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# Risk management of large-scale development projects in developing countries: Cases from MDI's projects

## **ABSTRACT**

*The aim of this article is to develop a risk management system to be used for large-scale development projects in developing countries. Such a system can help project managers of this type of projects to gear their projects to different risk environments. Due to high level of risk associated with large-scale development projects, the traditional risk management approach, which assumes that risk can be predicted and budgeted early on, is not adequate for application in the context of these projects. Each large-scale project has a high level of uniqueness that renders benchmarks from databases generated out of previous projects obsolete. Therefore, a reactive risk management approach is being promoted. The formulated system defines the key milestones, at which risk needs to be assessed and proper reactions identified. This system is investigated in the context of developing countries where investments in general are characterized by a high level of risk.*

## **KEYWORDS**

risk management  
large-scale projects  
project management  
development  
management  
Stage–Gate

## INTRODUCTION

The last two decades saw the 'development sector' booming worldwide, especially in developing countries that are rich in natural resources. This boom increased the pressure on governments to develop large-scale urban projects that can accommodate the newly emerging developments. Due to lack of necessary expertise and financing, governments in most developing countries found partnership with the private sector to be the way forward for developing these projects and having them delivered in time (Koppenjan and Enserink 2009).

The concept of 'large-scale project' is variously understood. Some, for example, consider 'cost' to be the principal indicator of the project's scale (Ver-veniotis 2008). Others define large-scale projects as the projects that have a social, economic and ecological impact (Alastair et al. 2005). For the purpose of this article, the latter definition is considered more appropriate than the former in view of the fact that variation of economic conditions across countries and over time would make the use of 'development cost' as a basis for definition unreliable.

Large-scale projects require a wide range of expertise that is rarely found within the developer's team, especially in developing countries, for at least three reasons. First, recruiting high calibre professionals from different disciplines is a time-consuming exercise, if not too difficult a task to deliver. Second, managing those professionals to come up with a coherent project that meets the desired key performance indicators (KPIs) requires an extensive experience in the domain, which is a criterion that not all developers satisfy. Third, formulating a team of this calibre will substantially increase the overhead of the developer unless this team is in charge of multiple projects of similar nature. This might not be feasible, however, as every project requires a large amount of investment. Hence, developers rarely invest in more than one project of this size at a time. Therefore, there is a need for a 'development manager' who is able to provide this large spectrum of expertise and is able to manage large-scale development projects.

Millennium Development International (MDI) is a leading company in the field of development management. Despite the fact that its work is focused on the Middle East, lately its area of operation extended to Kazakhstan and Malaysia. Established in 1999, MDI is known to be one of the first companies in the Middle East to provide this service. During the ten-year period of its existence, MDI has provided development management services for many prestigious projects in this region. Despite the fact that MDI has set a highly sophisticated management approach, this approach does not include specific guidelines for the management of risks that the large-scale projects might face. Analysing the projects that were accomplished during the last ten years for the purpose of revealing best practices in risk management and in developing a risk management system will help in guiding project managers and enhancing their efficiency when facing risks in the execution of large-scale projects.

## LITERATURE REVIEW

This section explores the types of risks faced by large-scale projects, the risk management approach to be followed and the Stage-Gate system that is found to be beneficial in the context of projects under discussion.

### ***Types of risks in large-scale development projects***

As risk identification is the initial step in risk management, understanding risks and their categories is essential to come up with an effective risk management system. Therefore, a comprehensive list of risks was formulated based on the review of literature. As no references were found on risks related to the whole process of development management, literature focusing on the construction part of development was mainly investigated. Other complementary aspects of the relevant literature, namely, sustainability and private–public partnership, were investigated in order to prepare a comprehensive list of risks that are related to the type of projects under discussion. Sustainability was investigated since it is the most comprehensive theme of urban planning nowadays. It discusses mainly the impact of urban projects on their social, economic and ecological environments. Furthermore, as most large-scale development projects usually take place in some kind of partnership between the private and the public sectors, the literature relating to this type of partnership was also investigated.

The identified list was organized along the three identified risk levels that were found to be applicable to the context of large-scale development projects, namely, project environment, external environment and institutional arrangement. However, little was found on how to mitigate these risks.

Risks at the level of project environment include market, financial, technological, management, technical and operational risks (Datta and Mukherjee 2001; Dey 2009; Gil 2009; Perera, Dhanasinghe and Rameezdeen 2009; Siebert 1987). Risks at the level of the external environment include political, social, environmental and economic risks (Datta and Mukherjee 2001; Dey 2009; Gil 2009; Lehtonen 2004; Perera, Dhanasinghe and Rameezdeen 2009; Senge and Carstedt 2001; Senge et al. 2007; Siebert 1987). Risks at the level of institutional arrangement include opposition to project; the multidisciplinary nature of projects under discussion; political conflicts; administrative bottlenecks that constrain approvals that would facilitate project development and implementation; and over-optimism of involved politicians with respect to effectiveness of projects (Koppenjan and Enserink 2009; Sagalyn 2007; Vanmarrewijk et al. 2008). Elaboration on risk categories that were found to be relevant to the case studies will be provided under the section **Findings: The risk management system**.

### ***Approaches of risk management***

The review of the literature shows the classic approach of risk management to be inappropriate for application to large-scale projects (Charette 1996; Pavlak 2004; Pitsis et al. 2007). For example, statistics on defence contracts in the United States showed that 70% of these contracts faced troubles that were not foreseen during the course of implementation despite the adoption of the most advanced techniques of project management (Pavlak 2004). The classical approach of risk management focuses on using databases of previous projects in order to predict potential risks. Based on that, an action plan is established to overcome these risks and a contingency budget is accordingly allocated. While this can be true for small-scale projects with limited number of parameters, it does not apply to large-scale ones. Large-scale projects are complex, with a high level of unpredictability and uniqueness, which renders databases from previous projects inadequate. Furthermore, allocating a contingency budget

for every possible risk within such projects that are full of uncertainty is not cost-effective.

The literature on risk management of large-scale projects promotes reactive risk management as opposed to the classical proactive risk management (Charette 1996; Pavlak 2004; Pitsis et al. 2007). This new approach focuses on reacting to risks as soon as they emerge and on investigating different alternative solutions that need not be part of databases containing tested solutions. When following this approach, the project manager will have to address all processes related to risk management (planning, implementation and monitoring) as part of his/her daily activities, rather than merely focusing on monitoring the implementation of a predetermined risk management plan.

**Stage-Gate systems**

Stage-Gate is a strategic management system that aims to assessing risk at conjunctural instances of product development, which are considered as high-risk projects. Lately, this system has been applied to service-oriented businesses, specifically in the financial sector (Cooper and Edgett 1996). This system acknowledges the inapplicability of classical risk management in high-risk projects and promotes identification of critical milestones of the project, at which reactive risk management is practiced instead of counting on a plan that is set prior to project initiation. The objective of this system is mainly to introduce gates for risk assessment at the end of each phase of the product development process, namely, scoping, establishing business case, development, testing and launching (Cooper 2008, 2009; Cooper and Edgett 2008). These steps hold a high level of similarity with the development process (see Figures 1 and 2). Such a system can be beneficial for formalizing the identified risk management approach by enabling identification of the critical instances of the project. The convenience of the application of a similar system in the field of development management will be investigated later using the selected case studies.

The earlier version of this system focused on standardizing the management process in order to be able to articulate the gates at which the ‘go/kill’ decision is taken. Nevertheless, the latest version of the system acknowledges

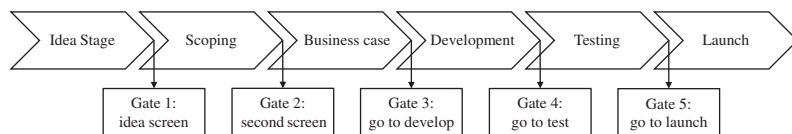


Figure 1: Stages of Stage-Gate system (Cooper 2008).

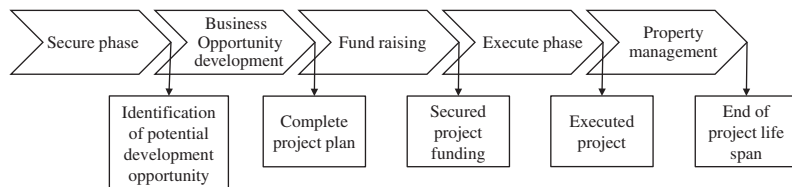


Figure 2: Phases of development process.

that the management process need not be similar for all projects. Therefore, a number of subsystems were developed that are customized based on the level of risk associated with the project.

This system has its own set of challenges that need to be listed in order to understand its risks (Cooper 2008, 2009; Cooper and Edgett 1996, 2008). These risks are the following: 'killing' decision might not be an option as this can be considered as a mismanagement problem; decisions at gates might not be taken seriously; first-tier managers might not be included, which can affect implementation of decisions; and gatekeepers might not be committed to gatekeeping meetings.

## **RESEARCH METHODOLOGY**

The main question of this research is the following: how to manage risks of large-scale development projects in developing countries? As this is a 'how' question, this research falls under the category of qualitative research (Royce and Bruce 1999; Yin 2009). This research is a qualitative case-study research as it does not require control over behavioural events (Yin 2009). Furthermore, it falls under the category of exploratory case-study research as its aim is to 'explore' risk management practices in order to 'enlighten' project managers of this type of projects. Multiple case studies were used in order to formulate a 'cross-case' research conclusion.

The literature was reviewed in order to identify a framework of analysis for different case studies. This framework allowed for a consistent research methodology that enforced the research reliability (Yin 2009). In addition, this framework of analysis was used to develop a guide for interviews with managers and assistant managers of selected projects. Collected data on case studies were analysed using the technique called 'theoretical saturation', which is considered to be convenient for research addressing complex business environments. In addition, results of the interviews were supplemented with personal observations and progress reports of selected projects. The outcome was a risk management system that can be customized for different types of large-scale development projects. In order to ensure validity of the outcome of analysis, case study reports were communicated to managers who were interviewed in order to make sure that the reports properly reflected their management practices.

The case studies were selected based on the largeness of scale, international recognition and coverage of a wide spectrum of development phases. The following are the selected case studies: Al Shamiyah Project in Makkah, Saudi Arabia (a 1,400,000 m<sup>2</sup> project with a construction cost of around two billion USD); Aktau New City Project in Aktau, Kazakhstan (a 5,000,000 m<sup>2</sup> project); Jabal Omar Project in Makkah, Saudi Arabia (a 1,000,000 m<sup>2</sup> project and the first real-estate project to be listed in the Saudi Stock Exchange market); Medini Development Project in South Johor, Malaysia (a one-and-a-half billion USD investment); Bandar Jissah Project (a 2,000,000 m<sup>2</sup> project); and Al Dariyah Project (a 600,000 m<sup>2</sup> project with a construction cost of around six hundred million USD).

## **FINDINGS: THE RISK MANAGEMENT SYSTEM**

The collected data were analysed and interpreted in order to come up with a risk management system that answers the main question of this research. As

risk identification is the initial step in risk management, we will go through different categories of identified risks before illustrating the suggested risk management system.

### ***Categories of risk in large-scale development projects***

The risks discovered in the case studies were found to be spread along the three levels that were identified in literature, namely, project environment, institutional arrangement and external environment. However, some modifications were necessary in the categories of risk that were identified in the literature review at each level, as some new categories were identified and other categories were found to be irrelevant to the context of the case studies considered.

At the level of project environment, the identified categories of risk are as follows:

- *Market risks*: risks under this category are related to changes in market assumptions about either the cost or revenue side of the project;
- *Financial risks*: these are correlated to risks of not securing necessary financing for the project;
- *Technological risks*: these are related to introducing new technologies in the project;
- *Management risks*: these are related to the risks of managing complex processes of large-scale development projects;
- *Completion risks*: these are risks that can lead to non-completion of the project;
- *Technical risks*: these are related to risks that might emerge from the technical complexity of large-scale development projects;
- *Operational risks*: these are associated with risks of improper functionality of the project;
- *Armed conflicts*: these are related to risks that might emerge from armed conflicts; and
- *Legal risks*: these are related to impracticality of some existing local laws and regulations in the country of the project.

At the level of institutional arrangement, the following risk categories are identified:

- *Multidisciplinary expertise*: unavailability of a wide range of required expertise in public authorities can create communication gap between the developer and such authorities;
- *Conflicts*: conflicts between different authorities or within individual authorities can undermine development and implementation of projects;
- *Lack of approvals facilitation*: risk arises from absence of mechanism in the public sector that would facilitate project approvals, particularly when authorities that do not benefit from the project might not have interest in facilitating procedures for project approval;
- *Delay of incentives*: this applies when and where projects are dependent on special incentives like tax or customs exemptions. Delays in the implementation of these incentives pose risk to project management.

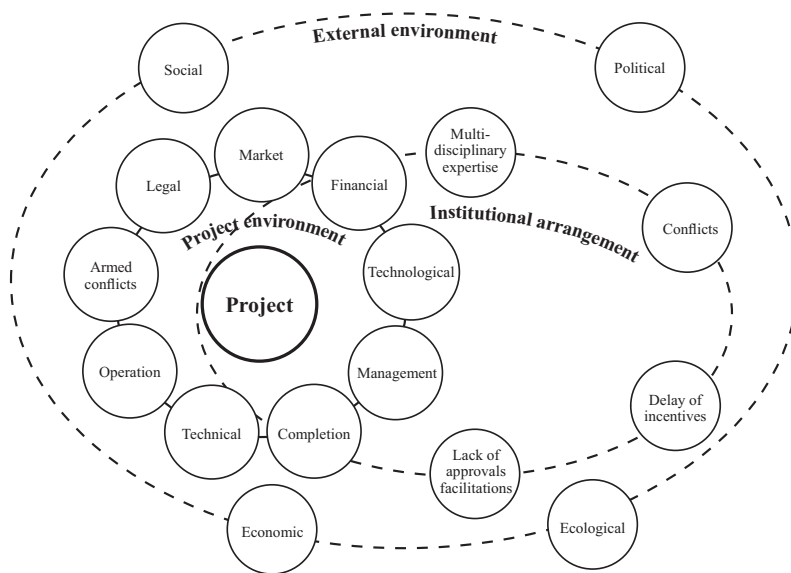


Figure 3: Relation between different environments that can impact the project along with their set of risks.

At the level of external environment, the identified risk categories are as follows:

- *Political risks*: these are associated with risks of political changes that can impact on the project through, for example, taxes or customs regulations;
- *Social risks*: these arise from lack of project acceptance by local community;
- *Economic risks*: these are related to changes in economic indicators that might have an impact on the project; and
- *Environmental risks*: the negative impact of the project on the natural environment could lead to withholding of the project.

The three environments of risk are interrelated. Initially, the project is directly affected by risks related to its environment. Simultaneously, it is affected by risks related to the institutional arrangement which defines the roles of different stakeholders in the project. At a macro level, the external environment contains both environments and has its own set of risks that could possibly impact the project. The relationship between the different environments along with their risks is illustrated in Figure 3.

Each of these risk categories contains a subset of risks that contributes to the high complexity and riskiness of large-scale development projects. For example, the category of market risks includes risks of land prices, risks of construction costs and revenue risks. Furthermore, each subcategory contains its own subset of risks (see Boxes 1–3). This variety of risks shows the high level of complexity and riskiness that are associated with large-scale development projects. Furthermore, it confirms that the classical approach of risk management, which is based on predicting risks associated with each project

and allocating necessary budget thereof, is inefficient. This together with the results of the interviews conducted for the study suggests that reactive risk management would be more appropriate as an approach to the management of risk in large-scale development projects.

**Box 1: Risks of land prices.**

*Increase in land prices leading to higher compensation for land acquisition:*

In some locations, specifically prime ones, the value of real-estate properties is continually rising, which increases the capital required for land acquisition. Hence, the budget for acquisition could not be fixed early on, especially if the inflation of real-estate prices cannot be projected due to the experience of irregular price increases during the previous years.

*Compensation on the basis of revenue stream:*

In some cases, public authorities might force the developer to compensate local residents on the basis of the discounted income stream of the property and not on the basis of the asset value, in order to ensure fair compensation. This arrangement would increase the capital required for acquisition.

**Box 2: Risks of construction costs.**

*Increase of construction costs:*

It was observed that construction costs are always subject to changes in international demand for construction materials.

*Inaccurate estimation of construction costs:*

Sometimes estimation of project cost is found to be inaccurate, and this constitutes a major risk for the project.

**Box 3: Revenue risks.**

*Size of the project:*

From a market perspective, the size of large-scale projects is a risk by itself, especially if such projects are unprecedented within their context. The scale factor can consequently put under question the ability of the market to absorb the project.

*Incompatibility between provided product and needs of end users:*

This risk is highly relevant to the projects, part of which relies on land development. In such projects, part of the parcels will be sold to second layer of investors, for them to develop buildings based on detailed development guidelines. For these parcels to be appealing to the second



layer of investors, the buildings along with their development guidelines would need to be in line with the requirements of end users so that they can be sellable. When the second layer of investors try to test the marketability of proposed buildings to end users, they might discover that some discrepancies exist between their requirements and the qualities of these buildings. This can be a major risk that might affect the whole project as this can be a deal stopper for the sales of these parcels.

### ***Risk management system***

As per the value chain of MDI that reflects different phases of development, the end of each phase is considered to be a major milestone at which clear objectives are achieved. The next phase cannot start unless the objectives of the previous one are met. Hence, these milestones can be considered as key junctions at which the level of risk of the project needs to be assessed in order to decide whether the project is to be continued or stopped. As discussed earlier, due to the complexity and riskiness of large-scale development projects, such decisions cannot be made early on. At each of these milestones, the decision-makers are better informed as new information about the project is provided, which will allow for better risk-assessment exercise. In risk management meetings to be held after achieving these milestones, decision-makers assess whether risks that emerged during the completed phase or expected to emerge in the coming phase can be mitigated or not, based on the information provided. If risks can be mitigated, the cost of mitigation can be assessed to check the feasibility of the project. If the project is still feasible, a 'go' decision is taken. Otherwise, the 'kill' decision will prevail. Such approach is similar to the risk management approach that is followed in the Stage-Gate system. Furthermore, this approach allows formalization of MDI's current risk management approach in order to make it more efficient through identification of the critical instances of the project at which risk needs to be assessed (Box 4). Similar to the Stage-Gate system, the key milestones can be called 'gates'.

#### **Box 4: MDI's risk management approach.**

As per the results obtained from the interviews, participant observations and progress reports, the risk management approach that was followed in different case studies is situational in nature. The high level of uncertainty that accompanied the selected projects called for a risk management approach that interactively responds to continuously evolving risks. The results of interviews suggest that this approach could be rendered more efficient by identifying the systemic structures of risk management practices.

Similar to MDI's current practice in risk management meetings, in gate meetings everyone would be allowed to express his/her opinion freely. The focus of these meetings is to brainstorm solutions for a set of risks not confronted in previous projects.

As per the literature, a Stage–Gate system has some challenges that need to be considered. As risk management is not currently institutionalized in MDI, these challenges were not revealed in the case studies. Hence, the challenges identified in the literature would need to be considered when implementing this system.

Despite the fact that the MDI’s phases of development were followed in different case studies, the business opportunity development phase was found to contain sub-phases that might vary from one project to another. The main reason behind these variations was found to be related to the risk behaviour of the client. A risk-taking client would expedite the process through running phases in parallel (as observed in the case studies) and collapsing sub-phases of the business opportunity development phase. On the other hand, a risk-averse client would take the project step by step in order not to venture into advanced phases before securing a solid ground for the project. Different scenarios for the development phases were categorized in order to create different versions for the system under discussion, depending on the level of risk the client is willing to take.

### CONSERVATIVE RISK-TAKING VERSION

This version assumes the business opportunity development phase to be subdivided into three sub-phases in order to minimize the exposure of the client and move in steady steps. These sub-phases are the pre-conceptual phase, the conceptual phase and the design development phase. Time is not the major issue for the project that follows this version as its number of phases is the highest. Clients of such projects are usually not willing to make steps that might be too risky, and hence, they prefer moving slowly and steadily through the project phases (Figure 4).

### AVERAGE-RISK VERSION

This version assumes the business opportunity development phase to be subdivided into two sub-phases, namely, conceptual phase and design development phase. This is considered to be the ‘classical scenario’, being the most commonly followed approach in project risk management. Clients of projects following this version are usually willing to take an average level of risk as the number of phases in this version is considered to be moderate (Figure 5).

### HIGH-RISK VERSION

Similar to the average-risk version, this version assumes the business opportunity development phase to be subdivided into two sub-phases: the conceptual

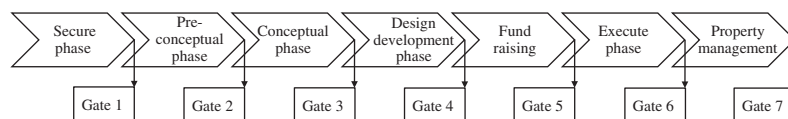


Figure 4: Conservative risk-taking version of risk management system.

phase and the design development phase. However, fundraising is assumed to be run in parallel with the design development phase in order to expedite the development process. In most of the cases that follow this version, the source of funding is private and not public, as public authorities are not usually keen on projects with a high level of risk. The client is assumed to be willing to take a higher level of risk than usual as he/she will be skipping a number of risk assessment gates (Figure 6).

**VERY HIGH RISK VERSION**

This version is similar to the high-risk version with the only difference that it involves a design and build contract as design and execution are run in parallel. The client is assumed to be willing to take a very high level of risk as he/she will be skipping many risk assessment gates (Figure 7).

**CONCLUSION**

This article contributes to the risk management literature through the risk management system formulated for large-scale development projects in developing countries. Currently, the reactive risk management approach promoted for application to the large-scale projects does not call for identification of key milestones, at which enough information for risk assessment and mitigation would be available. By analysing case studies from projects managed by MDI,

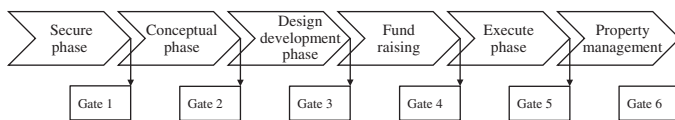


Figure 5: Average-risk version of risk management system.

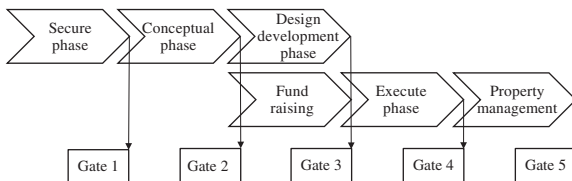


Figure 6: High-risk version of risk management system.

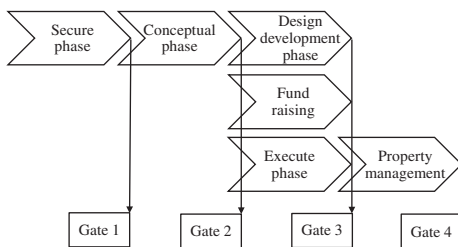


Figure 7: Very high risk version of risk management system.

these milestones were identified and formalized in a risk management system. This system contains gates of risk management of large-scale development projects along with its different versions. These versions depend on the levels of risk to be taken by the client. Furthermore, through identification of key milestones, this system will help in making the necessary coordination early on, in order to bring key decision-makers on the same table for risk assessment at different gates. A list of potential risks that might be faced in the type of projects under discussion was also identified to be used as a guide for risk identification in risk management gates.

Like any research work, this article has its limitations. As this is a case study research, its results are based on the analyses of a limited number of case studies. When analysing different case studies, the results might vary. Furthermore, although different sources of data were used, namely, interviews, observations and progress reports, interviews were used as the main source of data, notwithstanding that the interviewed managers had to rely on their memory while addressing questions. It is quite possible that some events might have fallen from memory and, hence, were not included in the collected data.

For all its limitations, this article provides a basis for further work on issues relating to the risk management of large-scale development projects in developing countries. There are still knowledge gaps, inter alia, with respect to the following: risk mitigation measurements of large-scale development projects in developing countries; KPIs for large-scale projects in developing countries; strategies for managing risks associated with large-scale development projects in developing countries.

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