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GLOBALIZATION AND CONSTRUCTION ENGINEERING MANAGEMENT EDUCATION

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Globalization is the study of dramatic global changes and their consequences in different fields of economy, technology and communications during the past two to three decades. Similar to other industry sectors or professional practices, globalization has enabled the construction industry to take advantage of cross-border markets and benefit from the opportunities that the globalized economy has provided. Advances in transportation, data sharing and communication have given construction professionals and the labor force unprecedented access to markets that were previously insulated. As the political borders have turned to be increasingly irrelevant and the national economies have become more interdependent, the socio-cultural differences are hence accentuated and further exposed due to historically-existing dissimilarities in societal cultures and business norms. In this paper, the main goal is to understand the globalization and its implications for the world economy specifically focusing on the construction industry. This paper studies the impacts of globalization in construction engineering and management profession and further investigates on the opportunities and threats that a globalized economy and more-synchronized business practices will bring for industry and how Construction Engineering educators shall successfully address those unprecedented issues in teaching Construction Engineering Management courses to the next generation of the industry leaders.

Keywords: Global mindset, Cross-cultural project management, Stakeholder diversity, Training, Academic, International markets.

1 INTRODUCTION

In the past decades, the global construction industry has grown rapidly as the demand for residential and commercial construction as well as civil infrastructure systems has grown considerably. The demand for construction output is projected to hit record highs by 2021 with an output of US$10.1 Trillion (Timetric 2017). Much of this is made possible through globalization in the construction industry. As the desire for bigger cities increases in developing countries, but limitations of resources such as knowledge, labor force, and materials become a challenge, well-established companies in developed countries seek to capitalize on these opportunities. Yet, the risk has grown parallel to the output as companies face new challenges in the international construction industry.

This research focuses on the changes in construction industry over time due to the global influences as well as the impacts and consequences that it brings. It looks into the role of the Construction Engineering and Management academic curricula to better educate and prepare students for new future challenges that they will face in foreign markets.

The global market in the construction industry outside of the United States has opened up a wider network of opportunities for companies from different countries who have gained advantages in revenues and the new market exposure. However, projects carried out in the United States have experienced much smaller effects of globalization than that of projects carried out in foreign markets.

With its geographical location and strict foreign work and investment policies, domestic companies - many of which are multi-national - carry much of the construction work in the US. However, as more opportunities open in foreign markets, companies from United States have been motivated to participate and offer their services abroad. The lack of awareness and experience in dealing with multicultural work force puts many entry-level or mid-career US construction engineering professionals at higher risk and uncertainty when dealing with large and complex projects carried out in other countries. In an ever-changing industry, future engineering graduates who specialize in construction management face more challenges ahead compared to their peers of the past.

This can also be attributed to the fact that much of the academic curricula in construction engineering and management in the universities and institutions across the US focuses mainly on technical aspects and issues that are seen at a domestic scale. While these are very important fundamentals to understand so that the students are prepared when entering the workforce, such curriculum designs disregard many of the challenges that engineering students will face in foreign markets through their career journeys.

2 GLOBALIZATION AND THE ACADEMIC EDUCATION

Globalization requires a proper education for humanity to understand its ideologies. As it involves social evolution on a worldwide level, collective cooperation is a necessity, and therefore the weight of education becomes most apparent (Schneider and Barsoux 2003). Local or national market boundaries no longer restrain the construction projects; supply and demand flows through a larger, singular market where any of the parts and pieces - ranging from bricks and mortar to human capital and design concepts - can come from corners of the world and used to build a project in other places.

The extensive construction projects that followed the advent of modern construction materials formed the background of what emerged as modern construction industry. Most building construction remained in the hands of small and medium-sized local contractors. However, civil engineering projects required much larger scale operations and, hence, formed a launching pad for international construction (Ngowi *et al.* 2005). In construction industry, the essence of the market focus and position is targeting the right business at the right moment in the right market. The industry's leading players have bolstered their competitiveness by securing strategic positions in high-growth emerging markets such as Brazil, Russia, India, China and South Africa (commonly referred to as BRICS countries), taking advantage of domestic infrastructure opportunities while securing lucrative contracts overseas.

In global construction market, financial success in project delivery is sought by securing global competitiveness, diversifying revenue sources and project portfolios. The volume of international contracts has contributed to firms' sustained growth by mitigating the impact of the domestic market's cyclical nature. Reduction in the influence of market's cyclical nature ensured a level of financial stability for multi-national construction firms through increased global activities (Low and Lim 2000, You and Zi 2007). For construction industry, globalization has been a trend of augmented exposure to the opportunities and competition in international markets (Toor and Ofori 2008). The larger contractors in the United States, for example, must compete

alike against the multi-billion-dollar Engineering-Procurement-Construction firms worldwide. This competition, however, directly and adversely affects mid-sized and smaller, local firms which do not have the means, methods or logistics refuse to adjust towards the ever-growing opportunities in international market (NRC 2009, Scholte 2005, Tomlinson 1999, Gunhan and Arditi 2005).

International construction can be riskier than domestic construction because of difficulties in communication management, understanding new cultures and obtaining market wisdom, avoiding local politics, as well as supervising a diverse group of professionals. According to Abdul-Aziz (1994), in a study of nine large US and Japanese construction companies, it was concluded that long-term profitability and balance of growth are the two prime concerns for going global. Moreover, technological advantages, sophisticated management systems for scope, cost, schedule, quality, risk and procurement for construction projects are among the main factors for success of a construction company in international markets. In order to enter new markets, construction companies must assign a much higher importance on client relationship management within their organizations vis-à-vis the culture and business norms of the country in which they are seeking to bid on a new project.

2.1 The Global Mindset

The Global Construction Perspectives and Oxford Economics Report (2009) predicts that construction in emerging markets, including Asia, Latin America, the Middle East and North Africa account for approximately 55% of global construction output. In such increased demand for new construction in these markets, the US companies will face a fierce competition with new players from other economic giants such as China and India. This demand will prepare the next generation of the US construction engineering and management professionals with a "Global Mindset".

In today's fast-pacing global construction industry, the barriers to global trade have been reduced significantly which enables capital, materials, labor, and technology to flow freely across borders. However, globalization has considerably increased the complexity of the engineering and construction business environment: Increased project demand and new funding mechanisms drive the stakeholders to diversify and seek mergers in newly-developed international markets to gain further and uninterrupted access to new opportunities.

To compete in today's uncertain, dynamic and interactive business environment, design and construction companies, domestic and foreign alike, need to focus on key trends that shape their external operating environment. New generation of construction project managers must be equipped with technical competencies and soft skills to anticipate and precisely observe and act upon emerging trends to find market opportunities, test the inherent risks and seize on new opportunities. In a world of rapidly changing of resources, competition and customer demands, the successful future leaders are the ones who look beyond traditional performance standards and the short-term thinking to explore, shape and implement inclusive multi-cultural financial strategies to address the complex sets of project stakeholders' needs.

2.2 Globalization and Construction Education Challenges

According to Han *et al.* (2010), these are the critical changes that have challenged the global construction engineering and management industry: (1) competition paradigm has been shifting from conventional price competition to a more complex competitive framework where intangible factors are gaining more traction; (2) the steady rise of private investment schemes and the growing size of projects requires a more comprehensive scope management in planning,

executing and monitoring the construction projects; (3) financing capability plays a key role in acquiring more opportunities in the international construction market as more international construction projects require newer financing arrangements; (4) price fluctuations and unpredictable increased costs of materials, equipment and labor in emerging markets that result in more complicated risk factors stemming from economic instability and cross-cultural business deal making.

International construction can be riskier than domestic construction. Increased project delays, scope or budget overruns may be resulted by managing projects in an unfamiliar business environment and/or operating and complying with different sets of regulations, business norms, and cognitive-cultural beliefs of the diverse project stakeholders.

The main challenge in front of the construction engineering and management programs in the globalized economy is to train the next generation of industry leaders and project management professionals to be creative thinkers and problem solvers. These professionals shall possess all or as many as of the following attributes: (a) technically competent in their field of expertise with a broader knowledge of the global economy, opportunities and threats in international markets; (b) lifetime learners of cross-cultural communication skills; (c) interdisciplinary problem solvers in managing broader and more diverse project stakeholders; (e) comfortable in managing projects with high levels of risk and uncertainty; (f) creative global mindset to identify and research on market capabilities for future business development purposes.

3 TRAINING THE NEXT GENERATION OF CONSTRUCTION ENGINEERING AND MANAGEMENT PROFESSIONALS AS GLOBAL COLLABORATORS

In order to adapt to emerging global trends and surviving the highly dynamic future markets, the construction engineering and management firms need to hire, train and retain the next generation of project management professionals who will be advancing the industry and sustaining the long-term profits of the firm through incorporating the following strategies: (1) developing a comprehensive understanding of financing structuring options for managing construction projects in global scale; (2) practicing niche marketing by identifying and focusing on prosperous international target markets; (3) collaborating with various multi-background stakeholders of complex international projects; (4) adapting to changing social environment and platforms; (5) enhancing the comprehensiveness of the Engineering-Procurement-Construction (EPC) services of the firm in undertaking global construction projects; (6) investing in new technologies, skill-sets and expertise; (7) incorporating human resources practices to train next generation of the industry leaders with globalization mindset for the future of the firm.

As new competitors enter the scene of domestic and international competition in construction, industry, the local and global engineering, design, and construction companies must response with new business solutions to target greater involvement of clients and reassessing their risk. Emphasis on greater efficiency and innovation, in particular, will ensure that a larger number of stakeholders can rise to the challenge of the new competitive fields both at home and abroad. Today's successful industry firms are providing professional services through incorporating human resources practices that understand the importance of hiring the best professionals with risk management capabilities, market knowledge and a deep understanding of cross-cultural client management especially when performing under pressure and tight deadlines in international markets.

3.1 Best Practices in Achieving Cross-Cultural Leadership Potential Realization

As the global engineering, procurement and construction (EPC) firms would be implementing newer and more holistic strategies to be more prepared to face the business challenges of globalization, acquiring and retaining the next generation of industry professionals with global mindset will play a vital key role.

Here are a few best practices for design and construction firms in achieving cross-cultural leadership potential realization that focuses on high-skilled global multi-background workforce and engineering teams.

3.1.1 *View competitors as potential collaborators*

In a globalized competition to win and deliver on more complex construction projects in international markets, both larger and smaller design and construction firms can work together towards successful project planning, executing and delivery.

Larger companies usually bring large-scale capabilities, financial resources, higher-end technologies or knowledgeable staff to the project, while smaller companies may offer a particular specialized staff or a niche set of expertise to an international project in which a larger firm may be interested.

3.1.2 *Understand the cost and risk barriers to entry*

A comprehensive risk management plan and sophisticated financial structuring strategies are among the main considerations for construction firms in doing business in international markets. The cost of entering international markets is usually much higher for construction firms as it requires detailed strategic planning, highly-skilled professional workforce with global mindset and new technologies to benefit from economies of scale in executing overseas projects. Therefore, risk management becomes a major factor in strategic and future planning.

Allocating the intricacies of risk usually present a new ground for contractors to cover when doing business outside of traditional borders.

Public Private Partnership (PPP) Projects specifically can be very challenging and often bring greater risk in terms of longer terms, larger scale of liability and increased vulnerability to the changes in external dynamics as the project progresses.

3.1.3 *Communicate and innovate to create new adaptation strategies*

In today's dynamic global business market, almost all international engineering and construction jobs are noticeably complex and collaborative. The project engineering teams are more diverse, and seldom can an engineering project be run in an isolated and closed manner.

Newly introduced technologies and increasingly sophisticated demands of various project stakeholders are pushing construction and design professionals to work in multi-background diverse project teams that consist of people from different cultures, ethnicities and religions. Therefore, managing communications among multitude of project stakeholders is a key factor towards successful project delivery. This important goal may be achieved, as more companies will be hiring, training and retaining construction professionals with a global mindset in order to build reliable networks to work in innovative ways.

4 CONCLUSIONS

The construction engineering and management curricula need to be accordingly adjusted to incorporate the effects of globalization in construction engineering industry. This will certainly

include increased focus on interdisciplinary subjects such as (but not limited to): ethical and cultural awareness, cross-cultural business deal-making, international market strategies, integrated project management in foreign markets, multi-cultural stakeholder management, knowledge of negotiation techniques, developing leadership and inter-personal skills and learning one or more foreign (i.e., non-English) languages.

The construction engineering education in the era of globalized economies has to be conducted with a global mindset. The next generation of construction project managers need to be trained through a globalized education in their field of expertise to successfully master essential attributes and the problem-solving skills to meet the demands of the evolving global markets facing challenges of sustainability and green energy alternatives, increased global population, moral and environmental awareness and the global climate change issues. US universities may achieve such goals not only by revisiting and modifying their current construction engineering and management curricula but also through establishing academic collaborations with international counterparts in the form of faculty exchange and/or student exchange programs. Moreover, inclusion of international internship or co-op opportunities within the construction engineering curricula, across the nation, can serve the students who are seeking to acquire cross-cultural awareness experience in starting their careers to be better prepared for future challenges.

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