
APS1018 History and Philosophy of Engineering – Final Team Projects, Fall 2013**Green Engineering Strategy: Best Practices at Sinopec Group in China, Cemex in Mexico and Bombardier in Canada**

Modern world manufacturing in China, Canada and Mexico presents big challenges for engineers and managers, who share responsibility for innovating and applying appropriate technologies to the market in order to succeed. Modern engineers have to be concerned about achieving technological performance, but they must also consider the current environmental crisis on earth. We look at Sinopec Group in China, Bombardier in Canada and Cemex in Mexico and examine how they achieved their position within the market. From the analysis we create and propose a model for green management.

We present our findings in four parts:

1. The history of each enterprise from its foundation through present day, looking back on the development and expansion of each firm.
2. The firms' environmental philosophy and ongoing innovations in alternative materials, decreased CO₂ emissions and reduced thermal energy usage.
3. The commercial and managerial strategies in decision making that have led the companies' expansion and development worldwide.
4. We propose a model with the best managerial practices from each corporation. This is the most challenging step since the model is aimed to fit with other enterprises as an example of successful green strategy and managerial decisions.

Conclusion

Through analyzing the strategies of these three companies, we conclude that their successes are not coincidence, and they should evolve their key strategies to continue their competitive position into the future. These companies each have different key strategies which help them to be dominant and successful within their relevant fields. For example, Sinopec is a state-owned petrochemical company, which invests a lot of capital to research new technologies and broaden its scope of business. For Cemex, it focuses on only one business (cement), and its capital is sourced mainly through borrowing from European countries. Bombardier's emphasis is on guaranteeing the quality of its products and meeting its customers' demands, which are also decided by the nature of transportation and aerospace company; based on these strategies, Bombardier is attempting to be the best in its field. Despite the differences, each company share a common green strategy. They consider environmental protection to be a social responsibility and ethical obligation for engineering companies like Sinopec, Cemex and Bombardier.

We must point out that we only analyzed three very large companies in different fields, and some of their strategies may be not be effective for other companies. For example, Sinopec is a state-owned company with a lot of money to research new technologies, and has many different subsidiaries to do different work. For companies which are very small or lack the resources to invest in research, this strategy will be worthless.

The strategies and lessons learned from these three companies each have constraints in their application, nevertheless they are worthwhile to understand and are good references for companies in similar environments.