms from increased pooling of common factors such as skilled human resources, specialised suppliers of inputs and technological spillovers.

2.3 Supply chain networking

Supply chain networking entails building co-operative relationships with customers, suppliers and competitors. This cooperative rather than adversarial mode of relationships has become crucial in mobilising distributed resource capabilities across company boundaries and delivering superior solutions ahead of competitors (Fisher, 1997; Johnsen et al., 2000; Power et al., 2001; Lechner and Dowling, 2003; Mackinnon et al., 2004; Holmen et al., 2007). Indeed it has long been recognised that collaborative working across the supply chain has been well established within the automotive and consumer electronics industries (Womack et al., 1990; Faulkner, 1995; Green, 1995). Within these industries, component suppliers in the supply chain feed lines involved with mass production of finished goods (Green, 1995, Womack et al, 1995).

Supply chain networking became popular in the early 1970's and 1980's as mass producers such as General Motors and IBM employed it for market penetration, outsourcing and distribution. Such earlier networks are different from newly emerging process dependent networks that share critical process capabilities while competing. Sharing and seamless flow of physical and non-physical assets amongst companies would lead to synergy in order to optimise total assets available to individual organisations. When fully realised, networking companies would allocate core modules of production amongst themselves, based on their relative competencies.

Several factors motivate supply chain networking. The first is advances in information and Internet technologies, which enable mutual and real time access to information, data and files amongst companies spatially distributed across the globe. Although IT applications initially evolved to support secure and evidential transfers of trading reports, cash and other assets and obligations by multi-national companies, recently applications have extended to logistics management, design, scheduling and manufacture (Yusuf et al., 2004).

Secondly, the advent of just in time practices with emphasis on smaller volumes of transactions motivates supply chain networking. This is because of the need to monitor real-time and as an integrated routine process, the volumes of transactions that were specified, executed and delivered. In addition, efforts to widen the range of product options available to customers motivated manufacturers to seek direct linkage to customers as well as direct control and sometimes part ownership of suppliers and distributors (Womack et al., 1990; Browne et al., 1995).

The third motivator of supply chain networking is product complexity, which compels focusing strategies (Porter, 1998b). As products and customer specifications become more complex, companies strive to focus on only a narrow aspect of the total supply chain where competitive advantage is greatest whilst networking with other companies to complete the supply chain. However focus strategy requires that companies strive to add the greatest values in order “..to build strengths, shore up weaknesses, extract latent value from assets and move to retain or regain leading market positions.” (Ernst and Steinhubl, 1997; 145).

Result and Analysis

This is the result of a case study on a logistics system sharing initiative among oil companies within the UK oil and gas industry located in Aberdeen. The initiative involving the logistics sharing was focussed on marine operations of oil and gas producers. Within the UK oil and gas operation province some producers operating in close geographic location went into a successful alliance that was conceptualised to take advantage of clusters through co-location of teams. The case is an example of where a marine logistics initiative resulted in substantial savings for a consortium of North Sea Client Operators. The driver for the alliance by the organisations was as a result of the following:

In 2006 three integrated oil and gas production companies were part of significant operators in the UK North Sea oil and gas region with large, equal sized volumes of production and exploration activity. Characteristic of most businesses although the oil operators were undertaking their business of oil production in close proximity to each other they operate their physical supply chains in parallel with each other and as competitors drawing from the same market for inputs and services. This case study concern how these three oil companies co-operated for mutual benefit and risk sharing, and created an operator alliance to maximise logistics performance, at a time that the prevailing working arrangement is one of adversarial relationships at a time in which the industry had an attitude that it was not enough to succeed others, must fail. Furthermore organisations consider that competitive advantage is gained its area of operation.

The initial procedure for forming the alliance was as follows:

- Management of the three organisations tasked their Logistic Departments to ascertain the feasibility of an alliance to maximise logistics performance – (this was a CRINE initiative).

- Members from each company chosen to undertake a benchmark study to review marine, aviation, and shorebase performance and examine:
 - 1] Cost saving potential through sharing
 - 2] Contractual restrictions
 - 3] How a Joint Venture could be run

Findings from the review and benchmarking revealed potential sharing saving's in marine support due to geographical location synergies. Further detailed review was carried out to among others:

- 1] Identify Cost Savings
- 2] Address issues to facilitate combining Marine logistics operations
- 3] Target date to have a Joint Operating Agreement between all 3 companies with a view to implementing the Marine Logistics Alliance.

Thereafter the following procedure guided the initial implementation process:

- The marine logistics alliance board was formed to create optimum marine logistics mode of operation, fleet composition, schedule of support, cost allocation methodology, whilst equitable spreading risk and savings to the participants
- Management, Steering Committee and operations structure identified
- Insurance, procurement, and financial issues were worked and solutions put in place
- Implementation phase established customer buy in and created an alliance board
- Benchmarking and measurement identified and reported
- Results analysed

Some of the obstacles encountered in the implementation stage include the following:

- Three Companies with differing Logistical Strategies
 - Best practice identified and applied
- Existing Contractual Obligations

- Best practice identified and applied
- Re-Educating Onshore and Offshore Personnel for buy in and change of legacy
 - Communication campaign
- Insurance and indemnity arrangements
 - Vessel Sharing Agreement created
- Procurement methodology
 - Strategy developed by Alliance board implemented by best practice organisation, use of dedicated shipbroker
- Cost allocation
 - Equitable system created administered by best practice organisation finance
- Establishing an equitable risk and reward basis

Cost allocations and benefits:

- Costs for term and spot hired platform support vessels (PSV's) are pooled and allocated by location on a monthly basis based on boat usage:
 - This gives protection from market fluctuations, as well as
 - Vessels are taken when needed and released when not (i.e. treated as spot hires)
- Costs for anchor handling tugs (AHTS) are pooled and allocated by location on a monthly basis based on boat usage
 - Gives protection from market fluctuations
 - Vessels are taken when needed and released when not (i.e. treated as spot hires)
- Pay as you use cost allocation delivers very small fixed costs
- Larger group meant more term vessels could be attained, and associated benefits of longer term contracts, safety, quality, operations, economies of scale.
- Joint procurement leverage raised the alliance combined procurement of the alliance members to 3rd largest UK vessel charterer (17% of North Sea market in 2006).

- Joint rig move programme could be ‘sold’ to lowest bidder, controlling cost and improving availability
- Vessel productive time is high due to geographic synergy & encouraged sharing as vessels pass directly from job to job
- Vessels are released back to the pool after each job, and this gives members access to term vessel rates without the utilisation risk
- Pooled fleet of vessels gives access to a larger number of vessels increasing availability and exposure to the market
- Pooled fleet of vessels gives access to a more diverse range of vessel type and ability
- Opportunity of shared voyages lowers cost, improves utilisation, and increase service level
- Logistics learning's are shared, service is improved and overheads shared
- Procurement effectiveness and resource sharing developed for waste management, warehousing, shorebase, marine services, helicopters, Deep Subsea Vessels
- Joint procurement of tank cleaning, fuel provision, and quayside services including waste disposal

At that time all three operators were working in close geographic synergy around the Tartan, Piper/Claymore and Scott fields. Initially three areas of the supply chain were reviewed, but only marine went forward successfully. Aviation was a second consideration but as all operators were around the 80- 85% efficiency mark only a seat sharing agreement was taken forward to share spare seat capacity. Onshore storage and inventory were deemed too large in initially and would not be looked at because of various considerations including too large to fit into one space. For Marine logistics alliance a two port operation was developed, Aberdeen and Peterhead because two of the alliance members were operating from Aberdeen and the other member operates from Peterhead. The alliance continued successfully with a

26% reduction in operations in the first year 2006/2007 and has reduced cost / improved efficiency year on year since. The model has been amended over time due to mergers and acquisition between the alliance members. Another member of the team has greatly reduced its operation with the sale of its main asset Scott. Currently the membership of the alliance has evolved now with the addition of a new member. Other oil operators have been part of the sharing concept and include four new oil operating companies that have acquired the stake of one of the pioneer partners. All of these additional companies have departed on the basis that they wish to have one only supplier in the supply chain for onshore storage and marine provider.

Additional benefits of the alliance are the increased purchasing power for marine vessels and associated services, quayside operations and fuel for example. There is a comfort factor with ship owners that the consortium is here to stay and this is reflected in one of the most efficient and low cost operations in the North Sea. Ships are sourced via a marine shipbroker who has been with the consortium since day 1 and good relationships are retained between all parties. The "model" is based on share the pain - share the gain and is non profit making. The success of the alliance is built on good Communication - Co-operation - Commitment. Indeed the alliance currently have 7 long term vessels in the pool on contracts varying in length from two years to 5 years duration. This lets the alliance board have the opportunity to review market conditions and source new vessels at opportunistic times when markets are none too volatile. The alliance board operate mainly from single quay in Aberdeen, known as Mearns Quay. With Mearns Quay being in close geographic proximity to the Shetland Base all quayside support services were provided from the Shetland Base.

Volume of activity and result

The following represent the marine logistics performance:

- 14 installations serviced each year (Floating Production Storage and Offtake –FPSO, Offshore oil Platforms)
- Up to 55 rig moves completed annually
- 500,000 tonnes cargo delivered annually - (average cost/tonne \$50)
- 8 vessels on charter each day (4 long term vessels plus a varying 4 from spot market)
- 50,000 tonnes of fuel purchased annually (\$11.25 Million purchased from one of the alliance members)
- 230,000 nautical miles steamed each year
- 200 plus charters completed each year
- \$10.5mm saving from anchor handling tugs (AHTS) Call Off contract
- 28% reduction in marine costs (normalised) in year one, likewise quayside costs
- Continual improvement year on year

Success factors of the Logistics Alliance:

Members of the logistics alliance articulated their success factors to include the following:

- The fundamental belief that benefits existed was the focus. Furthermore they contend that a resource shared is a cost saved. Thus this core belief must remain, all barriers can be changed in its pursuit
- The initiative has a subsisting top Management support and ownership
- Open book benchmarking and review process
- Adherence to the tenet of being fair and reasonable
- Trust between the parties was core, demonstrated and returned
- Equal risk, equal reward arrangement - equitably shared. Aligned goals and drivers
- Equal member rights.
- Active cross operator Management, Steering committee, and Organisational team structure

- Organisational team identity created, branded and active (people issues)
- Systems built around the designed optimum performance, not optimising a system
- Key Performance Index (KPI) identified and actively managed

Accordingly the following is the **KPI** utilised in the alliance:

- Cost/Tonne Normalised (retain vessel costs at £5K per day for year on year benchmarking)
- Cost/Tonne Actual
- Deck Utilisation
- Port Standby Time
- Offshore Standby Time
- Dead Time
- Tonnage shipped
- Boat days
- Tonnes / Boat Day

Conclusion

This case study indicates that when partnering and alliancing within the oil and gas industry are executed properly and partners have a full understanding of networking and integration potential for enhanced value addition as well as cost reduction can be realised. However the success of the alliances can be hinged on process specialisation or outsourcing within the oil and gas supply chain (Chisholm, 2006), as well as effective contract management and relationships management. Relationships management arose within the contract management, as well as the choice of appropriate relationship by the buyer in order to secure the services of the seller based on the dynamics of the business environment, which affects the nature of power balance within the supply chain. An earlier study of capabilities in the UK upstream oil and gas industry (Finch, 2002) found that the industry business cycle determines where

power balance resides in the supply chain, in that different opportunities arise during business cycle that affect the balance of power in the industry. The oil industry business cycle is approximated by drilling rig rates and price of oil which consequently make decision makers to be reactive in their decisions. However proactive organisations adopt supply chain strategy that will enable it to be competitive especially in a sellers' market. Thus the logistics alliance case enumerated above enabled the organisations to drive scale economy through leveraging their joint impact to enhance their competitiveness in order to source for logistics services.

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Oil and gas are highly demanded in industries as well as for commercial and domestic purposes. The products are used for lots of purposes ranging from the driving of machineries to the production of plastics and fertilizers. The upstream sector of the oil and gas industry involves processes including the searching for and the recovery of crude oil as well as its production. In the upstream sector, discovery or exploration of crude oil takes place. In a case in January 2013, a Dutch court rejected four out of five allegations posed on Shell on pollution in the Niger Delta but a subsidiary firm was found guilty and asked to pay compensation to Nigerian farmers. Same issue was experienced in Magdalena, Argentina. Here Shell was also responsible for environmental pollution. Oil and gas coordinations require experienced, committed administrations. There is no space for blunder. Errors can be expensive. Organizations request magnificence from their assets. In addition profound space information of all regions inside the segment. It involves trust. The genuine feelings of serenity you get when you have finish trust in your assets. Couple of businesses are as monetarily defenseless when inconveniences emerge. Regularly, oil and gas operations occur in remote areas of the world, and run day in and day out/365. On the off chance that materials aren't conveyed on t