

# Analysis Of Effect Of Just In Time (Jit) Increase In Performance Timing Of Gathering Station Construction Project In Tarakan, East Kalimantan, Indonesia

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**Abstract:** *Just In Time (JIT) is a construction system that is designed to increase productivity, get quality, reduce costs, and achieve delivery time as efficiently as possible by eliminating all types of waste contained in the construction process so that companies are able to submit their projects according to the will of consumers in a timely, Timely production systems (Just in Time Production System) was originally developed and promoted by Toyota Motor Corporation in Japan, Many studies in various countries have attempted to introduce the JIT in construction projects especially in the field of oil and gas industry to reap the same benefits. This study focused on the implementation of JIT in construction projects Gathering Station (GS) in Tarakan, East Kalimantan, Indonesia with the aim of improving the performance and competitiveness of the company to achieve profits / profitability. This paper discusses the current situation that occurred in the construction industry in the oil and gas sector in Indonesia; presents a potential obstacle to implementing JIT; and proposes a framework for the implementation of JIT in the field of preparation, design, construction, 'monitoring, evaluating, improvement' and the completion of the project. The results of this study indicate that the government and construction companies should play a major role as the spearhead implementation of JIT in the construction industry in Indonesia.*

**Keywords:** *Just-in-time (JIT), gathering station (gs), oil and gas industry, implementation JIT, profitabilitass*

## PRELIMINARY

The need for energy, particularly fuel oil in Indonesia is increasing, in 2016 reached +/- 1.6 Million barrels of oil / day, while the national production of +/- 850 thousand barrels of oil / day, it is necessary to discovery of new reserves by oil drilling and processing facilities setup crude oil / gathering station consisting of oil storage tank with

its supporting equipment. Based on data from frequent delays in the completion of development projects gathering station, causing a significant loss (Media Indonesia July 29, 2016).

The construction industry in Indonesia has grown in leaps and the construction sector will continue to play an important role in the Indonesian economy. However, the construction industry in the oil and gas sector in Indonesia is still under development for many construction projects still delay in its completion because it has low productivity, the result of low-quality construction product, low profit margins and poor working culture conditions. Therefore, the construction industry sector of oil and gas in Indonesia need to become more competitive and change its image in a positive way.

Role gathering station the oil production process is very important and can affect the whole production system. Crude oil out of the ground was mixed with water and gas, the need of a system to process crude oil from the oil and water separation and oil with gas, this process is in a place called the gathering station (GS). In addition to oil and water separation process in the GS test process occurs in oil production, the rest of the produced water (separation performance) is injected again into injection wells to maintain pressure called pressure maintenance wells (see Fig 1). Gas produced by separation processes utilized to supply to the Power Plant Tarakan via the gas network and used for operation as a generator plant, pump drive and illumination of public facilities.

This study on "Assessment Just In Time" construction project gathering station ranging from site preparation, soil investigation (sondir), construction of foundation (on pile), the construction of storage tanks of oil type welded (bottom plate, shell wall, roof), piping, instruments and fire protection system that focuses on the study of time. Data were collected through a questionnaire based on the viewpoint of the client. Study JIT discussed in this paper is to accelerate

the development gathering station where the equipment tank which is quite a lot and the capacity is big enough not take long in its execution, as well as a limited area (confined space) to accelerate the schedule of work is not possible if only add manpower, hours workplace and work equipment only. Need JIT selecting appropriate methods and technologies in its execution and in terms of procurement, especially procurement longlead items (pumps, generators, electrical and instrument system). Major items in the manufacture of storage tanks that welding work, the use of double-V groove welding method used takes twice as long in practice, yet in case it needs repair welding defects that require a longer time as well so could cause a delay completion of the project. Thus JIT selecting appropriate methods to accelerate the implementation of the completion of the project gathering station / GS, so GS can be immediately operated in accordance with the capacity plan.

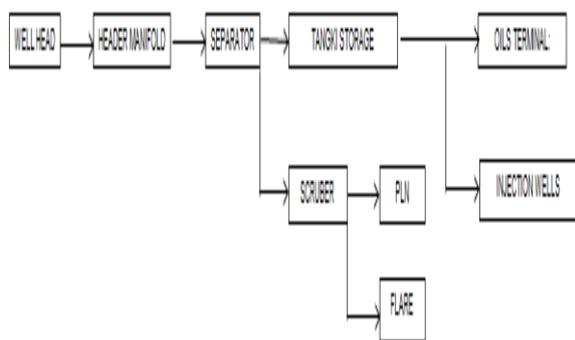


Figure 1: Flowchart Gathering Station (sources of oil and gas production data)

GS is designed for a capacity of liquid / oil and gas 16MMSCFD BLPD 30,000, with an area of +/- 7.2ha (consisting of several equipment: scrubbers, 3 phase separator, tank testing, storage tanks, transfer pumps, generators, instrumentation and fire protection system), design life time of 25 years. Storage tank is a critical item in the construction of GS, by the sheer numbers and time job long enough. There are some requirements, types, standard storage tank used in Indonesia. For construction work oil tank is generally located at a remote location so that the necessary preparations and methods in more detail in order to achieve time, cost, and quality according to the specifications required. Construction tanks broadly divided into two types: Type bolted Tank (moveable) and Type Welded Tank (fix), generally a tank capacity of over 12,500 barrels using a welded tank (type fixed) and the diameter of the

tank above 20 m length work takes 10 s / d 12 months of total project

The most important indicator in the Just In Time (JIT) Gathering Station Construction Project which is to reduce various waste materials and activities that are not necessary pekerjaan that serve as collection station that separates oil, water and gas perfectly. Work GS includes site preparation (land clearing), soil investigation (sondir), construction of foundation (on pile), the construction of the tank (Bottom Plate, Shell Wall, Roof) and fire protection system, Gathering Station are generally located in remote areas closer to wells production plays an important role in the whole process of processing crude oil because output produced must meet established specifications that oil is actually already terseparasi with water as well as gas is not wet, so ready to be transferred to PLN Tarakan, if drilling is completed but oil and gas are not can be produced then there is no meaning anything and in case of failure of production in GS, will lead to disruption of oil processing at a later stage which eventually disrupt the system as a whole. Study Just In Time, which is discussed in this paper is to accelerate the development Gathering Station where equipment tank which is quite a lot and the capacity is big enough not take long in its execution, as well as a limited area (confined space) and are located in remote areas should be the selection of methods and technologies precise in its execution and in terms of procurement, especially procurement longlead items (pump, generator and instrument system) and the construction process of a major item in the manufacture of storage tanks that welding work using welding methods double v groove that used to take two times longer in the implementation, yet in case it needs repair welding defects that require a longer time so that it can also cause a delay of the project schedule. Thus the selection of appropriate methods to accelerate the implementation of the completion of the project gathering station so it can be operated in accordance with the capacity plan. JIT is a set of principles, tools and techniques that enable companies to produce and deliver products with short lead times to meet customers on time according to the requirements.

Research Operational model is shown in the following figure:

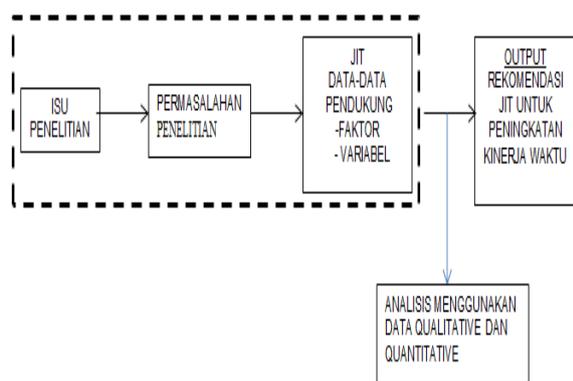


Figure 2. Operational model JIT for Development Gathering Station.

**RESEARCH ISSUES.**

This study has the problem as follows:

1. How does the analysis of the role of gathering station / collecting station in the oil production process in particular in Tarakan, East Kalimantan?
2. What are the important indicators in the Just In Time (JIT) construction project gathering station / oil collecting station in Tarakan, East Kalimantan?
3. How do the results of analysis of the influence of Just In Time (JIT) to improve the performance of a construction project implementation Gathering Station in Tarakan, East Kalimantan?

**RESEARCH METHODOLOGY**

In this study, we want to know the constraints that occur that affect the performance time, so in getting factors and variables to be included in the questionnaire study. The study involved owner who acts as the assignor in implementing development Gathering Station in Tarakan, East Kalimantan. Qualitative and quantitative approach adopted in this study. The study began with a review of the literature JIT with the aim of proposing appropriate recommendations on the potential implementation of the JIT by various stakeholders in the construction process GS. Research component is shown in the following figure:

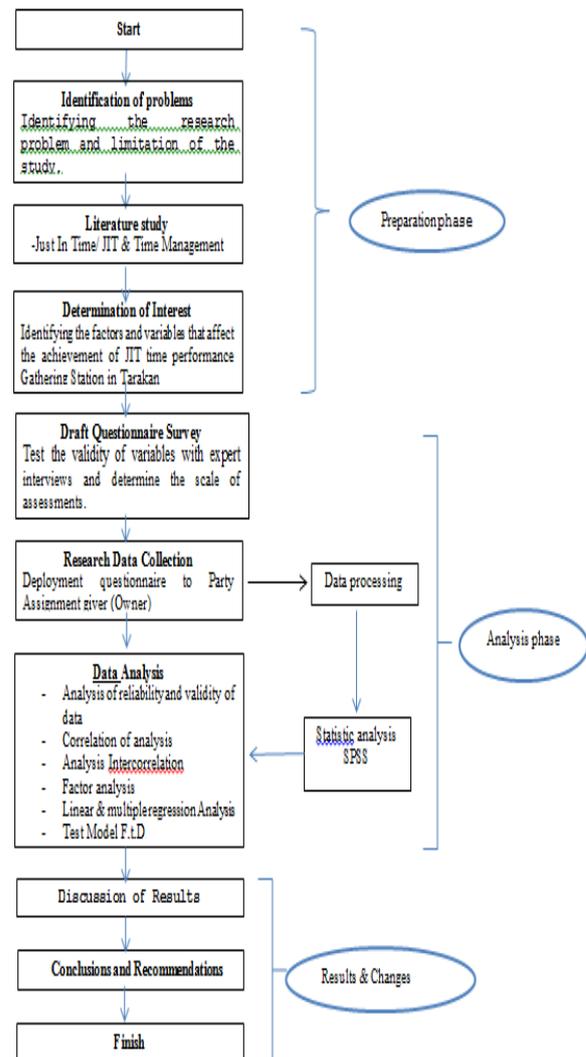


Figure 2: Process Research

**REVIEW ON Just In Time / JIT**

**JIT Principles and Implementation Framework**

Time management if executed properly, it can be used to monitor project status, updates and changes required memange / management of change. Project Network Integration is important, especially the impact of the activity on the time schedule. Activities implemented on the ground requires resources among other things (money, manpower, construction material and machinery / construction & operational equipment) should all be contained within the time schedule that includes the cash flow chart: cash in and cash out, manpower loading: manpower required, availability and productivity, material (bill of items and quantities), delivery schedule, machinery: mobilization and demobilization dates. Feed back is given from the Engineering, Procurement & Construction will affect the planning of the project time scheduling.

The iteration process will take place before the scheduled time of balanced and integrated and project implementation plan is achieved. A graphical display of effort cumulative / Resources (eg: costs, labor hours / mandays, or any other number), plotted against time. The name is derived from the S like shape of the curve (flat at the start and end, steeper in the middle) produced on a project that starts slowly, accelerates, and then finished. In addition to time management strategies to control the project schedule are still opportunities to accelerate the completion of the study period by applying the Just In Time (JIT) that can reduce waste-waste as well as activities that result in causing terkendalanya completion of the project.

Many previous studies on the benefits of JIT in improving productivity in manufacturing. Instead, researchers and practitioners from the construction industry increasingly explored the possibility of applying the knowledge gained in the construction industry to solve the problem at the time of construction procession (Bresnen and Marshall, 2001 ; Bates et al, 1999; Bertelsen, 2002).

This framework is shown in Figure 4.

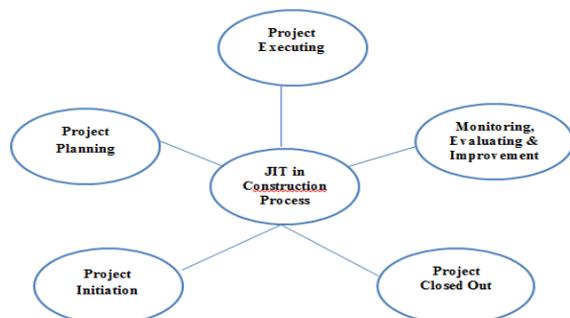


Figure 4. Framework JIT in the Construction Process

**Potential Benefits and Disadvantages Research of JIT**

If the JIT was applied to the results that can reduce labor who have minimize poor labor skills and provide adequate training to workers to improve their competence in accordance with their fields, project management assigned have experience were enough, organizational structure shaped lean each personal able to do multitasking, managing material balance to support construction activities, able to control the price of construction materials, improving the relationship between the supplier mutually support each other can get the job done ahead of schedule, many using the material / component prefabricated to shorten the time, empower the role of specialist contractor, eliminating congestion and inconvenience caused to the environment by mitigating risk. Improving

the company's competitive advantage in terms of consistent and continuously meet customer needs.

**Constraints in the implementation of JIT**

JIT can not be achieved without the initial investment for example: reducing setup time requires more sophisticated equipment, technology and more skilled employees will result in higher training costs.

Some companies have failed to implement JIT concepts for various problems. In this research, looking for variable factors JIT affecting the performance of a good cause of the failure and success of JIT obtained through surveys and questionnaires to some experts and practitioners construction from the viewpoint of the assignor (owner), widely obstacles implementing JIT classified in two categories: government regulation the lack of certainty of Building Regulations and standards which are used, the Regional Regulation Different Regions One other BECAUSE WITH regional autonomy, the maintenance of Licensing (environmental impact assessment, permit, certificate of improper functioning) are rigid and slow, scheduling JIT irrational and human resource issues involved in the construction process (such as contractors, specialist contractors, suppliers and owner). Awareness of the implementation of JIT and limited support from the government is very low and does not promote the implementation of JIT in the construction of Gathering Station and work culture that is conservative and difficult to accept the change.

**Role Assignment giver (owner)**

Facilitate the implementation of JIT Assignor / owner very important role in determining the successful implementation of the method of Just In Time (JIT) on the construction of gathering station, because the assignor in addition to having the benefit of the project is completed on time in terms of planned capacity can be achieved. The role of the assignor should start from JIT feasibility study that looked at various aspects including market aspects, technical, legal, economic / financial and cultural so that the project can be completely executed, investment gain significant profits and not lose money, JIT design stage to plan simultaneous and comprehensive scope of work detailed, quality plan planned and measured, JIT stage of an auction to determine the contractor who is competent and procurement strategies longlead items, JIT construction phase to minimize the factors and variables that cause the waste that affect the performance time (especially JIT the selection method of construction using the latest technology, resources allocation, utilization, and resources leveling, construction schedule,

construction cost, product and process quality and construction sequences), JIT Monitoring and evaluating project menggunakan EVM (Earn Value method), JIT Project closing at the time of handover to team operational / maintenance none of the constraints and the availability of sufficient financial indispensable by the assignor to be cash flow of contractors are not obstructed so that the method of Just In Time could be implemented and run well and can provide useful recommendations for the next project.

## **CONSTRUCTION INDUSTRY IN INDONESIA**

Growth of Construction Industry in Indonesia is getting better and has been following the development of technology in the world. Thus, we must know in advance the condition of the construction industry in Indonesia, especially in the field of oil and gas in its entirety before making recommendations for the implementation of JIT. Obstacles often happens that delays in the completion of oil and gas sector projects due to the low productivity of human resources and lack of project management experience, projects produced had not consistently applying TQM so that the resulting quality is not maximized the impact on the company's profitability is low.

### **JIT research results and recommendations:**

#### **-Design**

JIT process design detail thoroughly consistent and invariable start of the feasibility study the project was very influential, the scope of work that is clearly between the assignor and assignee, approval and procedures change order that is convoluted, the study constructability and quality plan structured can affect the smooth running of the project,

#### **-Procurement**

JIT procurement process from the selection of candidates contractor until the appointment of a winner takes quite a long time during the process of the auction to get a contractor who has the credibility that is good, it needs a special strategy for the procurement longlead items like (pumps, generators, electrical and instrument system) because this is critical in the procurement process relating to the regulation of inter-state at the time of export-import process to the need to maintain harmony, as well as long-term cooperation for mutual benefit with some contractors and suppliers so get competitive price and timely delivery. Escalation of prices and exchange rates in the procurement process must be managed properly in order to improve the profitability of the company.

#### **-Construction**

JIT construction process includes the construction sequences, the selection method of construction using the latest technology, resources allocation, utilization resources, and resources leveling, construction schedule, construction cost, product and process quality. The construction phase have longer periods of time than the other phases is a great opportunity to benefit if it can accelerate project completion GS, such as the use of components using precast, the selection of welding method 'single V groove' when the work storage tanks, manage storage materials with good special place so that no damage occurs, avoid bad habits at the time of fabrication material (eg, cutting rebar) should be implemented in the area fabricator is not projected so as not to cause noise and leaving waste iron scrap, access arrangements good construction in order to avoid traffic congestion diarea project on time some activities running concurrently, minimizing stock material which is not required in the project area, the use of a specialist contractor can be an option accelerate the completion of time.

#### **- Monitoring and Evaluating**

JIT project monitoring and evaluating can use EVM (Earn Value Method) so that the current condition of the project can be seen very quickly to determine the appropriate steps to accelerate the project, conduct periodic inspections and continuous improvement is very necessary proposals.

#### **-Produktiviti And Construction Management Experience is Lacking.**

We know construction project GS is diremote area where appeals for the use of the empowerment of local labor that is generally skill are low and productivity is also low for the necessary training / upskilling of the local work force and continue to generate skilled manpower from outside the area with a limited number. Based on the current conditions are still major gaps in productivity between different regions and governments implement effective regional autonomy in order to develop the potential of the existing area. Government through LPJK (Lembaga Pengembangan Jasa Konstruksi) / Construction Service Development Agency implement standardized competency based skills and levels with a clear qualification.

Construction management experience is lacking, especially at the managerial level upward influence on the policy impact on productivity, companies often perform efficiency with a lean organization / lean organization but competence personal less so

that monitoring is not effective then the solution be election organization based on project / projectize so personal involved more focus does not hold any other job. The use of Project Management Construction / PMC professional is one solution to gain managerial experienced construction.

#### - Quality

ISO 9000 can be used as guidelines for implementing systematic quality management, with a standard clause governing for establishing and enforcing quality awareness among staff of organizations involved so as assisting the implementation of JIT.

Application of Total Quality Management (TQM), which includes quality planning, quality control and quality assurance implemented in a sustainable manner can increase labor productivity and the quality of construction products GS with standard results in a higher institute,

#### - Profitability and Customer Focus

Despite the growth of the construction industry is very rapid in Indonesia, many construction companies that the level of profitability is still low due to a lack of long-term strategies for survival and growth in the Chinese construction industry. should motivate the construction companies to undertake initiatives such as adopting the concept of JIT to improve the level of profitability in Indonesia.

#### CONCLUSION

Based on this research there is potential for the application of JIT in tackling low productivity, low profitability and quality problems in the construction industry in Indonesia.

SOEs can be a precursor to commit raise awareness of the benefits that can be obtained from the JIT in addition to training for the application of JIT also important to reward and recognize companies that carry out the implementation of JIT :, simplify the process of licensing bureaucracy.

JIT study aims to analyze the role of GS in the process of oil production, suggesting an important indicator in construction projects Just In Time Gathering Station and provide JIT study results in improving the performance time of the acceleration of project construction purposes GS in improving the performance overall oil production cycle.

The role of the assignor, government and educational institutions should be aware of the importance of JIT and provide training to facilitate the implementation of JIT in the construction industry in Indonesia, especially oil and gas sector.

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