

Crises and Coping Strategies in Megaprojects: The Case of the Islamabad–Rawalpindi Metro Bus Project in Pakistan

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Abstract

This study focuses on crises in megaprojects and on the strategies used to cope with them. The context examined is the Islamabad–Rawalpindi Metro, a megaproject in Pakistan. Our empirical data comprise semistructured interviews, illustrative materials, and archival data, analyzed using grounded theory. In the crisis management model, we divide crises into four categories: (1) internal technical/economic; (2) internal social; (3) external technical/economic; and (4) external social crises; and link them to six distinct coping strategies: communication, coordination, resource mobilization, planning and multitasking, negotiation, and compensation. We observe that the first three of these strategies are generic in nature, whereas the three latter are crisis-specific strategies.

Keywords

crisis, coping strategies, megaproject, grounded theory

Introduction

Megaprojects are temporary organizations undertaken to plan and execute complex large-scale infrastructure project ventures with a long duration and a high budget (from several hundreds of millions to billions of dollars) that involve multiple stakeholders (Gillett & Tennent, 2017; Locatelli & Mancini, 2010; Flyvbjerg et al., 2000). Megaprojects are highly uncertain and crisis-prone projects that usually suffer from cost overruns, delays, and benefit shortfalls (Flyvbjerg, 2014). If not managed properly, crises can threaten megaprojects' project viability (Kardes et al., 2013). A crisis is a moment of decision and its importance is increased in megaprojects, as megaprojects are expensive in terms of time as well as money (Gillett & Tennent, 2017) and involve multiple organizations where actors such as clients, consultants, contractors, and subcontractors collaborate (Kornberger et al., 2019). With respect to the critical role of megaprojects in the national economy and social development (Wu et al., 2018), it is important to identify crises and the relevant coping strategies used to deal with them. Prior research has identified challenges and unexpected events associated with managing megaprojects (Flyvbjerg et al., 2000), mostly focusing on the management of risk (Flyvbjerg et al., 2003a), project culture (van Marrewijk, 2007), and technology adoption (Gil et al., 2012). These researches have addressed how organizations deal with unexpected events and deviations (Geraldi et al., 2010; Hällgren & Wilson, 2008, 2011), how to cope with uncertainty by learning from experience and conducting trials with multiple solutions (Pich et al., 2002), and identifying the

different response approaches used to deal with them (Tukiainen et al., 2010). Crises in megaprojects as temporary settings are rarely discussed (Hällgren & Wilson, 2011). This article complements these studies by identifying and describing types of coping strategies used in crises.

A more neutral term—unexpected event—inspired by risk management, is often used (Geraldi et al., 2010; Meyer et al., 2002). “An unexpected event can be predicted and should not happen. When it occurs, it can have a significant impact on the project” (Geraldi et al., 2010, p. 547). Unexpected events have been conceptualized in various ways in the literature, including deviations (Hällgren, 2007), exceptions (Orr & Scott, 2008), surprises, and emergent events (Sommer & Loch, 2004). The commonality to all these conceptualizations is the notion that unexpected events are not planned initially or expected to take place as part of a project (Tukiainen et al., 2010). Sometimes, the term *risk* is used interchangeably with *crisis*, but they are different (Iftikhar & Müller, 2019). Risk is “identifiable” (Sicotte & Bourgault, 2008, p. 468), involving foreseen and known events, which can be managed, but

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no one knows when they will occur (Knight, 1921; Meyer et al., 2002). Risk contains the property of the known-unknown, which means it is identifiable but it is not possible to find out if exactly it will occur. Risk is measurable, predictable, and manageable (Knight, 1921). However, a crisis is an unforeseen, unmeasurable, and unpredictable event (Seeger, 2002). In this study, a crisis is defined as “a low probability and high impact event” (Pearson & Clair, 1998, p. 60). A crisis is commonly described as an unanticipated, surprising, and ambiguous event posing a significant threat, leaving only a brief time to make a decision (Hermann, 1963; Pearson & Clair, 1998). According to Iftikhar and Müller (2019), risk is a potential future event, characterized by a certain probability of occurrence and, if it occurs, leads to negative consequences. Contingencies can be planned for risks, whereas a crisis is an event with a high level of uncertainty with typically no contingency plan.

According to Flyvbjerg et al. (2000), megaprojects always struggle with the identification of unforeseen events. These crisis events refer to potential outcomes and causal forces that are not fully understood (Miller & Lessard, 2007). Even a well-planned project in terms of design, execution, and operation can face a crisis. In the following section, we proceed to discuss the example of the Heathrow Terminal 5 (T5) construction project to illustrate the tremendous challenges that relate to the management of uncertain events as well as systems integration in megaprojects. The planning phase of T5 was started in 1986 and ended in 2001, when consent to proceed with construction was granted. The original project opening date was 30 March 2008. The design phase was also given full consideration as it began in 1989 with the development of the overall design concept. The construction phase included two subphases: (1) the construction of infrastructure and buildings from July 2001 to March 2008 and (2) the integration of systems and retail fit-out of the buildings from January 2006 to March 2008. The operational readiness phase involved tests and trial to prepare people, processes, systems, and facilities for the public opening. The start–finish team worked intensively during six months of systems testing and operational trials prior to opening, including 66 trial openings, each involving 2,500 people. Despite these preparations for the opening, the project experienced difficulties. In the five days after opening, British Airways misplaced over 20,000 bags and was forced to cancel 501 flights. Ironically, the troubled opening of T5 cost approximately US\$31 million, causing considerable reputational damage. The terminal achieved the first full schedule of operations 12 days after opening. This example illustrates the challenges involved in delivering a megaproject, particularly its systems integration challenges (Davies et al., 2009, 2016).

Typically, contemporary researchers have focused on one specific crisis event, such as the Mann Gulch disaster (Weick, 1993) and the Chernobyl and Challenger disasters (Vaughan, 1996; Weick, 1988). These are illustrations of industrial (organizational-based crises that cause extensive damage) and widespread destructive crises (cause real damage to human life and/or the environment, for example, death, injuries, and so forth; Shrivastava et al., 1988). These industrial and widespread destructive crises lead to major damages; however, not all crises will lead to major damages or

life-threatening events. According to Kornberger et al. (2019), crises also include normal accidents, as described by Perrow (1984). It does not take fire or a life-threatening event to precipitate a crisis; simple organizational miscommunication and labor strikes can also greatly impact organizations’ viability (Pearson & Clair, 1998; Pearson & Mitroff, 1993, Shrivastava & Mitroff, 1987).

As the aforementioned prior research focused on a single crisis event, which resulted in extensive damage to human life or the environment (Shrivastava et al., 1988), this study focuses on the variety of crises that megaprojects may have to deal with over time. Previous research has typically focused on individual organizations and neglected to consider crisis and coping strategies, where different organizations engage simultaneously in complex temporary settings (Weick, 1995). Therefore, little has been published on the coping strategies for crises in megaprojects; that is, the specific actions that organizations engage in when crises occur in megaprojects. The main purpose of this study is to address the aforementioned gap by developing a crisis management model that explains how multiple organizations engaged in megaprojects respond to crises. We identify and describe different types of crises in megaprojects and the related coping strategies used to handle them. Hence, we pose the following research questions:

RQ1: What types of crises do megaprojects face?

RQ2: What are the related coping strategies?

The unit of analysis is the megaproject. We examine the Islamabad–Rawalpindi Metro bus project in Pakistan. The Metro bus service is currently in operation. The project was carried out as a fast-track project and was completed in 15 months, which is considerably less than projects of comparable scope carried out in similar contexts. The case we chose is both a megaproject and a fast-track project at the same time. The fast-track method concentrates on reducing construction duration by means of conducting the design and construction activities in parallel (Cho et al., 2010). Fast-tracking increases time pressure, since these types of projects are more time-constrained compared to projects not being fast-tracked.

Practitioners and academics are expected to benefit from new insights into the nature of crises in megaprojects and distinct coping techniques that help practitioners prepare for and manage crises. This study is the first to provide crisis-contingent coping strategies, which can be used by managers, practitioners, and researchers to thoroughly understand the substance of different types of crises. A case study approach was used to answer the research questions.

The article is organized as follows: the next section reviews the relevant theory, followed by the case description and the methodology sections. Subsequently, we describe data collection and analysis, provide a model of the findings, discuss the findings, and draw conclusions.

Theoretical Framework

Megaprojects

Megaprojects are “large-scale, complex ventures that typically cost [USD one] billion or more, take many years to develop and build,

involve multiple public and private stakeholders, are transformational, and impact millions of people” (Flyvbjerg, 2017, p. 2). The strategic nature and high costs of these undertakings usually imply that public institutions hold a significant role in the project-financing phase (Locatelli & Mancini, 2010). Megaprojects are temporary endeavors (i.e., projects) characterized by high commitment in terms of investment made; extreme complexity; and long-lasting impacts on the economy, the environment, technological development, and society (Brookes & Locatelli, 2015; Bruzelius et al., 2002; Zhai et al., 2009). Megaprojects often involve the building of physical infrastructures, which may be roads, railways, airports, bridges, energy transport, and electronic communication (Priemus, 2010). Each megaproject is characterized by a distinct governance structure and a temporary production system (Miller & Hobbs, 2005).

Megaprojects are typically commissioned by the public sector and implemented by large firms. Furthermore, they are characterized by uncertainty, complexity, a high degree of political sensitivity, and typically delivered through temporary interorganizational networks involving both public as well as private organizations. These projects involve a wide range of business partners, such as representatives from the industry, politicians, and others (Clegg et al., 2002) and have a strong economic as well as environmental impact (Bruzelius et al., 2002). Organizations responsible for carrying out megaprojects face a performance paradox—a significant gap exists between what is expected from the investment and what actually is later obtained from it (Flyvbjerg et al., 2003b; Flyvbjerg et al., 2004). As Flyvbjerg et al. (2003a) indicate, megaprojects have a relatively poor history of performance in terms of adhering to budget and time constraints.

Crises

Crises are unpredictable as they are unforeseen, unknowable, and immeasurable (Oh et al., 2013). Researchers, however, find it difficult to agree on a common definition of crisis. For example, Seeger et al. (1998, p. 233) define crisis as a “specific, unexpected, and non-routine event that threatens organization goals.” For Weick (1988, p. 305), a “low probability/high consequence event threatens the most fundamental goals of the organization. Quarantelli (1988) and Hermann (1963) add a time dimension to the definition by outlining crises’ characteristics of urgency, limited time to respond, and surprise.

Crises seems inevitable in projects (Mallak & Kurstedt, 1997) and are viewed as one of the main reasons for financial overruns, time delays, and compromises in quality. For example, Hällgren and Wilson (2008) consider projects to be in crisis when a deviation occurs along the critical path, which threatens the project (objectives). The aforementioned definitions are very broad and fail to consider the fundamental elements and characteristics of a crisis. For that reason, in this article, we follow Pearson and Clair (1998, p. 60) and define crisis as “a low probability, high impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly.” When

using the term *organization*, we refer to the project as a temporary organization (Turner & Müller, 2003).

This definition directs our attention toward three main aspects of a crisis. First, a crisis is a major, unpredictable event that is likely to negatively influence the business operations of the focal organization. Furthermore, a crisis has the potential to threaten the organization’s survival. Second, a crisis has a low probability of occurrence and is therefore characterized by an element of surprise. Third, crises are characterized by time pressure, requiring a rapid response to minimize their impact (Bonn & Rundle-Thiele, 2007). Hence, “crisis (1) threatens high-priority values of the organization, (2) presents a restricted amount of time in which a response can be made, and (3) is unexpected or unanticipated by the organization” (Hermann, 1963, p. 64). From the three main aspects of the crisis, we derive the following three characteristics of a crisis. First, it is an unplanned event that may affect the employees within the organization and key stakeholders outside the organization. Second, a crisis may take place in any organization (small, medium, or large and national or international) and in any industry (Coleman, 2004). For example, governmental agencies, nonprofit organizations, utilities, cooperatives, multinational organizations, and so forth may all be affected by a crisis (Barton, 1993). Third, a crisis may also compromise the legitimacy of an organization. During a crisis, the media’s influence may affect how the organization’s stakeholders perceive it. When presented in a negative light, the legitimacy of the organization may be questioned (Ray, 1999).

Types of Crises

Crises occur in many forms, including internal, external (Loosemore, 1998; Smet et al., 2012; Wan & Yiu, 2009), intentional (the crisis act was committed purposefully), and unintentional (the crisis event was not committed purposefully; Coombs, 1995). Hwang and Lichtenthal (2000) identified abrupt (striking suddenly) and cumulative (developing gradually) crises. Other categories include conflictual (war, civil disturbance, riots, terrorist attacks, and human-generated situations) and consensual (generated by technical and natural agents) crises (Quarantelli, 1998).

This article focuses on the typology proposed by Shrivastava and Mitroff (1987), who studied the internal–external and technical–social dimensions of crises. The former refers to the source of the factors resulting in crises, which can be either the internal failure of the organization’s system/projects or failure in the external environment. The latter investigates the characteristics of causal factors of crises. These causal factors may be technical or economic in nature or, alternatively, matters associated with human, organizational, and social concerns. Mitroff (1988) recommends grouping crises types into clusters, families of similar crises, and developed groups of crises according to their underlying structural similarities. Table 1 represents crises arising within or outside organizations and distinguishes between their technical/economic and people/organizational/social dimensions. Following Mitroff et al.’s (1987) and Shrivastava and Mitroff’s (1987) typology of crises, we derived Table 1.

The examples provided for each cell in Table 1 are for crises in general, and do not illustrate project-oriented crises. Cell 1

Table 1. Typology of Crises

	Technical/Economic Crisis	Social Crisis
Internal	Cell 1 Product injuries Computer tampering Bankruptcy Defective/undisclosed information Plant defects	Cell 3 Failure to adopt/change Organizational breakdown Personal assault Illegal activities Workplace bullying
External	Cell 2 Industrial accidents Hostile overtakes Large-scale systems failure Government crisis International crisis	Cell 4 Executive kidnapping Bribery Extortion Symbolic projection Copyright infringements

includes technical and economic failures in the organization's internal systems and routines. These outcomes are typically caused by failures in the firm's core technologies. Crises in this cell are triggered by major accidents, defective plant equipment, and erroneous design. For example, a reactor meltdown at a nuclear power plant in Chernobyl caused the deaths of approximately 30 people. Hundreds of thousands of those living in the plant's vicinity were severely irradiated, and the estimated economic cost of radiation damage added up to billions of dollars (Shrivastava & Mitroff, 1987).

Cell 2 displays crises that primarily relate to technological and economic failures in the firm's business environment. For example, attempts at hostile takeovers prompted by the restructurings of industries, drastic currency rate changes and other macroeconomic occurrences, or attacks by corporate raiders. In 1985, for example, cheese contaminated with poisonous bacteria was sold in California and killed 84 people, which created a major public health crisis that affected the entire state. The victims' relatives sued the manufacturer for billions of dollars, forcing it into a hostile takeover (Shrivastava & Mitroff, 1987).

Cell 3 represents failures in the internal processes and systems of an organization. These crises are often caused by mistakes made by management, intentional harm by criminal actors, control system faults, and substandard working conditions. The in-flight destruction of the space shuttle *Challenger* is attributable to this type of failure. In 1986, the *Challenger* exploded 74 seconds after takeoff, killing all six crew members and one civilian passenger. This tragedy was a crisis for the National Aeronautics and Space Administration (NASA). The explosion was caused by failure of the solid rocket booster that powered the shuttle. The launch took place at an extremely low air temperature, which caused the seals of the booster to lose their elasticity and malfunction; later investigations revealed that the problem was in the design of those seals (Shrivastava et al., 1988).

Cell 4 represents failure in the social environment of an organization. These kinds of crises occur when actors react adversely to the organization. Incidents of sabotage, terrorism, or off-site product tampering or misuse represent examples of such failures (Shrivastava & Mitroff, 1987). For instance, in 1982 dozens of Tylenol[®] capsules were found to be

contaminated with cyanide and eight individuals who ingested these capsules died immediately. The result was a nationwide public health scandal and a corporate crisis for Johnson & Johnson, which had manufactured the capsules. The full cost of withdrawing products from the marketplace and making necessary modifications to the production system exceeded US\$500 million (Mitroff et al., 1988; Shrivastava et al., 1988).

Coping Strategies

Research focusing on coping strategies constitutes a prolific area of study in different fields, for example, behavioral psychology (Holahan & Moos, 1987). Duhachek (2005, p. 42) defines coping as "the set of cognitive and behavioral processes initiated by consumers in response to emotionally arousing, stress-inducing interactions with the environment aimed at bringing forth more desirable emotional states and reduced levels of stress." According to Folkman and Lazarus (1980), coping refers to the thoughts and actions required to tackle with an imminent threatening situation. Thompson (1967) argued that coping with uncertainty represents a core problem faced by organizations. *Coping* is the process of executing a response. Two types of coping strategies have been argued to exist: (1) problem-focused strategies and (2) emotion-focused strategies (Folkman & Lazarus, 1980).

The first coping strategy, termed *problem-focused coping*, is directed at problem-solving or altering the source of the threat (Folkman & Lazarus, 1980) and is a method of tackling the situation directly in active ways by concentrating on the problem (Okuntade, 2015). The second coping strategy, termed *emotion-focused coping*, attempts to reduce or manage the emotional load that is triggered by the situation (Folkman & Lazarus, 1980). These strategies are used to handle the feelings of distress; the focus is on the emotions rather than on the actual problem (Okuntade, 2015). Project managers have been argued to prioritize problem-focused coping strategies over emotion-focused strategies (Richmond & Skitmore, 2006).

Coping strategies have been shown to be situationally dependent (Lazarus & Folkman, 1984) because they result from people's cognitive assessment of a specific stressful event. For this reason, a situation must first be deemed a crisis requiring coping, which is followed by selecting the appropriate coping strategy for the event (Lazarus & Folkman, 1984). Miller and Lessard (2001) described the coping strategies for risks. They provide six strategies: (1) hiring experts or undertaking analysis and simulations, (2) transferring risks to the parties that can best bear them, (3) the constitution of large portfolios, (4) designing options to allow a greater range of responses in line with future outcomes, (5) risks are transformed through influences on drivers, and (6) residual risks are embraced by sponsors (Miller & Lessard, 2001). The coping strategies focused on in prior literature are behavioral and psychological, but we are exploring crisis events, which are triggers for coping strategies.

A Contingency Theory Perspective

The above problematization lends itself to a contingency theory perspective. This theory proposes organizational performance

as being the result of adapting the features of the focal organization to meet contingencies that reflect the situation of the organization (Donaldson, 2001). For example, organizational performance (as a dependent variable) is maximized when a certain *fit* is reached between the organization's structure (as an independent variable) and the organization's market environment (the context variable), as in the case of organic structures and dynamic markets (Burns & Stalker, 1994). In this study, the dependent variable of performance is substituted by the minimization of negative consequences. Coping strategies are the independent variable, and the crisis category is a context variable. Recent versions of contingency theory emphasize the reflexivity of independent and context variables for the benefit of organizational results (Donaldson, 2001). Hence, our underlying assumption is that the chosen coping strategies are adjusted to the nature of the crisis with the aim of minimizing negative consequences.

The Case: Islamabad–Rawalpindi Metro Bus Project

The Metro bus project was completed in eight packages—five packages for Islamabad (ISB) and three packages for Rawalpindi (RWP). A package is a subproject. A contractor is assigned to each subproject. The entire length of the Metro bus corridor is 23 kilometers, of which 8.6 kilometers are in the Rawalpindi area (including 10 stations), and about 14 kilometers in Islamabad (including 14 stations). The project was expected to be completed in 9 months using the fast-track method. However, the Metro project faced several problems, resulting in considerable delays in its implementation. Its construction began in February 2014 and was expected to be completed by December 2014. Re-planning led to three consecutive deadlines, which were all missed. Finally, inauguration happened on 4 June 2015. The project took six months longer than planned with a cost of 50 billion rupees (US\$470 million) compared to the planned cost of 34 billion rupees (US\$320 million; Archival data). The Metro project was a pioneer project in Pakistan so it created a lot of hype and underwent much scrutiny in electronic and print media. The project was highly criticized by the media during the execution stage and for its quality (according to illustrative materials).

Methodology

We conducted a single case study. The case study method is well aligned with research questions calling for a detailed understanding of a specific phenomenon, which is because of the rich nature of data that can be collected by the scholar in a case study (Hartley, 2004). The empirical domain in this study is the Islamabad–Rawalpindi Metro bus project in Pakistan. We then identify the events that led to crises and the underlying mechanics that supported their emergence and management. We selected this particular case as a representative case for infrastructure construction megaprojects with numerous crises, as indicated in the media and public discussion due to its

significance and the reported challenges. Project staff members were given copies of the analysis (discussed in detail as follows) and were asked to provide their feedback. Their comments were incorporated into the final analysis.

Data Collection

Data were collected using semistructured interviews, illustrative materials (e.g., newsletters and other publications), and (3) archival and project documents. Semistructured interviews served as a primary data gathering method due to their ability to gather rich data on relatively unexplored phenomena. Illustrative materials and archival data supported the cross-validation of information from different sources (Yin, 2003).

Twenty-one interviews with 18 participants were held, lasting between 35 and 90 minutes. The initial interview questions aimed to broaden understanding of the project. The interviews then proceeded toward more focused questions, iteratively developed during the analyses subsequent to each interview. Primary data were collected through face-to-face interviews with project directors, project managers, and other project management team members (deputy project managers and site engineers) from the client, contractors, subcontractors and consultants who were involved in the project (Table 2). We utilized a snowball technique, asking each informant who they believed could help us to understand crisis and coping strategies. A case

Table 2. Interview Participants' Details

Role of the Organization	Designations	Experience (Years)	Interview Duration (Minutes)
Client	Director general	20	52
	Chief engineer	30	45
	Deputy director 1	13	52
	Deputy director 2	13	40
	Deputy director 3	27	33
	Deputy director 4	28	52
	Assistant director 1	6	35
	Assistant director 2	13	50
Consultant	Project manager	25	39
	Deputy project manager	5	100
Contractor 1	Project manager	10	34
	Deputy project manager 1	26	98
	Deputy project manager 2	17	106
Contractor 2	Project manager	8	55
Contractor 3	Deputy project manager	3	70
Contractor 4	Deputy project manager	4	90
Contractor 5	Site engineer	1	55
Subcontractor 1	Project manager	15	64

study protocol entailing the study's research questions, aims, and generic interview questions was used during the interviews to support the reliability of the findings (Yin, 2003). Interviews were tape-recorded and transcribed. Archival data included documents provided by the informants and publicly available documents, such as newspaper articles, internet sources, and broadcasted talk shows.

Data Analysis

Grounded theory was used for data analysis (Gioia et al., 2012; Strauss & Corbin, 1998). In the first step of the abductive analysis, we resorted to open coding to identify first-order categories (Gioia et al., 2012). First-order codes were created by identifying numerous informants' terms and concepts (Van Maanen, 1979), known as "Verbatim coding on In Vivo coding" (Saldana, 2009, p. 74). In the second step, axial coding was performed (Strauss & Corbin, 1998) as we moved back and forth between literature and empirical data (Eisenhardt, 1989; Gioia et al., 2012) to develop a higher level of abstraction and conceptualization. For instance, initial line by line coding, such as *Claims from contractors*, *Payment to concerned department*, and *Compensation for the affectees* were grouped together to form the subtheme *Compensation*. Labels were derived, either by developing a more general term or by referring to the existing literature (e.g., internal technical/economic crisis, internal social crisis, external technical/economic crisis, and external social crisis), as recommended by Gioia and Thomas (1996) and Gioia et al. (2012). In the last step, we integrated the derived categories from the second-order themes (axial coding) and distilled them into distinct aggregate dimensions to provide a conceptual framework for organizing the emergent findings. Figure 1 illustrates the data structure resulting from our analysis.

Findings

The findings shown in Figure 1 are organized around two emergent themes: crises and coping strategies. Under each of the themes, subthemes emerging from our analysis are discussed. Rich quotes are used as examples and to support the arguments of the participants.

Crises

We asked the stakeholders—the client, contractors, subcontractors, and consultants working on the Metro project—to identify two or three crises (low probability–high impact events) they had faced in their particular packages and in the overall project. Stakeholders interpret different events as crises, so we identified various crises. After identification, we grouped them by themes, such as internal technical/economic, internal social, external technical/economic, and external social crises, in line with the theoretical basis discussed above.

Internal Technical/Economic Crises

Internal technical/economic crises are controllable and occur due to technical issues. One of the internal technical crises is site clearance and possession. There are several sensitive government institutions and public places, which affect the project. Since the context we studied is a fast-track megaproject, the design work takes place in parallel with the execution, which caused many problems and sometimes contractors had to redo their work. As one of the informants illustrated:

Until the end of the project, consultants were giving us drawings... which was a very serious thing. We always ask consultants to give us drawings during the course of construction because it will be difficult to dismantle things after construction. Sometimes we have to repeat our activities because of the revised drawings. (Deputy project manager 2, contractor 1)

The underground survey was not done properly and the soil was not the same, so when the project started, contractors encountered the high-water table and hard rock; they faced difficulties since things could not be done in the way they had been planned due to the water level and rocks. As a project manager (consultant) illustrated:

We were not so clear about the underground conditions when we started our work. There is a general idea about the depth in which you will find water in Rawalpindi city—we called it a water table, but at a particular location, water can be 5 to 10 meters up or 5 to 10 meters down as well. When it comes up then it can cause construction difficulties. Cost and time both start slipping.... Plus, depending on the underground conditions we assumed, which were soft soil, medium, hard, or very hard-rock, we have to assign different time spans to their activities.

Internal Social Crises

Internal social crises occurred in the internal environment of the project due to organizational and human causes. These crises are controllable. Codes included client capacity, contractors, subcontractor capacity, and coordination and communication gaps. One of the crises is the capacity of key stakeholders such as the client, contractors, and subcontractors. The crisis consisted of a deficiency in the stakeholders' capacity, which includes lack of experience and suitable human resources to handle such a big project at the client end, whereas contractors and subcontractors face shortages of financial resources and specialized human resources. As the director general (client) illustrated:

Unfortunately, [the client] does not have much capacity; they have not done such a big project before... Moreover, the client has limited staff; they do not have enough people to do such a project.

In terms of coordination and communication gaps, two gaps came up in: (1) coordination between the front and back offices,

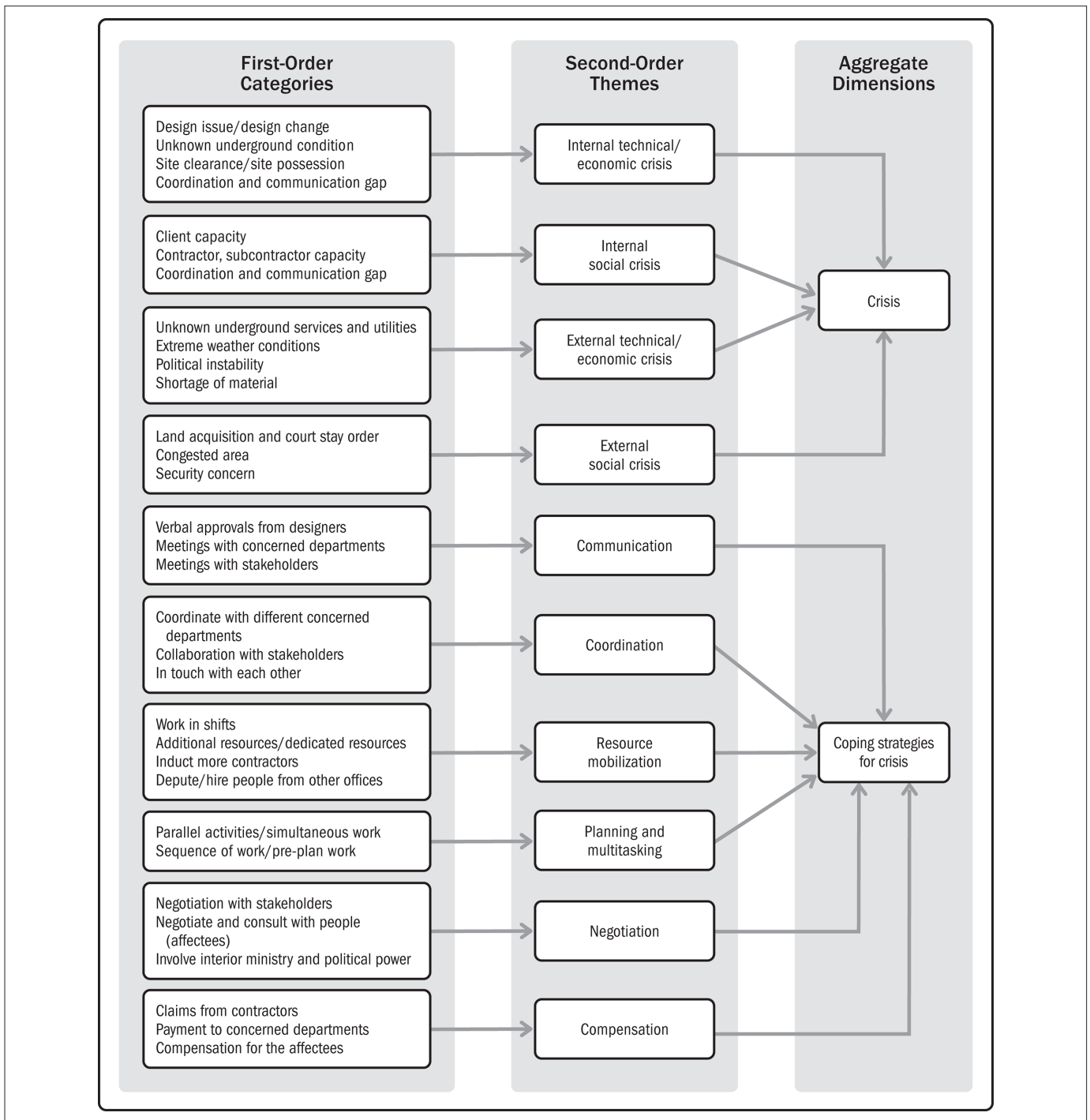


Figure 1. Data structure.

and (2) miscommunication due to the high number of communication channels. As the deputy project manager (consultant) stated:

In [the consultant company] engineers are not working on the Metro project; they are working on thousands of projects. In our point of view, the coordination gap was between the

site and office. One of the problems is that our head office is in Lahore.... How would you coordinate with them? Each person has to coordinate with each other, and everyone has to coordinate with the head office staff. There was a communication gap because they (head of the division) were in Lahore when they came to the site and could not give time to everyone.

External Technical/Economic Crises

External technical/economic crises occur in the project's external environment and are caused by technical and economic factors. These crises occur outside the project and are somehow uncontrollable. Causes include unknown underground services and utilities, extreme weather conditions, political instability, and shortage of material. One of the external technical/economic crises was caused by unknown underground services and utilities and, until the area was cleared by the department concerned, contractors could not start working. Moreover, the departments concerned do not have appropriate records of their services. As deputy director 2 (client) stated:

Shifting of utilities is a dilemma. Unfortunately, we do not have a utility services plan for the cities in the concerned departments. We do not even know to which department a certain utility belongs, who owns it, who looks after it—even the departments themselves do not know that this is their service. There are no proper utility corridors built and no proper utility drawings.

During project execution, the opposition party performed a sit-in and asked for the resignation of the government, which caused contractors to stop working since they thought the project would collapse when the government resigned or that their work would be slowed down because of blocked roads if the government stopped the public from entering the city. Political instability delayed the project. A shortage of material and equipment was another problem faced by the contractors, because the project was large and fast-tracked. As deputy director 1 (client) illustrates:

When the project started, we had to do deep boring... At that time there were only about 23 or 24 auger machines—the drilling machines—reportedly available in the whole country... So, what happened was, that the ones who took the lead got hold of as many auger machines as available and some were already deployed in the oil and gas sector so they were already being used. The rest of the packages were left with nothing. So, our progress suffered because of this.

External Social Crises

External social crises occur outside the project environment and contain social elements and social concerns, both organizational and human. A number of external social crises were reported, such as land acquisition and court stay orders, congested area, and security concern. Land acquisition is one of the crises since without land nothing can be built, so the first step is to acquire land, which is the responsibility of the client. However, the client faced some hindrances from the public. As the director general (client) illustrated:

There was a graveyard in Islamabad that came to the project track and the graveyard organization went to the Court. So

we got a decision from the court, and because of that decision some delay occurred; because the issue wasn't resolved, our work was stopped there... Land acquisition in Pindi, on Murree Road, was a very serious issue, because Murree Road is the main commercial lifeline of Pindi, and we acquired commercial property on Murree Road.

Since the project was being carried out in Islamabad, the capital city of Pakistan, the arrival of foreign delegations and army general headquarters had an impact on project timelines. Due to security issues, the project work had to be stopped for a specific period of time. As the project manager (contractor 2) described:

We are facing security concerns [the headquarters of the security institute]. It was crucial from a security point of view. We have to stop our work on their events or on main functions.

Coping Strategies for Crises

The next stage after the identification of crises is coping strategies, which represent how these crises are managed and handled. We identified communication, coordination, resource mobilization, planning and multitasking, negotiation, and compensation as coping strategies.

Communication

Communication is a medium used to connect crises with departments and stakeholders in order to come up with solutions. Verbal approvals and meetings were mediums used to communicate with different stakeholders, in other words, the client, consultant, contractors, subcontractors, and other departments concerned. Informal means of communication, such as, verbal approvals, are used. This helps contractors to continue their work instead of waiting for formal media (emails or letters) to arrive. As the deputy project manager (contractor 4) described:

We go directly to the designer; we take verbal approvals... there is a design change... We float the proposal through email and also submit it officially; it's called shop drawing but we took approval verbally. We do not wait for an official signed copy of the drawing... So, the work proceeds while the drawings are being revised.

Meetings were organized with different groups of stakeholders to solve the crises. A one-to-one meeting was conducted with the departments concerned, for example, regarding the crisis of unknown underground services and site clearance and possession. The meetings were conducted between the client and departments concerned. As deputy director 4 (client) illustrated:

We used to have a weekly meeting every Friday in the Convention Centre Islamabad. In that meeting, we used to have people from [organization's name], all the members from utility

and service providers, such as telephone, gas, water management, etc.; that meeting was chaired by the Commissioner of Rawalpindi. So, we used to discuss every issue, related to every package there and it used to be a three- to four hour long meeting... We used to have many Scrum meetings and a lot of sessions like that.

Coordination

Coordination is a coping strategy, for example, used to coordinate the internal and external affairs of a department. Coordination within departments involves team members working on the project. Coordination outside the department involves consultants, engineers, contractors, and other departments concerned. All this coordination is necessary. As illustrated by deputy project manager 1 (contractor 1):

We collaborated with [name of organizations] etc., because we have to execute our work... No one can carry on without the collaboration of all the stakeholders and institutions and understanding one another.

The client made extra effort to maintain a directory for all the internal and external stakeholders in case anyone wanted to contact them. As illustrated by deputy director 1 (client):

We were in touch with each other and maintained a separate directory for contacts. This directory contained hotline numbers for contacting anyone, so we used to have immediate coordination. It was a very close liaison. If the contractor had to ask for a traffic diversion, we used to coordinate with the traffic police on the spot... It was a very well-coordinated effort.

Resource Mobilization

Resource mobilization enhances the use of current resources and the deployment of additional resources. Resource mobilization includes increase in human resources, material, equipment, contractors; increasing shifts; dedicated resources; and the hiring, reassigning, or transferring of people from one office to another. For crises like extreme weather, political instability, and unknown underground conditions, stakeholders increase shifts, utilize additional resources; such as, manpower, equipment, machinery, and assign dedicated resources. As illustrated by deputy director 3 (client):

We had to do very aggressive pumping to remove water and when we dug the trenches, water filled them up, along with the rainwater, and then we had to excavate to dispose of that water to do our concrete work there. So, we had to work with a lot of planning, because water was continuously coming out, and concrete work requires settling time so that water does not sweep away the cement with it. Obviously, extra labor and extra machinery manage time. Time management is also a science. We did work in three shifts.

On the other hand, stakeholders either apply additional resources or reassign staff from different departments. For example, contractors hired more petty contractors as an additional resource. The client, a government institute, reassigned engineers and other staff from other governmental organizations. As illustrated below:

We have to hire more contractors and decrease their scope of work... We applied additional resources... We did the dumping of all our construction material in the space available to us two weeks prior, so our schedule for the execution of work did not get affected by it. As long as we had that material, our work went on smoothly... In this way, we achieved the continuity of about 2 to 3 weeks. (Project manager, contractor 1)

Planning and Multitasking

This is stakeholder related, as stakeholders have to plan for crises either in advance or during the course of their work. Multitasking means to perform more than one task simultaneously. The project's work was done both in sequence and simultaneously. As deputy director 1 (client) described:

The work was going on simultaneously... Suppose that there is an elevated corridor, and lines from utilities and other services are crossing from three places. We have to stop work until the utility and service providers shift those lines; when they are done with the shifting, we can get back to work. We kept working in parallel.

Stakeholders plan their activities in advance: if there is a problem at point A, the contractor will work at point B. During the time the contractor is at point B, the issue at point A might be resolved, at which point they are able to return to point A. So, activities are planned accordingly. As described by deputy project manager 1 (contractor 1):

Our job is unfolded in a sequence—it's not like shifting a glass from one place to another and we complete a portion of project. If you are starting from point A and you have to go to Z, then there is ongoing activity between A and B, then B and C is another activity, and then C and D is another activity and so on. It means work is divided into different tasks, divided into chunks... When we were working on activity between A and B, we also faced problems between E and F. We cannot start work on it but, according to the progress chart, these activities should be done.

Negotiation

Negotiation aims for win-win situations for all parties. Negotiation takes place with different stakeholders, some of them involved in the ministry and with political power to negotiate. As illustrated below:

We had to do a lot of negotiations with the stakeholders. We had to do direct negotiations with them. We signed the memorandum of understanding (MOU) after a lot of discussions... We had to convince departments; we had to sit with them and talk about what we could or could not agree on. (Deputy director 4, client)

Compensation

Compensation is about payment to stakeholders. Some contractors were not able to work, so they asked to claim compensation. As illustrated by assistant director 2 (client):

Contractors' machinery, manpower, and resources remain idle so they have submitted their claim to us.... They have proper recording... they have CD and DVD recordings, for example, work was stopped for four hours, then stopped for two hours, so they calculate all these hours and they submitted a claim. Definitely, if someone brings resources and machinery and their labor was sitting idle... they can submit a claim.

The client made payments to the departments concerned with shifting their services and utilities. They also paid people who were affected by the project. As illustrated below:

People have been living here for 30 to 40 years, they had established clientele.... Customers have been there for many years and they have earned a good name but when they shift to a new place... and again establish their business, it is rare that previous clients will go to a place where a new setup has been established... We acquired their land but we cannot measure goodwill in terms of money... so we pay them a generous amount, plus we also gave disturbance allowance, so the formula was that if someone is paying rent then we will pay their 12 month rent in advance. (Director general, client)

Crisis Management Model for Megaprojects

The model in Figure 2 outlines the different types of crises, such as internal technical/economic, internal social, external technical/economic, and external social crises. We added the related coping strategies of communication, coordination, resource mobilization, planning and multitasking, negotiation, and compensation.

Notably, not all of the coping strategies are equally relevant for each type of crisis. At the top-left side of Figure 2 are internal technical/economic crises, for which the coping strategies are communication, coordination, resource mobilization, and negotiation. The lower left side shows the coping strategies for internal social crises, which are communication, coordination, and resource mobilization. The top-right side indicates the coping mechanisms for external technical/economic crises, which are communication, coordination, resource mobilization, planning and multitasking, and compensation. The lower-right side of Figure 2 shows that external social crises require

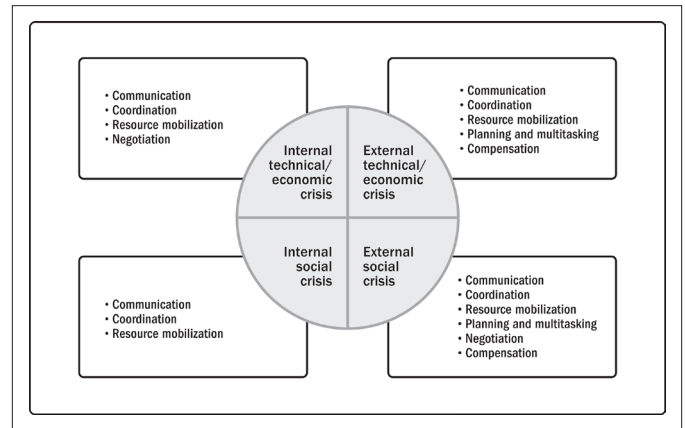


Figure 2. Crisis management model.

communication, coordination, resource mobilization, planning and multitasking, negotiation, and compensation. Some coping strategies are generic across crises types, whereas others are specific to a particular crisis type. Coping strategies are contingent on the type of crisis at hand. This supports the importance of crisis identification in order to apply appropriate coping strategies. Hence, crisis management encompasses the types of crises and their related coping strategies.

As mentioned earlier, *problem-focused coping strategies* are aimed at problem-solving (Folkman & Lazarus, 1980); they are ways to directly tackle the situation or problem (Okuntade, 2015) and we considered crises to be a problem. Table 3 shows that problem-focused strategies can be classified into two categories: (1) general coping strategies and (2) particular coping strategies. General coping strategies are those required for all four types of crises. In our case, we identified communication, coordination, and resource mobilization as general coping strategies. From a process perspective, the presence or need for these types of coping strategies might be checked prior to the selection of one of the specific coping strategies.

Specific coping strategies are specific to certain types of crises. For example, planning and multitasking is only considered necessary for external technical/economic and external social crises. Negotiation is only relevant for internal technical/economic and external social crises. Compensation is useful for external technical/economic and external social crises. We did not find specific coping strategies for internal social crises. Therefore, in terms of specific coping strategies, we can say that not all coping strategies are equally relevant for all kinds of crises.

Discussion

This study is one of the first to identify and categorize types of crises and related coping strategies in megaprojects. We relied on the crisis typology of Mitroff et al. (1987) and Shrivastava and Mitroff (1987), which was originally developed in the context of permanent organizations and transcended it into the

Table 3. Crisis and Coping Strategies Matrix

Crisis	Internal Technical/Economic Crisis	Internal Social Crisis	External Technical/Economic Crisis	External Social Crisis
General coping strategies			Communication Coordination Resource mobilization	
Specific coping strategies	- Negotiation -	- - -	Planning and multitasking - Compensation	Planning and multitasking Negotiation Compensation

realm of temporary organizations (i.e., projects; Table 4). Table 4 builds on the typology developed by Mitroff et al. (1987) and Shrivastava and Mitroff (1987); however, it contains the crises that occurred in the project we studied. In this way, we extend the crisis typology developed for permanent organizations to the temporary setting of megaprojects. This approach of applying concepts from neighborhood disciplines to investigate new phenomena in a different discipline is known as *bricolage* and is recommended by Denzin and Lincoln (2005). The study results support the applicability of the typology in this new context.

By building on this framework we identified and categorized contingency strategies related to crisis type (Table 3). This complements prior research, which mainly focused on coping with different types of stress (Folkman & Lazarus, 1980); changes and stress (Gällstedt, 2003); risks (Miller & Lessard, 2001); environmental uncertainty (Karlsen & Elvenes, 1997); or time-dependent uncertainty of information adequacy (Pich et al., 2002). This study provides a new perspective by identifying and categorizing the specific coping strategies for crises in megaprojects. Through our findings, we extend the existing literature to six coping strategies: communication, coordination, resource mobilization, planning and multitasking, negotiation, and compensation. Furthermore, we dissect coping strategies into general and specific coping strategies. The study results indicate that general coping strategies are applicable to all kinds of crises, whereas specific coping

strategies are contingent on specific crisis types. Through this, we expand the existing literature on crisis and coping strategies in organizations to that of megaprojects.

The three general coping strategies of communication, coordination, and resource mobilization refer to typical management practices described widely in the existing literature as being crucial for project and organizational success. Communication plays a central role in any form of organizing (DeSanctis & Monge, 1999), but it is crucial when a megaproject (with a temporary and interorganizational setting) faces a crisis. Coordination becomes challenging in turbulent situations (Kellogg et al., 2006) and helps organizations accomplish interdependent and collective organizational tasks, which they could not carry out without the contributions of external actors (Pitsis et al., 2003). Related examples for the importance of communication and coordination for project performance include Turner and Müller’s (2004) cross-sectional study and Hossain’s (2009) study on the related particularities in construction projects. Rawat et al. (2012, p. 802) show the importance of resource mobilization by stating that “[a]ny delay in the mobilization of resources will have negative impacts on other activities carried out in the phase or in subsequent phases.” Coping using these three strategies is done by identifying possible solutions to the crisis at hand through communication with relevant stakeholders, identifying and agreeing on a way forward, and then mobilizing resources and coordinating activities to implement the solution. All these steps require communication.

Negotiation is a coping strategy used for both internal technical/economic, as well as external social crises. As a dialogue to accomplish beneficial outcomes for those involved, negotiation is the most fundamental way of interacting to identify the involved parties’ limits of acceptability of possible measures to solve conflicts or maneuver out of a crisis. Through personal interaction, negotiation lends itself to crises of a social nature, but also those where economic limits can be negotiated. As a direct interaction between the parties in a project, it is different from mediation, which occurs through a neutral third party, or arbitration, which would resemble a legal proceeding. Project stakeholders frequently negotiate and interact with each other (Hobday, 1998). Stakeholders face continuous pressure to establish and maintain a working consensus among them (van Marrewijk et al., 2016). Negotiation builds on the goodwill and

Table 4. Typology of Crises in Megaprojects

	Technical/Economic Crisis	Social Crisis
Internal	Cell 1 Design issue/design change Unknown underground condition Site clearance/site possession Coordination and communication gap	Cell 3 Client capacity Contractor, subcontractor capacity Coordination and communication gap
External	Cell 2 Unknown underground services and utilities Extreme weather condition Political instability Shortage of material	Cell 4 Land acquisition and court stay order Congested area Security concern

shared interest of the parties to jointly solve the crisis at hand. Anderson and Polkinghorn (2008), who investigate negotiations in construction megaprojects, point to the need for negotiations to remain principle-based and to recognize that trust is a critical element that must be maintained in order to commence problem-solving more easily.

Two coping strategies were identified for external crises: planning and multitasking and compensation. The former coping strategy refers to active measures taken to mitigate crises or their impact, whereas the latter applies to cases of no or insufficient mitigation, which results in an adverse deviation from plans, for which the impacted parties are compensated. Songer et al. (2000) point to the need for planning and multitasking when it comes to changes caused by crises in construction projects. They emphasize the particular multitasking needed by craftsmen, involving using alternative construction methods and the implementation of new or different teams. They emphasize the need to finish planning before these multitasking activities take place.

Compensation as a coping strategy does not refer to planned compensations here, such as planned compensation to households for loss of land due to the megaproject (e.g., Jia et al., 2015). Instead, it refers to compensation for deviations from original plans or adverse effects through crises. Compensation is a governance approach to risk management, where unresolved issues from the project management level are deferred to the governance level. Chang (2015) suggests that this approach works best for practitioners, if defaulting to risks and potential contract breakup have been included up front in the project governance system and the implications for the governance system have been jointly considered by the parties in the project.

Conclusions

This is the first study on crises and coping strategies in megaprojects. We extend the literature on coping strategies by developing theory. To answer research question RQ1 (the types of crises) we used the framework from Shrivastava and Mitroff (1987), who distinguished between internal/external and socio-economic crises. All crises identified in the case study did fit into these four categories. Research question RQ2 asked about the types of coping strategies for the different types of crises. The results are shown in Figure 1 and modeled in Figure 2. There are general coping strategies that apply to all types of crises: communication, coordination, and resource mobilization. Other coping strategies are contingent on crisis types, such as negotiation being applied in internal technical/economical and external social crises, or planning and multitasking and compensation being applied in all types of external crises (Table 3). The answers to the research questions are further elaborated on in the Discussion section.

Theoretical Implications

We used contingency theory as a theoretical lens through which we assume that the interaction and alignment of context (i.e., crisis

type) and organizational characteristics (i.e., coping strategies) lead to the most beneficial outcome for the project. In interpreting Table 3, we see theoretical implications in the form of general enablers. These include extended communication with stakeholders, providing for flexibility in designing, agreeing, and implementing crisis-specific measures and the related coordination of tasks. Moreover, it also includes the mobilization of the resources required to execute these tasks. Hence, crises in megaprojects are overcome through joint efforts and not through one-sided decision-making by authoritative project managers. This supports earlier findings, for example from psychology, which show that crises are better handled by leaders who are more interactive and charismatic than those who are effective in non-crisis situations (e.g., Pillai, 1996). Similarly, when taking the perspective that crises increase the complexity of planned projects, leadership studies in project management have shown that project managers in the most complex projects score highest in emotional intelligence and other people-related personality dimensions (Turner & Müller, 2006). To that end, crises generally require people-related managers with strong communication and emotional skills, who develop responses to crises in interaction with stakeholders. Beyond this general level are the specifics of some crisis types, which require other coping methods. Closest to the general coping strategies is the negotiation strategy, which is also based on dialogue and serves in internal and external crises. Specific to external crises are two types of coping strategies: (1) measures of planning and multitasking to overcome the crisis, and (2) escalation to the governance level if these measures do not succeed. The contribution to contingency theory is twofold. First, the interaction between context and organizational characteristics that happens through planning and multitasking of measures executed by the set of stakeholders appropriate for the crisis at hand (in conjunction with the three generic strategies of communication, cooperation, and resource mobilization). Second, the surrender and default to the governance structures in cases where these measures are not successful.

Managerial Implications

Managers benefit from the study by being aware of the model shown in Figure 2 and selecting a coping strategy appropriate for their crisis type as a starting point. Moreover, the model may be incorporated into project management training and education programs to develop awareness of the types of crises to be expected in megaprojects and the possible coping strategies that may be relevant. In a second step, this includes training in personality styles, such as those improving emotional intelligence and interaction in leadership (Turner & Lloyd-Walker, 2008), which has been identified as a success factor for projects in general, but especially in more complex projects and programs (Shao, 2011; Turner & Müller, 2006).

Like every study, this investigation has its strengths and weaknesses. Among the former are the use of existing techniques to classify crises, an approach supported by the clearness of the results. Moreover, the chosen case showed a wide variety of crises, which allowed for the first identification of

a taxonomy of coping strategies. Among the weaknesses is the limited representativeness of a single case study, which limits the results to the specific case and defines the need for further case studies to identify a broader spectrum of crises and coping strategies, such as those in the public sector, telecommunications, or other non-construction types of megaprojects. The results from these studies can then be validated and generalized through quantitative global studies. Furthermore, future studies may extend the present work by addressing the specific processes required to implement the coping strategies in different circumstances, probably leading to a taxonomy of implementation processes and their context contingency.

The contribution of this study to knowledge lies in a first identification of crisis types for megaprojects and a model for and taxonomy of possible coping strategies for them. The model shows the multidimensionality of coping approaches, which requires the balancing of a leader's personality (i.e., his/her interaction with stakeholders); professionalism in project management (i.e., planning and coordination); as well as the ability to identify the limits of management and to escalate issues to the governance level when appropriate.

Limitations and Future Research

In this article, we followed Mitroff et al.'s (1987) and Shrivastava and Mitroff's (1987) crisis typology as shown in Table 1, considering the dimensions of internal-external and social-technical/economic crises. However, future researchers might split technical and economic crises; we represented them in a combined cell. We used an existing model (which cannot be changed without a related study that proves the change to be acceptable). This model might be modified/refined through a future study, and then subsequent studies can investigate the phenomenon at a more granular level. Another limitation of this study and a potential subject for future research is to consider the roles of emotions, emotional intelligence, and leadership, the importance of which increase significantly when crises erupt. Crises lead to emotional burnout, but we did not study the influence of crises on the emotions of the people involved in the management of these crises. Moreover, we did not study the outcomes of applying the coping strategies, which would be useful in the selection and application of coping strategies. The set of coping strategies and crisis management in general could be applicable to other sectors, such as tourism, food, and the urban environment. Our research, however, provides evidence from megaprojects; researchers can further investigate the implications of this study in different industries by replicating the research in different sectors.

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