



Megaprojects in Developing Countries and their Challenges

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Abstract—Megaprojects management have their challenges in many areas from the planning to operating phase, the internal and external factors can be affected to the project success and failure. In developing countries megaprojects had been facing with many challenges that influence to megaprojects failed and the poor quality of megaprojects, thus, those issue can be a major challenge for those low-income countries in term of dealing megaprojects management. Social, economics, technology, organization and other external environments factors in developing countries didn't support the running successful megaprojects and project governance mechanism cannot achieve the project objectives, due to those countries have been lacking of many basic facilities for driving the megaprojects success. This research aims to identify the major challenges of megaprojects in both developed and developing countries thorough review of academic journals related to megaprojects and construction project management studies with the comparing the differences of those challenges. In addition, this research aims to develop a conceptual framework for megaprojects challenges and megaproject needs in developing countries. The results of this study provided the potential information, characteristics of megaprojects, project management issues and context of the megaprojects management studies in developing countries. Moreover, it identified main challenges of megaprojects from different perspective that can be contributed the knowledge of megaprojects, particular the study can support the future research of megaproject in developing countries.

Keywords—Megaprojects, developing countries, major challenges, internal and external factors, conceptual framework.

I. INTRODUCTION

Megaprojects are characterized by size, duration, uncertainty, ambiguity, complex interfaces, integration, significant political and external influences [20], besides that characteristics their complexity had delivered through several of partnerships between public and private organizations [5]. Mega construction projects MCPs require high design knowledge and technical skills, competent human resources and managerial capabilities as well as high cost of investment [30, 69]. The growth of construction industry in can be support the infrastructure and urban development, in developing countries, megaprojects or major projects have considered as contrasted with the country's gross national product, they have an impact on the country's economy and the advancement of transition. Due to their substantial cost, direct and indirect impact on the community, environment, and budgets and attract high levels of public attention and political interest [76], therefore,

megaprojects or major projects are normally owned by governments and executed by large construction firms and normally commissioned by governmental authorities and delivered by multi-skilled national and international participants [66]. Therefore to avoid the "white elephant" projects [42], governments in developing countries have to concern with developing MCPs as an approach for achieving sustainable development objectives and project success in the governance issues [61, 80].

Researches on megaproject in developed countries tend to focus on their failures, problems, complexity, cost overruns, delays, stakeholder conflicts, alternatives, ambiguities schedules and governance [5, 28, 29, 60, 51]. However, there are great benefits from the associated with project development and implementation processes that are rarely discussed. Many areas of megaprojects management remain largely uncharted such challenges and solutions of their delivery in developing countries as engineering, human development, managerial, political and sustainability challenges [15]. Moreover, the poor quality and inadequacy of infrastructure projects become one of the major challenges for infrastructure development [47] because in developing countries have a shortage in many of requirements which obstruct the successful of megaprojects.

This research aims to identify validate and classify challenges of MCPs in a developing countries thorough review of the literature with related journals on megaprojects research and construction management studies. In addition, this research aims to develop a conceptual framework of megaprojects challenges in developing countries and identify the causal relationships between those challenges.

II. MEGAPROJECTS IN DEVELOPING COUNTRIES

Megaprojects in developing countries such as Panama Canal Expansion in Panama [4], Hyderabad Metro Rail in India [21], Suvarnabhumi Airport in Thailand [64], Suramadu Bridge of Indonesia [71], Kuala Lumpur International Airport (KLIA) Project of Malaysia [73], 2010 FIFA World Cup Stadium in Durban of South Africa [72], Toshka Project of Egypt Marmaray Project of Istanbul [36] and other developing countries still at an immature stage although the general awareness of the concept seems to permeate within various industries [68]. Organization and project management contexts in government institutions of developing countries [62, 38] have experience challenges in project management practices because many organizations are still not committed to project organization. In Ghana, [54] argues that on senior management commitment, competency and coordination in order to improve the quality of project

management, while in Nigeria, [57] identified a lack of in-depth knowledge of project management in public organizations amongst other factors affecting project management practice and [62] mentioned that most public organizations in non-industrialized countries.

Project management is an effective approach for developing countries to use in improving their management capabilities and facilitate, the communal culture of the local context resulted in community members feeling pressurized to participate in hazardous construction activities. Local customary laws further compelled individuals as they were concerned they could be fined or arrested should they not fulfill their communal obligations [6]. However, it's still a lack of knowledge of project management techniques and tools, and insufficient time spent on reporting and controlling in a certain context [1]. In developing countries, Project managers, and indeed managers in general, work in different context and face a different set of issues from those in industrialized countries [14].

On the other hand, project governance in developing countries contains a set of the management system, regulation, relationship, structure, framework which to provide decision supporting in order to realize the expected goal [19]. In many developing countries, the government launches the megaproject governance through Public-Private Partnership (PPP) model [34, 79]. Over the past decade, PPP has been in use for helping developing countries to improve their infrastructure stock to achieve their economic goals as well as loans and grants by institutions. Study of PPPs in the Southern Africa region, [27] provided evidence that PPP has demonstrated viability in transport corridors with clear and understandable economic benefits, tends to treat Privatization and PPP as two separate forms of infrastructure provisions, one good differentiating factor between the two is the presence of a regime of state price regulation [40]. And leverages private funding and the strengths of private entrepreneurship and management, for the maximum provision of public services [26].

However, lack of consensus among policymakers, lack of political instability and lack of understanding of the PPP concept can affect high participation costs [2]. [43] emphasize that a broader political construct is required to further support this investment focus, risk of a PPP project comes from the complexity of financing, taxation, law regulatory, acquired technical documentation and construction process involved in a major infrastructure venture [59, 67] state that in general idea of risk management process frame (model) is identify all main risks and to calculate time and cost contingency of the project.

III. THE CHALLENGES OF MEGAPROJECTS IN DEVELOPING COUNTRIES

In many developing countries, megaprojects are multicultural projects different designers, contractors, subcontractors, and suppliers from all over the world work together to achieve excellence, but dealing with megaprojects bring many challenges on how all these people from different background, different laws, policies, legislations and ways of work can achieve harmony and finalize the projects within value

and time [50]. Main challenges affecting MCPs included finance, skills shortage, enabling environment and competition, cost and time over-runs, delays and quality [11, 13, 45, 49, 55, 63, 70]. Besides, challenges of technical, financial, social, political, modern materials, equipment, and technologies challenges regarding project management [3, 39]. Additional, [52] mentioned five major factors challenges such as 1). Incompetent designers/contractors, 2). poor estimation and change management, 3). Social and technological issues, 4). site related issues, and 5). Improper techniques and tools.

Study on the challenges of megaproject and large infrastructure project in developing countries such as Turkey [12], Nigeria [49], Saudi Arabia [13], Thailand [56], Malaysia [48], India [3] and Jordan [8, 53]. Conversely, developing countries experience shortage of many of these requirements, which obstruct the development of MCPs, the major problems faced in developing countries have been classified as: 1). problems imposed by the industry's infrastructure, 2). problems of inaccurate information and frequent changes in instructions and failure to meet obligations on the part of clients and consultants, and 3). problems imposed by their own shortcomings [56]. Moreover, [58] identified 45 challenges and developed a conceptual model to overcome the challenges of MCPs development in developing countries [16].

A. Corruption

Corruption in construction project and megaprojects are very serious [32, 78], particularly in developing countries, such as South Africa, Nigeria, Pakistan, and India [9, 10, 22, 23, 25]. Bureaucracy and corruption practices [7, 31] had been discussed, corruption in the infrastructure construction sector occurs in all stages from securing government contracts to the delivery of infrastructure. Developing countries facing a greater challenge in preventing corruption owing to the lack of sufficient legislative and institutional support [55] and corrupt context on megaprojects [32]. Major impacts of corruption in infrastructure can lead to poor construction, limited occupational safety and low returns to government infrastructure investments [44], there are a number of causes of corruption in infrastructure construction, including the lack of transparency and competitiveness in bid processes, the discretionary power of individual bureaucrats involved in the award of contracts, inadequate financial and physical auditing, and inadequate capacity of regulatory bodies to enforce regulations [43, 44].

B. Megaprojects financing

To build a megaproject in developing countries, governments should spend high investment cost for drive project success, lacking financial supporting can be directly affected to MCPs and cause many challenges [55], megaproject financing can be effect to the country's economy and the advancement of transition [76]. In developing countries, the high cost of financing [17] must be getting loans from financial organizations and there are many factors identified in financial effect [12]. In the same way, [7, 31, 41] mentioned to the challenges of financial issues in megaprojects, such lack of financial resources, cost control, venture capital and financial regarding project management practice [3, 39].

C. *Lacking project technical and technology*

Challenges of technical and technologies regarding project management failed [39], many developing countries still lacking of high technology, specific technical and knowledges on megaproject management, they facing with many technical issues in project management process such on lack of design knowledge and experience related to MCPs, missing the professional expertise and full consideration of technical requirements [31], lack of in-depth knowledge of project management and challenges skills shortage[55, 57]. To deal with megaprojects and drive a successful megaproject, high technology is the main tool to get the project going on and there is an inappropriate level of scientific, technological knowledge and application required [41].

D. *Contractors challenges*

Problems caused by contractors in megaprojects have regarding to finishing construction megaprojects, in developing countries, many construction companies and contractors have lacking experience, poor management and supervision, equipment failures or allocation problems, inadequate labor skills, project manager lacking planning and scheduling [48], inaccurate estimation, and poor contract management [53] and[56] confirmed that construction industry problems of shortages or inadequacies, problems caused by clients and consultants, and problems caused by contractor's incompetence inadequacies. Moreover, [52] mentioned five major factors challenges of contractors such as 1). in competent designers/contractors, 2). poor estimation and change management, 3). social and technological issues, 4). site related issues, and 5). improper techniques and tools.

E. *Social and culture affecting*

Social and culture have indirectly effect to the managing of megaprojects. However, in developing countries, lack of managing social and cultural factor cannot drive complexity project management fluently in project management practice [15, 24, 33] and dealing with problems of cultural complexity is through a managed process of sense-making. The complexity organization on a personal level trust is another mechanism often used to reduce complexity challenges of social and cultural challenges regarding project management [3, 39]. It is important to recognize that the cultures of the people in the developing countries have not yet reached the degree of sophistication existing in the west with a variety of cultural differences and backgrounds [66]. Cultural factors play a role which does not allow for the practice of managerial skills and the positive environment it impossible for makes the best indigenous project manager operate effectively. Since culture and environment have a rich and varied interrelationship with one another, almost certainly [50].

F. *Project management knowledge challenges*

In developing countries, such as Russia, India, Turkey, and Vietnam, remains weak or lacking experience to deal with megaproject complexity in organization and stakeholder management including project planning, procurement, monitoring and control phase [77]. Many big projects had lack in managing complexities of work content and work processes in the project, lack of strategic project planning and ineffective

leadership [37], leadership problems [7] cannot drive projects into the right objective. Ineffective project management and poor use of experience, competency of client and contractor organizations[37] and weak project governance [35, 37], lack of quality front-end planning, improper decision-making and overlooking specialists and stakeholder's consultation during the decision-making process [41, 75] until lack of efficiency at all levels and poor coordination interface management. Moreover, between project stakeholders [75]are still facing in term of project management knowledge and effectiveness of the project management process [35].

G. *Challenges of project resources*

Two main resources in a construction project are human and materials resources. However, in developing countries difficulty resourcing of the right skills are not matching with project demands [18], many construction project delays in developing countries causes of lacking of resources, poor contractor management, shortage of labor, design delays, planning and scheduling deficiencies [65], lack of construction material availability, material shortage or late delivery, labor shortage to drive construction projects success [53, 74]. On the other hand, workers or labor has not meet the standard of project staff [37]such as lack of providing and managing high-qualified human resources, lack of available on-site skilled workers or local labor forces[18, 31, 46].

H. *External environment challenges*

An external environment such inconsistent policies and slow government permits of developing countries [53] can be the negative effect of constructing megaprojects for success and difficult to make good project governance. [56] had mentioned on external problem effect to the project such as 1). problems imposed by the industry's infrastructure, 2). problems of inaccurate information and frequent changes in instructions and failure to meet obligations on the part of clients and consultants, and 3). Problems imposed by their own shortcomings. Moreover, [55] had argued on the lack of considering environmental requirements, preserving historical sites, and natural reserve enabling environment and competition.

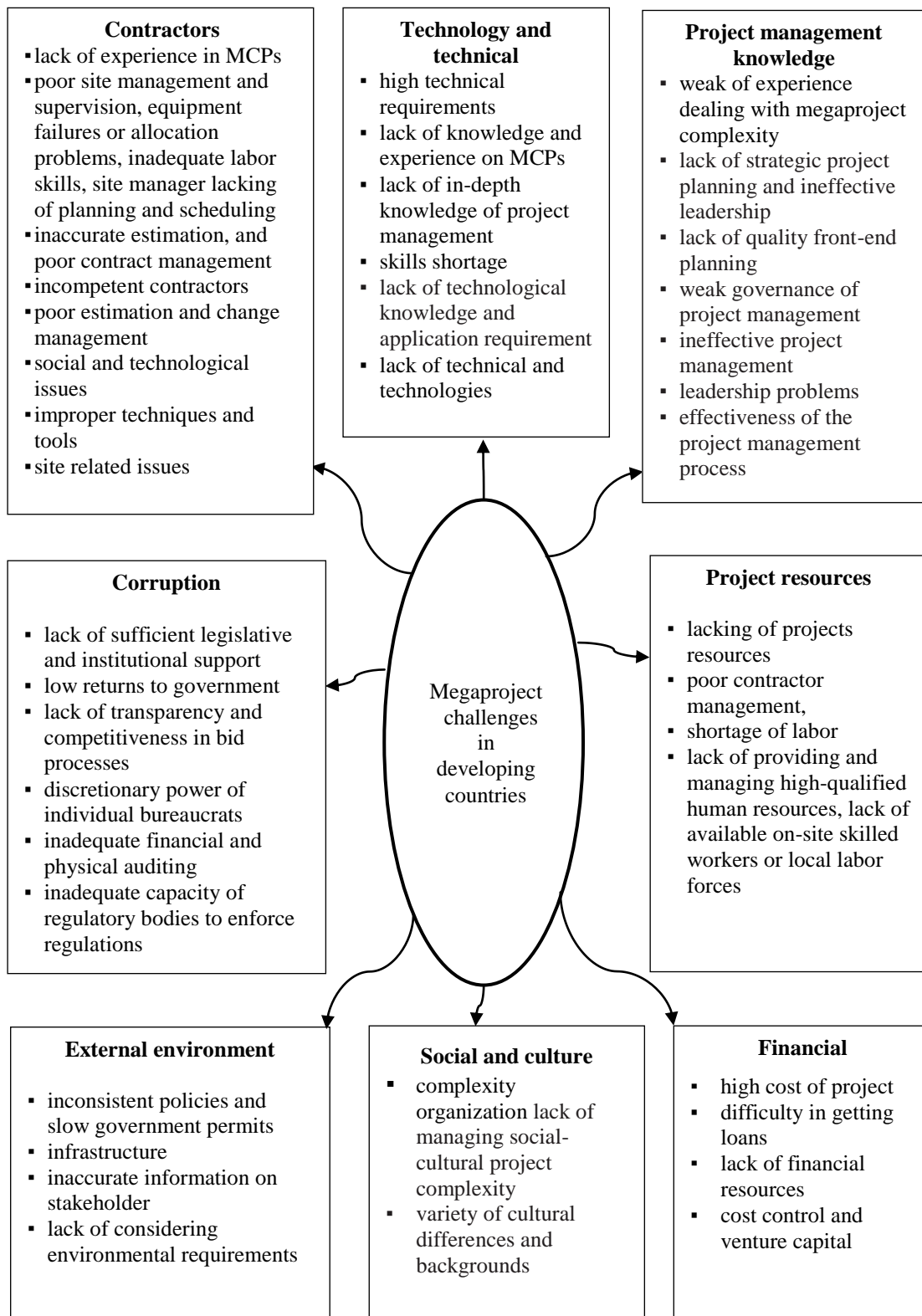


Fig.1 New conceptual framework for megaproject challenges in developing countries

TABLE I. THE DIFFERENCES BETWEEN MEGAPROJECTS CHALLENGES IN DEVELOPED AND DEVELOPING COUNTRIES

Megaprojects in developed countries	Megaprojects in developing countries
<ul style="list-style-type: none"> • <i>Complexity</i>, [5, 81, 83, 84, 85, 87] • <i>Planning</i>, [28, 29, 60, 86, 87] • <i>Organization</i>, [51, 82, 88, 89] • <i>External environment</i>, [55, 56] • <i>Cost overran</i>, [29, 90] 	<ul style="list-style-type: none"> • <i>Corruption</i>, [32, 78, 9, 10, 22, 23, 25, 7, 31, 55, 43, 44] • <i>Financing</i>, [55, 76, 17, 12, 7, 31, 41, 3, 39] • <i>Technical and technology</i>, [39, 31, 55, 57, 41] • <i>Contractors</i>, [48, 53, 56, 52] • <i>Social and culture</i>, [15, 24, 53, 3, 39, 66, 50] • <i>PM knowledges and skills</i>, [77, 37, 7, 35, 41, 75] • <i>Resources</i>, [18, 65, 53, 74, 37, 31, 46] • <i>External environment</i>, [53, 56, 55]

CONCLUSION

This research aims to identify, the major challenges of megaprojects in developing countries through review of the literature with journals related to megaprojects and construction management studies. Firstly, introduce the megaprojects and in developing countries, secondly, identify their characteristics in including its organization, management practice and context of developing countries on megaprojects, thirdly investigate the megaprojects challenges through different view of academic publication, finally this research had compared the main challenging of megaprojects between developed and developing countries and conduct with developing a conceptual framework with identify the causal relationships between those challenges.

The results as a framework can be contributed to project management studies, particular megaprojects in developing countries and its clarification of different megaprojects perspective. This research had provided the ground for further studies on megaprojects in developing countries and its direction in order to the investigation on what developing countries characteristics in term of dealing with megaprojects. Further research is needed to investigate the megaprojects challenges in different perspectives, can exist and thrive throughout an organization and under what conditions, even though the main organization's governance orientation may be different. Moreover, future research should investigate the impact of the megaprojects in developing countries through the case study in those low-income countries to find what megaprojects really needs and how it can be affected to the social and economic development.

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