

Panama canal construction problems



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The canal of Panama is 77km long and it facilitates shipping in region by connecting the Pacific Ocean and Atlantic Ocean. This waterway has been a vital route for trade in international maritime. The US canal project commenced in 1904 and completed in 1914. Since its completion, it has witnessed an increase of traffic from approximately 1000 ships per year to 14, 702 ships per year in 2008. This was one of the most complex and huge engineering project ever carried out. Its completion had a huge effect on navigation between the two water bodies since it aided to eliminate treacherous and long route through the Cape Horn and Drake Passage. The idea of a canal in the neighborhood of Panama was embarked from early 16th century. The primary effort to build a canal started in 1880 under French headship, although it was deserted after 21, 900 workers were reported to have died. Many deaths were caused by landslides and diseases specifically yellow fever and malaria. The US started another attempt to construct the same canal that resulted to 5, 600 additional deaths although managed to open the canal in 1914. After completion, United States government took over authority of the canal and neighboring Zone of Canal. The control of Panama was placed under transition by the 1977 Torrijos-Carter Treaties and starting from 1979 until 1999, the water way was under joint control of Panama and US. However, starting from 31st December 1999, the management of the waterway was passed to Waterway Authority of Panama. Panama Canal construction raised several issues that resulted to change of the initial design.

French Construction Issues

The French government was inspired after it successfully completed the Suez Canal construction in 1869. This gave them confidence to pursue the project of same magnitude which was to join Pacific and Atlantic Ocean. The La Societe Internationale du Canal Interoceanique Company was established in 1876 to oversee the project and after two years from its creation it acquired a concession from the Government of Columbia, which at that time had the control of land, to construct a canal passing through Isthmus. The leader of the project was a Frenchman, Ferdinand de Lesseps, who oversaw the building of Suez waterway. Ferdinand managed to gain enthusiastic leadership accumulated from success of Suez Canal project. This kind of leadership allowed him to convince ordinary citizens and speculators to invest in the project to raise about US \$400 million. Exceptionally, Ferdinand was not an engineer by profession although he succeeded in the previous scheme. The building of Panama water way was very distinct compared to Suez Canal that was simply digging a ditch in a level desert of sand, which represented few problems.

The Central America terrain runs to a low spot at Panama, while still elevated to the altitudes of 110 meters from level of sea at the lowest areas. Lesseps suggestion of sea level canal would need enormous digging presenting a challenge as a result of differentiated rock hardness. French was faced with another challenge presented by rivers passing across the canal because their flows would increase substantially in wet seasons. The water would interfere with canal because it would raise a very serious danger to shipping.

Therefore, the rivers cutting right across the canal course needed to be redirected. Another grave challenge that faced the French project was

diseases in tropics, specifically yellow fever and malaria. This was aggravated even further by the lack of skills on how diseases spread and any prevention measure was futile. The legs of hospital beds used by French workers were put into containers full of water to prevent insects from infesting the bed, little did they that the tins provided suitable environment for mosquitoes breeding.

The Panama project as proposed by Lesseps was dogged by deficiency of engineering professionalism from its initial stages. The meeting in Paris of international engineering congress in May 1879 comprised of 136 members with merely 42 professions in engineering and the rest comprising of non-professions. The building of the canal by French started in 1882 and a huge manpower was prepared in 1888. The labor force comprised of approximately 20, 000 workers where 90% of them were afro-Caribbean men originating from West Indies. The status of project and well-paid French engineers fascinated professionals from French engineering schools but massive losses of workers from diseases lowered their attraction. In early 1885, it became apparent to many that a canal of sea level was impossible and that a raised ditch with locks was the only feasible solution.

Nevertheless, Lesseps did not readily buy the idea until late 1887 when the design of lock canal was accepted. At the time of adopting the plan, the project was dogged with a lot of challenges such as mudslides, floods, death tolls, engineering problem and financial crisis. Additionally, the company was declared bankrupt in 1889 forcing it to abandon the project in 1889. Until the collapse of the project, money amounting US \$ 234, 795, 000 had be used

and project was only 40% done. The project was entirely abandoned in 1893 as a result of inadequate skills and other difficulties.

U. S Construction

US showed a huge interest in constructing the waterway through Isthmus and in 1902, the US government embarked on the project of Panama waterway. The then US president, Roosevelt Theodore, decided to purchase the excavation and machineries from French at a cost of US \$ 40 million and the job was commenced in 1904. The head of Engineering between 1905 to 1907, John Stevens, opposed the plan of French to build a sea level canal. Fortunately, President Theodore bought the idea of chief engineer to built waterway with locks and dams. Engineer John Stevens managed to lay down infrastructures in panama that were vital for completion of the project. He improved the transport technology by restructuring Panama Railway and developing a way of collecting soil from the digging via rail. Additionally, he put in place good shelters for workers and encouraged funding to improve sanitation. He also gave attention to programmes of controlling mosquitoes in order to remove yellow fever and malaria from the region. The building of a raised waterway with locks started to be feasible after the considerable redesigning of the infrastructure and effective diseases control programmes were put in place. The US government saw the need to replace the deteriorating machineries of French with equipment designed for massive jobs to hasten the speed of construction. The Ellicott Dredges Company in US developed the cutter dredges utilized in building Panama waterway. The initial equipment to be build by the company was 900 HP steam engine with dredge of 20 inches. The completion of constructing Panama Canal was

finished in 1914, much early than it was projected. The waterway was officially opened on August of the same year of completion.

Panama Canal Technology

The technology that was employed to construct Panama waterway by French was sea level design. This is because they had successfully employed the same technology in construction of Suez Canal. Unfortunately, the technique did not work in the Panama Canal project. With the development of technology in field of engineering, the United States ignored the design of French and continued with the design based on a huge lake raised with one and two lock combination on the side of pacific and three locks at the Atlantic side at Gatun. The technology employed in design of sea level suffered severely from the huge volume of digging needed and from flooding that would have happened on the Chagres River. This river was usually frequented by flooding that would have put the waterway into peril and affect traffic flow. The engineering technology allowed US to built dam close to the Chagres River mouth in order to mitigate impacts of flood and reduce excavation. The locks were controlled by highly designed electro-mechanical control system that are still functioning since 1914. The issue of diseases that had cropped in French project was tackled by US through technological improvement in the field of science. A Doctor from Cuba, Dr. Reed Walter, had been able to discover that mosquito was the vector that transmitted malaria. In addition, technology saw US in the replacement of old ineffective equipments with machineries that were designed to handle huge work like the big hydraulic crusher.

Conclusion

French government embarked on the attempt of constructing Panama Canal in 1882 after gaining motivation from successful completion of Suez Canal. The French head of project was not an engineer by profession and he employed the design that was used to build Suez Canal although Panama terrain was different. A sea level design utilized by French was faced with high elevations and rivers passing across the canal. Workers during French project perished from floods and diseases because of lack of skills to deal with those challenges. Owing to lack of enough skills and other difficulties, the project was entirely abandoned in 1893. In 1902, the Government of US embarked on the construction of Panama Canal. Learning from failure of French, US opted to use different design that employed locks and dams. There was a considerable redesigning of the infrastructure and effective diseases control programmes. The engineering technology enabled US to built dam close to the Chagres River mouth in order to mitigate impacts of flood and reduce excavation. The technology that was used in 1914 to operate locks is still in use today.