

**Efficiency Improvements of Construction Processes: A Case Study with Hourigan**  
(Technical Paper)

**Cultural and Political Risks of International Construction Projects**  
(STS Paper)

**A Thesis Prospectus Submitted to the**

Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements of the Degree  
Bachelor of Science, School of Engineering

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Fall, 2020

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On my honor as a University Student, I have neither given nor received  
unauthorized aid on this assignment as defined by the Honor Guidelines  
for Thesis-Related Assignments

## **Introduction**

Globalization facilitates rapid economic growth by introducing foreign capital and technology into developing markets, helping the world GDP grow from around 50 trillion USD in 2000 to 75 trillion USD in 2016 (*New globalization report: Three mega-trends expected to impact our future* | UN DESA Department of Economic and Social Affairs). Although globalization creates more economic opportunities for society, there are obstacles to obtaining such benefits, especially in the construction industry. Domestic contractors are increasingly entering international markets for their high profit margins, but there are also risks with this activity. Such contractors are familiar with delays due to weather or shipment delays, but risks due to cultural and political differences are infrequently included in formal analysis (Chan & Tse, 2003). This sociotechnical project will apply risk analysis to cultural and political aspects of international construction projects. A more thorough consideration of cultural and political risks in international construction projects may reduce the risk of delays and contractual disagreements.

While the focus of international construction improvements relies on the consideration of broader societal factors, domestic construction companies can reduce and prevent construction delays by focusing on technical factors, such as data analytics. Large projects typically take 20% longer to finish than scheduled and are up to 80% over budget (Agarwal, Chandrasekaran, & Sridhar, 2019). A Virginia-based construction firm, Hourigan, has provided data from multiple medium-large size construction projects. Applying data analytics to the given data will allow for identification of which activities and change orders drove delays and cost overruns, analysis of impacts on specific subcontractors and interim milestones, and an understanding of where

projects went wrong, who was responsible, and how well the schedules were built. The final technical deliverable of meaningful analytics, concise visuals, and useful insight will help Hourigan manage, avoid, and overcome future challenges related to overruns, delays, and project risk issues.

### **Technical Topic: Efficiency Improvements of Construction Processes: A Case Study with Hourigan**

The pervasiveness of construction delays has meant that only “25% of [construction] projects came within 10% of their original deadlines in the past 3 years” (*KPMG’s 2015 Global Construction Survey 2015*). Not only do construction projects experience delays, but they also experience cost overruns; just “31% of all [construction] projects came within 10% of the budget in the past 3 years” (*KPMG’s 2015 Global Construction Survey 2015*). As problematic as delays and cost overruns appear to be in the present, there is potential for delays and cost overruns to become significantly worse in the future. Construction costs are on the rise with 44% of construction firms increasing construction prices due to labor shortages (Turmail, 2019). Costs are also expected to rise from increasing construction material costs (*Construction material prices increase steadily in June 2018*). Construction demands are also expected to increase due to an ever-growing population, with 1.6 million new housing units planned in the United States each year, an 8.1% increase from the prior year (*Monthly New Residential Construction, September 2020 - U.S. Census Bureau 2020*). With these increased costs and demands, delays and overruns will become even more problematic if they are not addressed now. The proposed capstone project will focus on analyzing data from multiple medium to large-size construction projects to manage, avoid, and overcome these future challenges.

The company sponsor for this project is Hourigan, a construction and development firm located in Richmond, Virginia. The capstone team, consisting of systems and civil engineering students, is acting as a client to Hourigan to provide scheduling analytics. Faculty advisors, Dr. Diana Duran and Dr. Arsalan Heydarian, will act as consultants to the capstone team. Hourigan has provided the capstone team with project schedules, plans, specifications, RFIs, and change orders for three construction projects. Plans and specifications will be used to gain a general understanding of each of the projects. The capstone team will then analyze the schedules using project scheduling software such as Primavera P6. The team will use delay analysis techniques to determine the activities that contributed to delays and overruns. RFIs and change orders will also be analyzed to make further connections of the activities that contribute to delays and overruns. This data will also help with understanding more specific impacts on subcontractors and interim milestones. The commonalities among delays between the three projects will help the capstone team provide data-driven recommendations to Hourigan. Alongside this analysis, the capstone team will continually conduct literature reviews relating to construction delays and overruns. The capstone team will provide Hourigan with monthly reports of the progress made analyzing project data. The final deliverable will consist of a comprehensive report to Hourigan with analytics, visuals, and insight outlining how well the schedules were built, where the trouble spots were, and how they can be improved in the future.

### **STS Topic: Cultural and Political Risks of International Construction Projects**

In a globalized world, more construction companies are looking towards global markets to expand their portfolios, with “international revenue of the top 225 contractors [growing] from \$106.5 billion in 2001 to \$453.02 in 2011” (Kadry, Osman, & Georgy, 2016). With increased

involvement of construction within international communities, there will be new uncertainties and risks that have not been encountered in domestic construction. An identified risk for international construction projects is a host country's political uncertainty (Maemura, Kim, & Ozawa, 2018). Political risk studies have been carried out since the 1980s, but these studies have not identified or addressed the root causes of political risks (Maemura, Kim, & Ozawa, 2018). Understanding the root causes of political risks will allow for better management of these risks. Less commonly identified in formal analysis are cultural issues, ranging from human problems such as language and communication, to the contextual environment of the region (Chan & Tse, 2003). The stakeholders involved in construction projects are primarily contractors, subcontractors, and suppliers of materials and components (Tijhuis & Fellows, 2011). As a project's size increases, complexities increase due to technical inclusions, more diverse stakeholders, and scale (Tijhuis & Fellows, 2011). Project complexities are especially difficult to manage within the context of international projects, where several parties of different nationalities need to avoid conflicts relating to laws, regulations, contracts, and jurisdictional problems (Gad & Shane, 2017). A deeper understanding of political and cultural risks will reduce project schedule delays and disruptions. One benefit of understanding of these nuances can help with the selection of a proper dispute-resolution method clause in a contract (Gad & Shane, 2017).

The STS theory that will be applied to this project is risk analysis. Risk analysis not only involves the identification of risks, but it also considers ramifications and solutions of such risks. Risk analysis is based on the concept of risk society coined by German sociologist Ulrich Beck. Risk society is defined as "a systematic way of dealing with hazards and insecurities induced and

introduced by modernization itself” (Beck & Ritter, 2013). A criticism of risk society is that the theory ‘totalizes’ risk, such that risk the center of contemporary life and therefore neglecting other important factors (Curran, 2016). Another critique is that some argue that risk society should be considered as a series of important social process in society rather than an “epoch distinct from all others” (Curran, 2016). Risk analysis will answer the research question based on the concept that “the less risks are publicly recognized, the more risks are produced” (Beck & Ritter, 2013). Although the risks involved with international construction are apparent, these risks are sparingly recognized on a formal basis. Risk analysis will be used to identify cultural and political risks while also considering ramifications and solutions. This research will not only help construction contractors with project schedules and contracts, but will also help engineers how to best manage and prevents issues that arise from differing perspectives.

### **Research Question and Methods**

Research question: How do political and cultural risks of international construction affect project schedules and contracts?

To answer this research question, Documentary Research and Historical Case Study methodologies will be used. The sources will be from Civil Engineering and Construction Management Journals, using the keywords “international construction,” “culture,” and “politics.” Background information will be provided on international construction markets, current methods domestic contractors utilize to enter international markets, and broad factors affecting international construction (Chen & Messner, 2011; Gunhan & Arditi, 2005; Tijhuis & Fellows, 2011). After initial background is provided, more specific cultural and political risks will be

addressed (Ashley & Bonner, 1987; Chan & Tse, 2003; Kadry, Osman, & Georgy, 2016). This documentary research will demonstrate the importance of considering cultural and political aspects international construction. Historical case studies will be used to demonstrate the ramifications of cultural and political risks. Case studies from Vietnam, Hong Kong, Egypt, and Nigeria will highlight construction delays and contractual conflicts due to culture and politics (Maemura, Kim, & Ozawa, 2018; Lo, Fung, & Tung, 2006; Abd El-Razek, Bassioni, & Mobarak, 2008; Aibinu, & Odeyinka, 2006). Finally, methods to reduce or prevent cultural and political risks, such as new dispute resolution methods in construction project clauses, will be introduced (Gad & Shane, 2017). This will demonstrate that there are ways to address political and cultural risks on a more formal basis.

## **Conclusion**

This proposal will investigate the cultural and political risks of international construction projects. Globalization has led domestic construction contractors to enter foreign markets with a greater frequency. This opens the door to new opportunities such as increased profits, but these opportunities come with new risks. Applying risk analysis to political and cultural risks will identify specific risks while also considering ramifications and solutions to them. This research will develop a better understanding of political and cultural risks of international construction will reduce conflicts, project schedule delays, and disruptions.

The proposed technical project will also analyze project schedules and data from three medium to large-size construction projects. This information is provided by Hourigan, a construction firm in Virginia. Project schedules will be analyzed using project scheduling software such as Primavera P6, while other information will be analyzed using methods acquired

from literature review. The final deliverable will be a report containing analytics, insight, and visuals that will provide Hourigan with knowledge on the efficacy of their schedules and areas for improvement.

### References

- Abd El-Razek, M. E., Bassioni, H. A., & Mobarak, A. M. (2008). Causes of Delay in Building Construction Projects in Egypt. *Journal of Construction Engineering and Management*, 134(11), 831–841. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2008\)134:11\(831\)](https://doi.org/10.1061/(ASCE)0733-9364(2008)134:11(831))
- Aibinu, A. A., & Odeyinka, H. A. (2006). Construction Delays and Their Causative Factors in Nigeria. *Journal of Construction Engineering and Management*, 132(7), 667–677. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2006\)132:7\(667\)](https://doi.org/10.1061/(ASCE)0733-9364(2006)132:7(667))
- Ashley, D. B., & Bonner, J. J. (1987). Political Risks in International Construction. *Journal of Construction Engineering and Management*, 113(3), 447–467. [https://doi.org/10.1061/\(ASCE\)0733-9364\(1987\)113:3\(447\)](https://doi.org/10.1061/(ASCE)0733-9364(1987)113:3(447))
- Agarwal, R., Chandrasekaran, S., & Sridhar, M. (2019, October 10). Imagining construction's digital future. Retrieved October 27, 2020, from <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/imagining-constructions-digital-future>
- Beck, U., & Ritter, M. (2013). *Risk society: Towards a new modernity*. London: Sage Publications.



- Chan, E. H. W., & Tse, R. Y. C. (2003). Cultural Considerations in International Construction Contracts. *Journal of Construction Engineering and Management*, 129(4), 375–381.  
[https://doi.org/10.1061/\(ASCE\)0733-9364\(2003\)129:4\(375\)](https://doi.org/10.1061/(ASCE)0733-9364(2003)129:4(375))
- Chen, C., & Messner, J. I. (2011). Permanent versus Mobile Entry Decisions in International Construction Markets: Influence of Home Country– and Firm-Related Factors. *Journal of Management in Engineering*, 27(1), 2–12. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000029](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000029)
- Construction material prices increase steadily in June. (2018, July 11). Retrieved 2020, from <https://www.bdcnetwork.com/construction-material-prices-increase-steadily-june>
- Curran, D. (2016). *Risk, Power, and Inequality in the 21st Century*. Basingstoke: Palgrave Macmillan.
- Gad, G. M., & Shane, J. S. (2017). Culture-Risk-Trust Model for Dispute-Resolution Method Selection in International Construction Contracts. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 9(4), 04517020.  
[https://doi.org/10.1061/\(ASCE\)LA.1943-4170.0000242](https://doi.org/10.1061/(ASCE)LA.1943-4170.0000242)
- Gad, G. M., Shane, J., & Strong, K. (2012). *Effect of Culture on Selection of Dispute Resolution Methods in International Contracts*. 909–918. [https://doi.org/10.1061/41109\(373\)91](https://doi.org/10.1061/41109(373)91)
- Gunhan, S., & Arditi, D. (2005). Factors Affecting International Construction. *Journal of Construction Engineering and Management*, 131(3), 273–282.  
[https://doi.org/10.1061/\(ASCE\)0733-9364\(2005\)131:3\(273\)](https://doi.org/10.1061/(ASCE)0733-9364(2005)131:3(273))

- Kadry, M., Osman, H., & Georgy, M. (2017). Causes of Construction Delays in Countries with High Geopolitical Risks. *Journal of Construction Engineering and Management*, 143(2), 04016095. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001222](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001222)
- KPMG's 2015 Global Construction Survey. (2015, March). Retrieved 2020, from <https://assets.kpmg/content/dam/kpmg/pdf/2015/04/global-construction-survey-2015.pdf>
- Lo, T. Y., Fung, I. W., & Tung, K. C. (2006). Construction Delays in Hong Kong Civil Engineering Projects. *Journal of Construction Engineering and Management*, 132(6), 636–649. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2006\)132:6\(636\)](https://doi.org/10.1061/(ASCE)0733-9364(2006)132:6(636))
- Maemura, Y., Kim, E., & Ozawa, K. (2018). Root Causes of Recurring Contractual Conflicts in International Construction Projects: Five Case Studies from Vietnam. *Journal of Construction Engineering and Management*, 144(8), 05018008. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001523](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001523)
- Monthly New Residential Construction, September 2020 - U.S. Census Bureau. (2020, October 20). Retrieved 2020, from <https://www.census.gov/construction/nrc/pdf/newresconst.pdf>
- New globalization report: Three mega-trends expected to impact our future | UN DESA Department of Economic and Social Affairs. (n.d.). Retrieved October 27, 2020, from <https://www.un.org/development/desa/en/news/intergovernmental-coordination/new-globalization-report.html>
- Tijhuis, W., & Fellows, R. (2011). *Culture in International Construction*. CRC Press LLC. <http://ebookcentral.proquest.com/lib/uva/detail.action?docID=738695>
- Turmail, B. (2019, August 27). Eighty Percent of Contractors Report Difficulty Finding Qualified Craft Workers to Hire as Firms Give Low Marks to Quality of New Worker

Pipeline. Retrieved 2020, from <https://www.agc.org/news/2019/08/27/eighty-percent-contractors-report-difficulty-finding-qualified-craft-workers-hire-0>