HOW DOES DREDGING EFFECT THE ECONOMY?

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ABSTRACT

This paper will explore both an objective and subjective journey into the effects dredging has on the economy. By defining the word dredging and the various types of dredges that are used throughout the world. The paper will explore concepts from the varying business sectors touched by the dredging industry including but not limited to, contracting, manufacturing, consulting, the economy, the environment, governmental roles and education. This paper will explore the real effects of the dredging industries' role throughout the world and the unthinkable concept of what would happen if a moratorium was placed on dredging. This paper will review true case studies that were successful from the design phase through project completion, as well as review some projects that have missed execution throughout these phases. It will also propose additional project phases that can be implemented to further benefit the entire criterion used in overall project evaluation and commencement.

Keywords: global, port, exports, barter, environment.

INTRODUCTION

In order to understand the importance of dredging, one must be aware of the many applications that involve dredging. Dredges are used for numerous processes including; waterway navigation, mining, aquaculture, environmental, land restoration, land development and many other applications. While these categories are broad in nature, we should explore them in detail to educate the public on what dredges really do. When we discuss an economy, we can either think in terms of a global economy, a country’s economy, a state’s economy, or more specific, an economy on a local level and how they can interact with each other. We must also define what constitutes a dredge in order to understand the complete effects of dredges on the economy. As related to this paper, dredges will be defined in two basic categories; hydraulic and mechanical. Hydraulic dredges are defined as a dredge utilizing a pumping system that uses water as its means of transportation, while mechanical dredges are defined as a dredge that uses mechanical means of removal of the dredge material and requires a secondary means of transportation.

DREDGING APPLICATIONS

Navigation

Waterway navigation encompasses port development, port maintenance, waterway creation, and waterway maintenance. This not only applies to rivers or sea ports, but also to lakes, streams, and marinas. While smaller lakes and streams are generally referenced as recreational dredging, they still play a major role in dredging, and have an effect on local economies. The layman thinks of these applications when they hear the word dredging. Typically, the general population sees a dredge as an underwater vacuum cleaner and most commonly associates them with port or waterway maintenance. Ironically, the main reason the global economy has grown is due to the development of port systems around the world.

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In fact, no other single factor has prompted continual growth of the world’s nations; both in their economies and in their nations’ overall wellbeing. Without port systems, the only form of trade would be the barter system. Without proper funding, port systems would decline, along with the region’s overall economy. Figure 1 illustrates a thriving port system, while Figure 2 displays a dead port system.

Figure 1. Thriving port.

Figure 2. Dead port.

Mining

Dredges used in mining processes may include the largest variety of applications, but they are rarely considered a major part of the dredging industry. The layman does not think or even know about these dredges because they are seldom seen. For example, aggregate dredging operations exist all over the USA; however, the high walls, levees, or berms that protect them also hide the dredges from view of a passerby. The mining of sand and gravel is critical for a country’s infrastructure. Roads, highways, buildings, and residences are all affected by the production and processing of sand and gravel. Dredges are also heavily used in the minerals mining process. This includes well-
known minerals such as gold, diamonds, and other commodities. Other less commonly known mining dredge applications include Titanium Dioxide (TiO²), Phosphates, etc. Dredges can be used in the active mining process or sometimes simply in a process of the overall excavations. The active mining side involves the dredge as the excavation device for the intended final product. The process side involves the dredge handling byproducts such as tailings or fines process for the overall mining operation.

The mining process can also lead into an environmental process or actually cause the use of a dredge for an environmental portion of a mining process. An example of this would be in tailings processes where the dredge is involved with process of the waste or byproduct of a mining project. While this may be considered a mining application, we can also bridge the gap and classify this type of dredging as environmental in many instances.

Dredging operations in the Andes Mountains offer a current example of the use of a dredge in a mining/environmental application. While the majority of copper mining takes place by surface mining techniques, the tailings generated from surface mining create millions of tons of tailings that are contained within tailings dams high in the mountain ranges. The possibility of tailings dams becoming too full and breaking has led to the use of dredges to transport tailings out of the dams processing centers located at lower elevations, which ultimately reduces a potential disaster to nearby cities. A similar example can also be found in the handling of tailings from Tar Sands applications in Northern Alberta, Canada where the tailings are transported to holding areas and for future processing.

Environmental

When we talk about environmental dredging, we often think of a Superfund project. Environmental dredging projects typically are very costly because of the treatment required to the dredged material, but are normally small in quantity of material to be dredged. Nonetheless, the treatment process usually requires lower flow rates or lower production rates, so the process can be fairly lengthy to finalize. These projects are known for very high dollar requirements, such as the Fox River Project, with estimated total costs of $600+ million over a five to seven year timeframe.

Aquaculture

A fairly uncommon form of dredging is aquaculture. Dredges can be used to maintain ponds that are designed for breeding fish, shrimp, and other marine life. While this type of dredging may not have an overall impact on the global economy, it should be considered as an application that would affect local economies such as shrimp farming in Ecuador or fish farming in Honduras. Dredges are used in this capacity to clean ponds of decaying byproducts of the breeding process and to keep water clarity at acceptable levels. Many companies involved in aquaculture have closed because poor water conditions led to disease and eventually death to the marine life they were harvesting. Dredges can be used in this application as a benefit to maintain proper water quality and to help a local economy or seafood industry thrive.

Restoration

Using dredges for restoration has become an increasingly interesting topic, yet is still only utilized minimally at present. This is mostly due to the costs to effectively provide restoration services because of the incredible large demand for areas needing restoration. Unfortunately, when the US Government looks at the cost of dredging and Congress determines the budgets, they only see “what is the cost to dredge”. An educational campaign must be implemented to show how effective and responsible dredging can decrease the costs of long-term dredging projects. We are not keeping up with the current demand; therefore, at this point we may never be able to catch up. As a resident of the State of Louisiana, I would like for my grandchildren to have the opportunity to enjoy our wetlands and coast, but not when the coast eventually meets the Metropolitan New Orleans area.
Creation

Dredges have been used for land creation. A recent example of this is the berms projects that were implemented after the BP oil spill. While there was disagreement on the scope, purpose, and parameters of the berm project, it is a fine example of what can be accomplished in a focused and responsible dredging project. The berm project also defined the relationship between restoration and creation. These terms should more frequently be used hand in hand. Another example of land creation is an underwater habitat mitigation project successfully designed and implemented by Western Contracting Corporation in Nebraska for sturgeon migration and breeding.

THE EFFECTS OF DREDGING OR NOT DREDGING

Many factors make it difficult to put real numbers on the effect dredging has on the economy. Since the dredge manufacturing, contracting, consulting, and service industries are made up of many private firms, the public figures are hard to obtain. Private firms are less likely to disclose their financial results due to competition, and what is available is typically hearsay and unworthy of a true representation of their results. So throughout the course of this paper many assumptions will be made, but the overall intent is to provide details that can be further shared to educate people, governmental entities, private firms and all stakeholders of the tremendous effects dredging does have on the economy and the environment.

When we talk about environmental effects of dredging, we ask that you think beyond environmental sciences. What I am proposing is to think of the environment in regards to its localized effects and industry; the environment that makes up an industry. For example, when we think of a waterway that is not properly dredged, how might it effect the shipping environment? Figure 3 shows a possible effect.

![Figure 3. Grounded ship.](image-url)
What happens when a project remains unfunded? How might this affect a local industry or local economy? What happens if our consultants were not allowed to forecast problems and solutions? A possible situation is shown in Figure 4.

![Severely grounded ship.](image)

Figure 4. Severely grounded ship.

What would be the effects on the economy if we quit using dredges to clean waste from waterways? Figure 5 and Figure 6 show a possible view of the economical effects of a non-dredged water system.

![Polluted waterways.](image)

Figure 5. Polluted waterways.

![Polluted waterways.](image)

Figure 6. Polluted waterways.
What would happen if dredging technology was not used in aquaculture? Figure 7 shows a possible outcome on the fishing industry without proper dredging.

![Fish kill](image1.png)

**Figure 7. Fish kill.**

As mentioned earlier, dredging for minerals has a very profound effect on the economy. Let’s make a comparison on a city that is void of dredging. City X’s infrastructure is minimal and they do not use dredges. The absence of dredging can be shown in the lack of highway funding or infrastructure to build and maintain roads or a highway system as shown in Figure 7. Figure 8 shows the same outcome for City X as it relates to their construction and building industry.

![City X highway system](image2.png)

**Figure 7. City X highway system.**
In comparison, City Y has invested in their infrastructure with the use of dredges. City Y has invested in dredges for production of sand and gravel for highway construction and building construction. Figure 9 shows an example of a major highway system that was developed through the use of dredging for sand and gravel. Figure 10 provides an example of a construction and building industry that was established on the foundation of sand and gravel extraction.

Figure 9. City Y highway system.
DREDGING ECONOMIES

Some relative information is available from a USACE budget shortage to dredge the mouth of the Mississippi River. A US $20 million budget shortage to dredge the lower Mississippi has resulted in a – 0.3 meter (1 foot) draft capability for commerce passing through the river. The Mississippi River sees approximately 85 to 100 billion in foreign trade pass through the mouth of the river on an annual basis. The – 0.3 meter (1 foot) of draft reduction for ships can result in a range of US $250 thousand to $800 thousand loss of cargo per ship. With an average of 6,000 vessels per year and 68 million tons of cargo, it is quite obvious the $20 million shortfall in the dredging budget is a ridiculous cut made by the administration. 60% of grain, the largest cargo component of many ships that travel the lower Mississippi River, in the USA pass through the Port of New Orleans. The Harbor Maintenance Trust Fund is a way to fund the shortages as it was originally intended to do, as well as many other needed dredging projects.

As we review the available published data on dredging figures and international trade, it becomes increasingly obvious that dredging played a major role in developing the global economy and still plays a huge role in annual global trade.

The IADC reported an estimated +10.9 billion Euros of dredging work for the Fiscal Year 2009. However, this report only outlines the hard contract revenues and not overall economical factors that generate revenues for the service providers to the contracting firms. Service providers include but are not limited to: dredge manufacturers, repair yards, component suppliers, fuel suppliers, labor providers, hotels, food suppliers, transportation providers, etc. I once heard that for every dollar generated, seven additional dollars are created. I am not sure how the math was calculated for this but it does remain plausible that every dollar does generate a decent multiple of additional dollars.

The US Department of Commerce published export trade figures for the Fiscal Year 2010 at $1.8 trillion dollars. This number is a bit misleading because it only accounts for US dollars measured by export documentation requirements. It does not factor in the trillions of dollars that are generated domestically by material and service providers to the end exporter. An example of this would be a dredge pump manufacturer. Say the dredge pump manufacturer supplies 10 pumps to a manufacturer that will be used in the dredge manufacturer’s final product. The dredge manufacturers export for the sale of the dredge is recognized but the dredge pump supplier’s sale of the dredge pump is only recognized as a domestic sale. But without the supply of the dredge pump the dredge manufacturer may have not received the export order. And without the other domestic service providers the dredge manufacturer may not be able to successfully export. So we need to remember that not only the hard measured export dollars are the true basis for exports, we need to remember the domestic component that contributes to the
local, domestic and global economies. The US GDP is only 12.5% as compared to Germany with a GDP of 40%. The higher a country’s GDP, the more they rely on exports. Nonetheless, the day we stop dredging will eventually lead to a minimal of 12.5% of the US economy, and continually dwindle the economy down to a barter system. With President Obama’s National Export Initiative being a major concern for the US Department of Commerce, utilizing dredging and the Harbor Maintenance Trust Funds for their intended use needs to be a major priority to meet the administrations initiative. And dredges must be used to maintain the ports to allow for a continued and increased level of global trade.

As mentioned earlier, it is hard to acquire accurate data because some companies just don’t want other companies to know how they are performing. Private companies may potentially be afraid of giving away a trade secret, a niche market, or a developing economy that requires dredges or dredge related products and services. But through some questions and answers to the US domestic dredging industry, some data was obtained and can be utilized to show a microcosm of the effects of dredging on local, domestic and industry economies. The USACE published FY2010 data for Contract Dredging Program with figures in excess of US $1 billion dollars. It should be noted that the majority of this was scheduled work and does not include any emergency work or private industry contracting figures. The estimated US domestic market for new small to medium sized dredges (average dredge size smaller than 30 inch diameter) is between US $150 million to US $200 million. Estimated number of employees for this domestic market is 400 to 500 people. A single major US dredge contractor has fiscal year 2010 revenues of $700 million while employing an average of 800 people.

The bottom line is that the world has grown economically, scientifically and technologically due to a global education and trade exchange that was initially created through our port systems. Without ports there would be no way of effectively trading with multiple nations because of geographical limitations and transportation restrictions. We would revert back to a system of bartering and each nation would only fulfill the needs required by that particular nation or nations that could trade through over-land transport systems. But this balance of trade would be insignificant compare to transport over waterways, easily the most economical and effective way to trade. In order for the dredging industry to be graciously accepted by the majority of all people, we need to promote through education and awareness the effects that dredging has on the global economy. Without dredging our ports could look like Figure 11.

![Figure 11. A port without dredging.](image)

Direct measurements can and have been made on some vital statistics that show the effects of dredging on the US domestic port systems as noted in Figures 12, 13 and 14.
Figure 12. US jobs that depend on dredging.

Figure 13. Export cargo that depends on dredging.

Figure 14. Our safety and homeland security.
INDUSTRY AWARENESS

It is also important to point out the current perception about dredging as viewed from a layman’s point of view. The best resource we thought we could find for this illustration is to simply surf the web to see what the primary thoughts are about dredging. We defined primary as what ranks the highest on the search engines when you are looking for dredge related information.

Here’s what we found when we Googled “is dredging good” as shown in Figure 15. Notice that the primary thoughts do not really answer the question. We see more along the lines of good news, a company’s good performance, good trends and of course we will find the “Dredging is Good for the Economy” simply attributed to organizations such as the Western Dredging Association and USACE promotion. But the primary information lends itself to a different result then what we were looking for.

Conversely, what did we find when we Googled “is dredging bad” as shown in Figure 16 and Figure 17. The results from this search were a little more direct and we found some focus on why people think dredging is bad. Other
search engine results are also identified in Figure 18 & Figure 19 to further confirm our findings that a bad perception is easier to find than a good perception.

**Figure 16. Googled is dredging bad.**
is dredging bad - Google Search

**OIl dredging....good news/bad news**
4 posts - 4 authors - Last post: Apr 22, 2005
The good news is that the dredging in Morehead City went under budget and they were able to divert $500,000 of that to Oi. The bad news is...
www.tidalfish.com/.../70856-Oil-dredging....good-news-bad-news - Cached

**Dredging Today – Port of Georgetown (USA): dredging situation bad...**
Mar 1, 2010... MYRTLE BEACH — The director at the port of Georgetown said the dredging situation there is now bad enough that the port turns away cargo and...

**Why Is Dredging Bad | Life123**
Dec 1, 2008... Why is channel dredging so bad to the environment? Generally speaking, any form of dredging is harmful to the seafloor life.
www.life123.com/question/Why-Is-Dredging-Bad - Cached

Figure 17. Is dredging bad.
How Does Mining Affect the People?

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Mining Stock - In Play Massive Lithium Reserve Discovery. Earn 100% on the
Mining Truck Simulator Optimize the safety and efficiency of your haul truck

Mining is destructive to the environment as trees and vegetation are cleared and
metals are stripped from the soil. In fact mining is one of the causes for deforestation
naturally the people will be affected.

The mining pits dug during land dredging mining remain as stagnant water pools
other water-born insects. People living near such water pool areas have high possi
malaria. The gravel, mud, and rocks displaced during river dredging mining disrupt
and other aquatic living organisms often die and fishermen find it very difficult to
gravel mining may sometimes pave way for contaminating the groundwater.

Chemicals used during mining process causes pollution to the environment: arsenic
mercury, or methyl mercury used to amalgamate the metals and minerals extract
streams, bays, and oceans, thus contaminating the water bodies and the aquatic
bodies. People who consume such contaminated aquatic organisms are prone to:
cannot be used for bathing, drinking, cooking, or washing clothes, thus creating

The toxic waste from mine tailings flow into either an abandoned mining pit or as
pollute the river in the case of river dredging. People who are exposed to the
problems. They may suffer from skin rash, headaches, vomiting, diarrhea, etc.
disposal of heavy metals, such as lead, into the atmosphere. This can have serious
children. Asbestos dispersed into the environment during asbestos mining is life th

People living near mining areas or mining villages are very much disturbed and if
drugs/ alcohol, prostitution, rape, cultural degradation and sexual abuse are unfor
living on mining areas. The poor people who face the health problems of mining as
people who live in a remote village where a doctor is not accessible remain untr


Figure 18. Is dredging bad.
CONCLUSION

In conclusion, we know as an industry that dredging has a positive and remarkable effect on the global economy and the overall lives of people on Earth. However, the word “dredging” still has a bad connotation to those who are simply uneducated about dredging and its global benefits. As an industry, we need step-up our efforts to further educate and create awareness, so everyone has the opportunity to understand the effects of dredging on the economy, the effects of dredging on their lives and the effects of dredging on the world as we know it today.

REFERENCES

Dredging Contractors of America. Various Photos.
Google. Various Photos.


CITATION