Well Servicing Chain of Value

Well work and well servicing is a complicated subject and there are a lot of moving parts. It is potentially so complex that many oil and gas companies seek to avoid it altogether when they can. A thorough understanding of the rank order of the options available, and what they can do is the key to being able to unlock tremendous value. A few 'simple' or fortunate' or 'clever' oil and gas operations can be set up where operations are simple – drill a well, complete it, produce it to abandonment pressure and conduct abandonment. For every other situation well servicing is the key to profitable operations. This is a very general way to look at the cost of well servicing, and how it affects operations in the field. The exact details will vary from country to country, field to field, region to region and company to company.

Well servicing options

The following general group of services are available for well work. They are listed roughly in order of cheapest to most expensive for land operations.

- slickline
- cased hole wireline
- misc. pumping services
- smart slickline
- workover rig
- coiled tubing unit
- snubbing unit
- drilling rig

In shallow waters with fixed platforms or other facilities with direct well access the chain of costs and values are slightly different - the overall costs are generally higher, but the general 'ladder of values; is different also.

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Pumping services tend to get more expensive offshore, because of the degree to which the equipment must be assembled on location. Wire based services still require assembly, but because the parts are smaller can usually be mobilized in larger 'chunks' thus requiring less assembly on location. On land, fluid pumping equipment is much more readily portable on trucks or trailers. Workover rigs on land are incredibly cheap in most places as measured on a per diem basis. Part of their advantage is that they arrive to location with most of their key components already assembled in/on one truck. This advantage disappears offshore where the rig must be assembled on site first.

In deep-water with subsea wellheads where there is no permanent facility available to access the well, costs are turned on their heads, and look roughly as follows:

- light well intervention vessel
- drilling rig
- Slickline
- Smart slickline
- Cased hole wireline
- Coiled tubing
- Snubbing unit

Paying for a drilling rig or intervention vessel is the price of gaining physical access to the well. Everything else must be added to it to get physical access to the general area and then gain access to the well. There is no need for various forms of standalone pumping services because the vessel or rig will already have a cementing unit and/or the mud pumps available for that sort of work.

Repeatability

Performing the same operation over and over again has significant cost savings attached to it. Once the correct housing and supply arrangements are in place, and all the necessary people and equipment have been assembled, continuing to use it altogether 'as is' can save an enormous amount of money compared to dispersing it all and starting over again later. For land operations, this is most pronounced in areas where reservoir, surface, and operational practices allow for grouping wells together in relatively small areas, and for clustering well pads. Depending on what work is being done to the wells and how close together they are it may be possible to 'hop' from one well to the other without ever moving the equipment on a road or doing a complete rig-down.

This is one area where offshore operations can see tremendous improvements and synergies. Having facilities with multiple wells at a single physical location allows for extremely high levels of flexibility economies of scale if the same sorts of equipment and skills can be utilized on one well after another in succession.

Deepwater operations can benefit from this too, but not as much as 'traditional' fixed or surface access facilities, because the overall day rate of the rig or intervention vessel is often much higher, and the process of switching between wells is often much lengthier.

Relative Costs

On land, you hire the unit and crew, and a small diem fee is added to the cost of employing them so they can stay in a hotel and get food when they are not working. The crews will transport themselves to and from the well and move the equipment to and from the well also.

Offshore, housing, food, and transportation to and from the wellsite must be arranged as part of the work to be performed. This involves contracting crewboat(s), work boat(s) helicopter flights, catering services, and crew quarters buildings with a galley, laundry, showers, toilets, etc. Extra space

must be allocated or created at or near the wellsite facility for the extra quarters. Many of these same factors are also present in remote land locations. The nature of operations in the Sahara Desert, or the North slope of Alaska, or the Congo jungle are more like those offshore with respect to cost and access than they are to more ordinary land operations where 'normal' food and housing operations catering to the population of the area in general are accessible.

For deepwater, everything for offshore must be provided, but with the additional difficulty that none of it can be made permanent, because there are no permanent surface facilities. In addition, simply getting to the wellhead once you have a drillship, semi-submersible, light well intervention vessel or other type of access facility floating over the top of the well is a considerable challenge. Depending on the nature of the operations which must be conducted, the access method, and the weather and current conditions it may take a period ranging from a day or two, to several weeks before access to the well is accomplished and the well work itself can start.

Consequences

The costs of conducting business in each of these 3 areas tend to scale very roughly in factors of 10. 100 wells making 50 bbls of oil each on land is a cash cow. Offshore that is a disaster, because the cost of servicing those wells is prohibitive. A more reasonable scenario is 10 wells making 500 bbls of oil each. In deepwater, a well making 500 bbls of oil a day is an abandonment candidate, if indeed it got that far along before abandonment. One well making 5,000 bbls a day is more. The direct cost of hiring (for example) a snubbing unit do not scale by factors of 10, but the overall cost of employing a snubbing unit do. As a result, different types of well servicing make sense in one area which may not make sense in another. On land in areas with ordinary access to infrastructure (not the Sahara or Alaska) operations like slickline are often so cheap that they are a routine procedure, with preventative or predictive maintenance schedules to scrape away paraffin or remove small amounts of scale. By contrast, it is completely cost prohibitive to try and attempt to perform similar work in deepwater – you either design and operate the well in such a way that paraffin and scale do not build up in the wellbore at appreciable rates, or you P&A the well. The cost of routine mitigation is simply too high. The relative cheapness of most workover rigs on land is another major factor. Many types of operations which could in theory be carried out in some other way are done with a workover rig simply because it is the most cost-effective technique, even if other methods might be faster, or involve fewer people. The relatively high cost of a rig for offshore facilities means that in most cases every effort short of getting a rig is tried first. Then a catalogue or list of operations to be conducted by a rig at a given facility will be gradually built up over time until they reach a critical level. At that point, a rig will be sent out to conduct all the operations which only it can perform, moving from one well another to save costs by making the work repeatable.