

Cheating Can Kill

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Cluster 4- When Disaster Strikes: Earthquake Engineering

11th Grade



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The twenty-first century is a new era with thousands of new buildings and skyscrapers being designed by structural engineers. These advancements have been improving the lives of citizens and creating large amounts of revenue for developing companies. Yet, the increasing possibilities and structural disasters created by these engineers has raised ethical questions on the accuracy and honesty of the building and design process. Ethical issues are those regarding moral obligations (Merriam-Webster Dictionary). Ethics are crucial in structural engineering because the buildings and infrastructure that engineers create affect the lives of everyone near their structures. Even with all the building codes and government regulations in place regarding building safety, structural engineering is still considered the most corrupt field in the world due to bribes, competition, and pressure from large-scale clients (Eliminating Corruption In Our Engineering/Construction Industry). With the demand for infrastructure constantly growing, engineers feel the pressure to cut corners and are slow to take action, which only results in damages to people, the buildings themselves, and the economy. The only way to ensure that future engineers uphold these ethical standards is to put a larger emphasis on ethical responsibilities by creating a mandatory course in all schools that engineers must take before they graduate, so they are completely aware of their position and impact on the world around them.

Rather than focusing on building a safe and sustainable building, engineering companies like the one that built the Sampoong Department Store, are paid off by wealthy businessmen who only see the structure as a source of income. This disaster in Seoul, South Korea resulted in the death of 502 people. The owner of the department store, Lee Joon, made numerous negligent decisions through bribery that ultimately led to the building's collapse. He first demanded a fifth floor--which was against regulations--be added to his pre-existing building, but once his builders refused to comply with his request, he simply hired new ones. The company that completed his project completely disregarded how overburdened the existing columns were. Additionally, when the air conditioning machinery on top of the building was making too much noise, the building management removed them by carelessly dragging 45 tons of machinery over the roof, opening up multiple cracks. To make matters worse, even though the executives were aware of the danger of the open cracks, they refused to evacuate the building full of unaware citizens (The

Guardian). Although the blame in this example seems to fall on the owner, Lee Joon, the engineers and building companies that were involved share responsibility in this disaster. Lee Joon had fired two companies prior to following through with his building plans that clearly imposed danger. The engineers that added on the unsafe fifth floor were bribed, knowing the possible dangers this construction project could cause, which is completely unethical. Although the two fired companies did the right thing by refusing to follow through with the design, they should have taken action to expose Lee Joon's plans once they realized he was implementing an unsafe structure.

Another aspect of corruption such as cutting corners, which is due to significant pressure to create the cheapest and most innovative projects, was clearly shown on August 2, 2007, when the Interstate 35 West bridge crossing the Mississippi River in Minneapolis plummeted into the river killing 13 people and injuring 145. What was shocking about the bridge's collapse was that it was already deemed structurally deficient and was actually undergoing repair when it fell. According to NPR National, "the National Transportation Safety Board determined that... [the collapse] was a design flaw, and not deferred maintenance, neglect, or other problems." During initial construction, the steel gusset plates that held the bridge together were only half as wide as the original size due to additional concrete and heavier traffic loads that developed over the years. Also, in 2005 there were multiple state inspections on the bridge which recorded its possible failure areas, yet nothing was done to improve the bridge (ABC News). Although the engineers that created this bridge did not break any building codes or laws, they did not take the time and effort needed to ensure that this bridge was structurally sound. If the engineers and inspectors had taken their warnings seriously, this horrible disaster could have been prevented. Additionally, if bridges were made correctly the first time, the government could save millions of dollars by avoiding disasters and even maintenance.

One way that the issue of corruption in the engineering sector can be diminished is by emphasizing the importance of ethics in schools. Elyse Paneral Knew who attended the Massachusetts Institute of Technology explained that none of, "her instructors talked about professional challenges she'll face...like pressure to cut corners" (Before the Bridge Falls Down). Of course, feeling extreme pressure to outperform others is nothing new to many students. All

too often students feel the need to cheat in class or plagiarize just so they can obtain the best grade possible instead of doing their job and learning the material. This same phenomenon is only amplified to a larger scale in structural engineering. Engineers would rather “cheat” and use cheaper or weaker materials to finish their structure faster and with less of a cost. Rather than merely telling their students not to take bribes or cut corners, they should simulate situations that test a student’s ethics so that they are better prepared to take on the pressure once they enter the workforce.

Although the mistakes of the Sampoong Department Store and I-35 West Bridge are in the past, negligent behavior and carelessness of engineers will still occur unless action is taken. Engineers need to learn to put aside their reputation and work to serve their community. They are not only creating structures to gain revenue, but are creating the structures that hold millions of people every day. The social construct of the construction sector needs to change and engineers need to understand that speaking up and making it mandatory for workers to report every aspect of the construction process is crucial to ensuring that another disaster defined by human error never happens again.

Works Cited Page

“Ethic.” *Merriam-Webster*, Merriam-Webster, www.merriam-webster.com/dictionary/ethic.

J, Kathi, et al. “Before You Cross That Bridge: Did the Engineer Learn Ethics?” *Undark*, undark.
org/article/did-the-engineer-learn-ethics/.

Jong, Maarten de, et al. “Eliminating Corruption In Our Engineering/Construction Industry.”
ASCE Library, 15 June. 2009, <https://ascelibrary.org/doi/full/10.1061/%28ASCE%291532-6748%282009%299%3A3%28105%29>

Marshall, Colin. “Learning from Seoul's Sampoong Department Store Disaster – a History of
Cities in 50 Buildings, Day 44.” *The Guardian*, Guardian News and Media, 27 May 2015
, www.theguardian.com/cities/2015/may/27/seoul-sampoong-department-store-disaster-hiStory-cities-50-buildings.

Matthews, Petter. “Why Is the Construction Industry so Corrupt and What Can We Do about It?”
World Economic Forum, www.weforum.org/agenda/2016/02/why-is-the-construction-industry-so-corrupt-and-what-can-we-do-about-it/.

Michels, Scott. “Bridge Collapse: Who's at Fault?” *ABC News*, ABC News Network, 3 Aug.
2007, abcnews.go.com/TheLaw/story?id=3443574. Schaper, David. “10 Years After
Bridge Collapse, America Is Still Crumbling.” NPR, NPR, 1
Aug. 2017, www.npr.org/2017/08/01/540669701/10-years-after-bridge-collapse-america-Is-still-crumbling.