Critical decision in crisis management: Rational strategies of decision making

By Mario COCCIA [†]

Abstract. Turbulent environment can create crises that management has to soles in a limited time with critical decisions. Critical decisions are an attempt to apply efficient modes of cognition and action to enable the organization to cope with consequential environmental threats or take advantage of important opportunities in the presence of highly restricted time in turbulent markets and/or specific situations. Critical decisions involve a process of the organization's leadership to think, consult, act, gain acceptance for optimal solutions to complex problems in the presence of highly restricted time in crisis given by scarce resources, uncertain factors, aversive environment, environmental difficulties, ambiguous circumstances, unclear and volatile situations, or a combination of these factors. This study presents the endogenous and exogenous types of crises for organizations and vital factors for critical decisions that can be categorized in responsive, proactive and recovery critical decisions. After that, the study shows strategic operations and steps of critical decisions in a perspective of reductionism, and a rational structure based on tree diagram to systematize the process of decision making. The study here also suggests strategies for critical decisions in different environments based on theory of rational choice, such as max-min, max-max and min-max approaches, described with a vital example. Final part of this study shows how a complex problem can be treated in different ways in a wider perspective of ecological rationality by approaches of resolution, solution and dissolution. The implications of strategic management are that the approach of dissolution of a complex problem requires design of a critical decision that may incorporate research and trial and error activities. Overall, then, this paper suggests one of the most effective way of solving systemic and complex problems by private and public organizations operating in, more and more, turbulent markets and volatile environments.

Keywords. Strategic management, Decision making, Critical decision, Crisis management, Competitive advantage, Strategies, Strategic change, Business Strategy, Operational excellence, Problem solving, Bounded rationality, Decision rule, Decision theory, Natural disasters, Risk management, Bounded rationality, Environmental threats, Ecological rationality, Theory of rational choice.

JEL. C44, D70, D81, D91, H12, M51, Q54.

1. Introduction

T he markets and environment have, more and more, a growing dynamism that generates environmental uncertainty and turbulence (Johnson & Scholes, 1988; Emery & Trist, 1965). In this uncertain and unstable environment, organizations are open systems having activities in interaction with external factors (McDermott & Taylor, 1982; Gioia & Chittipeddi, 1991). Crises and problematic situations confront

[†] CNR, National research Council of Italy & Yale University School of Medicine, 310 Cedar Street, Lauder Hall, Suite 118, New Haven, CT 06520, USA.

☎. + 85287-4804 ✉. mario.coccia@cnr.it

organizations and leaders with complex issues they do not face on a daily basis—for example, in the presence of hurricane, earthquake, political instability, terroristic attacks, high custom duties, high taxation, market restrictions, etc.Critical decisions are hard calls, which involve tough value trade-offs and also major changes, such as stop the production after disasters, staff cuts and/or move the location of firms in other geoeconomic regions (Coccia, 2018r). These manifold factors lead to organization and management to take critical decisions to cope with consequential environmental threats in the presence of highly restricted time, endeavoringto minimize the possible loss for a worst case scenario. A critical and effective decision also requires interagency and inter-organizational coordination. Moreover, the effective implementation of critical decisions requires that personnel of different departments work together. In this context, public organizations are originally designed to conduct routine business in accordance with values of fairness, lawfulness, and efficiency. However, critical decisions in the presence of a crisis require flexibility, improvisation, redundancy, and the breaking of rules in a very short time. An effective critical decision to a crisis is, to a large extent, the result of a naturally evolving process that may not be managed in linear, step-by-step, and comprehensive fashion. Next sections show sources of risk for open organizations that trigger critical decisions, logical steps of the process of critical decision making and a set of general strategiesfor critical decisions to cope with consequential environmental threats in turbulent markets.

2. Type of crisis for applying critical decisions

A critical decision occurs in the presence of a crisis given by an unexpected complex problem that involves the stability of a public and/or private organization, institution or country at risk. These sources can either originate internally or they can be due to external factors to organizations. If organizations do not decide timely, and sources of risk are left unaddressed, they can permanently damage the business, public service or cause it to fail with consequent socioeconomic problems. The identification of a crisis for organizations needs the evaluation of vital elements, such as: a) the problem must pose an imminent threat to the organization; b) the situation must involve an element of surprise or shock; c) unexpected and uncertain nature of a complex problem will place pressure on business to make timely and effective critical decisions. However, some crises are unavoidable, and organization has to be ready to handle conflicts. A general definition of risk for organizations is a performance variance or environment change, whetherthey impact the organizationand business negatively (cf., Bouchet *et al.*, 2003, p.10). Crisis can be due to endogenous and exogenous factors that trigger a process of critical decisions for survival and or adaptation of organizations themselves in new contexts.

☐ Endogenous *crises* to organizations are:
1. Financial Crisis

2. Personnel Crisis
3. Organizational Crisis
4. Technological Crisis

1. A financial crisis occurs when a business loses value in its assets and the organization cannot afford to pay off its debt. This crisis can be due to a significant drop in demand for the product or service of firms that should move funds around to cover immediate short-term costs.

2. Personnel crises can be due to strikes for contractual claims, such as higher salary, benefits, occupational safety, etc. It can be also due to unethical or illegal misconduct of employees. Organizations need to identify the scope of the situation and determine appropriate meetings with representatives of personnel and trade-unions in order to find a plausible solution, and if necessary, provide a written agreement.

3. Organizational crises are due to many situations, such as a low demand of products and services, conflict between owners or between shareholders and management, etc. This type of crisis can also include misconduct misusing managerial powers.

4. Rapid evolution of technology can create problems to organizations that have to apply flexibility and capacity of adaptation in the presence of technical change in markets. The first step is to hire personnel with high-tech experience in emerging technologies and/or design strategic alliances with high-tech firms to cope with consequential and rapid technological change (Coccia, 2017, 2017a, 2019; Coccia & Watts, 2020)[1].

☐ Exogenous *crises* to organizations are due to:
1. natural disasters
2. social risk
3. economic risk
4. political risk
5. terrorist risk

1. Natural disasters refer to phenomena of physical geography, such as earthquake, hurricane, flood, etc., that may negatively impact the infrastructure, facilities, equipment, machines, marketsof organizations, etc. This situation can be worsened by weak infrastructure and inefficiencies of local and national institutions.

2. Social risk is due to collective actions ofspecific organizations, such astrade unions, non-governmental organizations, lobbies of local

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[1]For other studies about the interaction between science, technology and innovation, their sources, evolution, diffusion and impact on socioeconomic systems, see: Calabrese *et al.,* 2005; Chagpar & Coccia, 2019; Coccia, 1999, 2003, 2004, 2005, 2005a,b,c,d, 2006, 2006a, 2007, 2007a, 2008, 2008a, 2009, 200a, b, 2010, 2010a, b, c, 2011, 2012, 2012a, b, c, 2013, 2014, 2014a, b, c, d, e, f, g, 2015, 2015a, b, c, d, 2016, 2016a, b, 2017, 2017a, b, c, e, f, g, h, 2018d, e, f, g, h, i, l, m, n, o, p, q, 2019, 2019a, b, c, d, e, f, g, h, i, l, m, n, o, p, Coccia, 2020; Coccia & Benati, 2018; Coccia & Cadario, 2014; Coccia & Finardi, 2012; Coccia & Rolfo, 2002, 2008, 2009, 2013; Coccia & Wang, 2015, 2016; Coccia & Watts, 2020.

authorities and/or international organizations that influence policy and/or management of public and private organizations. In this context, the worst-case scenario, associated with social risk, is the physical aggression of employees and even kidnapping for firms/institutions located in problematic geoeconomic regions, such as in Libya, Nigeria, Chad, etc.(cf., Coccia, 2017d).

3. Economic risk refers to the variability of structural indicators in economy, such as output, price, interest rate, foreign exchange, trade, employment, public debt, etc. For instance, hyperinflation in some countries of South America, high public debt of some European countries, etc. (cf., Coccia, 2017b). Another source of economic risk is devaluation or general increase of prices, etc. (cf., Coccia, 2016). In general, macroeconomic risk includes all negative events that may affect industries or firms. Some of these risks are difficult to identify exclusively within a single category, such as energy shortages is an economic risk that can also be due to natural causes (cf., Coccia, 2005, 2007, 2010).

4. Political risk is associated with political instability and uncertainty of countries. This risk can lead to alter governmental policy or political regime (cf., Coccia, 2019b). Political risk covers any unanticipated detrimental actions to domestic/foreign organizations taken by local authorities, such as expropriation, breach of contract including loan repudiation, foreign exchange controls, trade restrictions or trade agreements that could favor some competitors at the expense of others, etc. (cf., Miller, 1992; Coccia, 2017c). In particular, political risk concerns any potential or actual change in the political system, but also includes any sociopoliticalregression that may disrupt the foreignand/or domestic businesses, such as in countries of Latin America or Africa (Coccia, 2019a, 2019b, 2019c).

5. Terrorism is due to some group organized that has technical skills to carry out a terrorist action directed to challenge a nation's authority and induce fear and anxiety into civilian population (cf., Crenshaw, 1981, p.380).Terrorism can be due to economic factors (such as low income, poverty, inequality…), high demographic growth associated with poor resources, political factors, etc. (cf., Coccia, 2017d, 2018, 2018a, b, c; Krueger, 2007; Newman, 2006). Ackoff & Rovin (2003, p.146) argue that "countries that are the breeding grounds for terrorists are the least advanced economically". Terrorism is a source of risk for public and private organizations that need critical decisions in volatile and uncertain environment.

3. Critical decisions and strategies to cope with consequential environmental threats

A crisis management team is a task force within organizations to proactively prepare for managing crises and taking critical decisions. These teams are in charge of anticipating potential problems and making critical

decisions to resolve strenuous situations and complex problems for organizations. Successful crisis management teams understand the different types of crisis and are thoroughly prepared for all situations. In a crisis, leaders are expected to reduce uncertainty and provide an authoritative account of problems, solutions and difficulties. When leaders have formulated a strategy for complex problems, they must get others to accept the proposed solution.In fact, the strategy of leaders can coincide and compete with those of other parties, who hold other positions and interests, and who are likely to espouse various alternative solutions and actions. Management of critical decisions is the process by which an organization deals with a disruptive and unexpected event that threatens to harm the organization or its stakeholders. Vitalfactors for a critical decision in aversive environment: are:

(a) a threat to the organization,

(b) the element of surprise,

and (c) a short decision time.

Venette (2003) argues that "crisis is a process of transformation where the old system can no longer be maintained". Therefore, a critical decision generates a "strategic change" (cf., Gioia & Chittipeddi, 1991). In this context, critical decision process endeavors to find the best ways to avoid effective and potential threats to organization. In particular, critical decisionsshould deal with threats before, during, and after they have occurred. Management has to be able, using high skillcompetencies and techniques, to identify, assess, understand, and cope with a serious situation, especially from the moment it first occurs to recovery procedures (cf., Groh, 2014).

Different types of critical decisionsare (cf., Seeger *et al.,* 1998; Shrivastava *et al.,* 1988; Bundy *et al.,* 2017):

Responsive critical decision

When a problem hits business of organizations, it is important to have a plan of action ready that matches the situation at hand. Crisis management executes the plan of critical decisions and handles any unexpected roadblocks that may pop up. Responsive critical decisions are used for financial and/or personnel crises where organizationsmust provide a timely response.

Proactive critical decision

Proactive critical decision anticipates a potential problem and works to prevent it, or prepare for it. For example, building an earthquake-resistant factory and sharing an evacuation plan with employees are methods to prepare for natural disasters. While not all crises can be prevented or planned for, actively monitoring for threats to business oforganizationscan reduce the impact of potential problematic situations in future.

Recovery critical decision

Sometimes, itis not possible to see the complex problem coming (e.g., earthquake), or it is too late to prevent the damage it caused. In these cases,

company may not be able to lessen the impact, but it can begin to salvage what is left of the situation.

The usual perspective for critical decisionsis based on strategic operations and steps, such as (Linstone, 1999):

– the definition of a complex problem *Pr*from volatile environment, and the implicit assumption that the problem can be solved.After that, it is important to gather information for possible solutions of the problem *Pr*

– *Reductionism*, the study of complex problems in terms of a very limited number of variables and the critical interaction among them

– Identification of the purpose of critical decision about the complex problem *Pr*under study

– Suggestion and evaluation of different alternative solutions to complex problem *Pr*under study

– Ignoring or avoiding the individual interests

– Selection of the optimal solution, or the search, whenever possible, for a best solution in a short time

– Implementation of the critical decision and evaluation of results

In short, the starting point of critical decision is a complex problem that we assume a possible solution exists. A complex problem has several solution concepts (Sl), each of which leads to several consequential problems (Pr) and solutions (Sl). A critical decision can be systematized by a tree structure of decision makingwith different levels of *Pr* and *Sl* succeeding (Fig. 1).
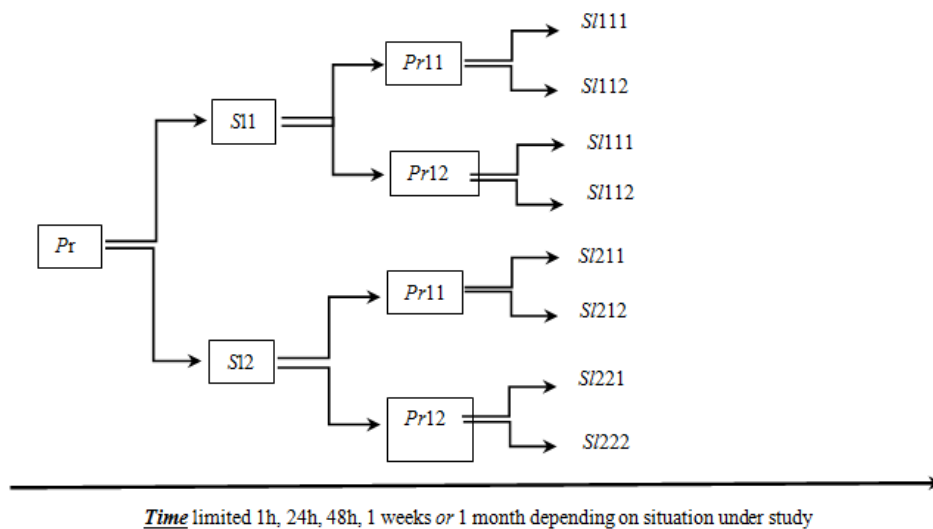

Figure 1. *The problem-solution tree for critical decisions.*
Note. *Pr*=problem; *Sl*=Solution.

Different rulesand strategies can be applied for critical decisionsin the presence of turbulent scenario, such as:

o *max-min* critical decision

o *max-max* critical decision

o critical decision based on *highest expected value with different probability of scenarios*

M. Coccia, 7(2), 2020, p.81-96.

o critical decision based on *highest expected value with equal probability of scenarios*

o *min-max*critical decision

A simple example can clarify these different approaches for critical decisions (cf., Lloyd & Dicken, 1977).

First of all, we create a matrix of results (or *payoffs*) as in Table 1.

Table 1. *Matrix of payoffsfor a critical decision process*

	Environmental Situation		
	I	II	III
Strategy 1	200	155	145
Strategy 2	130	220	130
Strategy 3	118	118	225

Critical decision depends on manifold endogenous and exogenous factors, also considering the behavior of management toward risk and uncertainty. The critical decision based on different rules is as follows.

o *Pessimistic critical decision* is based on a rule of *max-min*, selecting the max of the worst result in each strategy:

145 for strategy 1	Critical decision with *max-min*
130 for strategy 2	
118 for strategy 3	

o *Optimistic critical decision* is based on a rule of *max-max*, selecting the max of the best result in each strategy:

200 for strategy 1	
220for strategy 2	
225 for strategy 3	Critical decision with *max-max*

o *Rational critical decision*considers relative probabilities of each environmental situation.

For instance,if the probabilities of situations in table 1 are assumed to be:

	Probability
Environmental Situation I	0.2
Environmental Situation II	0.5
Environmental Situation III	0.3
Total	1.0

then, critical decision here is based on selecting the strategy with the *highest expected value, given by*:

Strategies		*Expected value*	
strategy 1	0.2(200)+0.5(155)+0.3(145)	=161	
strategy 2	0.2(130)+0.5(220)+0.3(130)	=175	Critical decision
strategy 3	0.2(118)+0.5(118)+0.3(225)	=150.1	

o *Approximate critical decision* assumes that the probabilities of all environmental situations are equal. Table 1 has three environmental situations and the equal probability is 0.333 (i.e., 1/3=0.333….):

	Probability
Environmental Situation I	0.333…
Environmental Situation II	0.333…
Environmental Situation III	0.333…
Total	1.000

This critical decision is also based on selecting the strategy with *the highest expected value:*

Strategies		*Expected value*	
strategy 1	0.33(200)+ 0.33 (155)+ 0.33 (145)	*=165*	Critical decision
strategy 2	0.33 (130)+ 0.33 (220)+ 0.33 (130)	*=158.4*	
strategy 3	0.33 (118)+ 0.33 (118)+ 0.33 (225)	*=152.5*	

o *Critical decision with Min-Max strategy*

If the critical decision, *a priori*, is strategy 3 and the environmental situation, *a posteriori*, is I in table 1, the best critical decision *ex-post* would be strategy 1, rather than strategy 3, and the regret ex-post for the wrong choice done *a priori* is 83 (i.e., 200-118). The calculation of this value for each cell is the base for *Min-Max* rule of critical decision, given by minimizing the max value of strategies, i.e.,

80 for strategy 1	
95 for strategy 2	
82 for strategy 3	Critical decision with *Min-Max*

4. Conclusion and management implications

The decision rule and mechanism for critical decisions, of course, change according to the situation that can be affected by manifold variables. In this context, it is important to consider the *ecological rationality* that claims *how* the rationality of a decision depends on the circumstances in which it takes place, so as to achieve one's goals in this particular context. What is considered rational under the theory of rational choice account, it might not always be considered rational under the ecological rationality account. In short, rational choice theory puts a premium on internal logical consistency, whereas ecological rationality also targets external performance in the world (cf., Allais, 1953; Kahneman *et al.,* 1982; Gigerenzer & Todd, 1999; Simon, 1955). In some markets, timing is the essence of management behavior in markets. In particular, management must nurture quick-footed capability for getting into the market before competitors enter the same niche and destroy profitability. For instance, in the presence of a technological crisis, firms have to improve specialized complementary assets, and undertake specific Research and Development

(R&D) investments in new technologies or strategic alliances with high-tech firms that may help to support R&D process and competitiveadvantage in turbulent markets.However, within process of critical decisions, it is also important to consider bounded rationalityof decision makers, i.e., rationality is limited when individuals make decisions by the tractability of the decision problem, the cognitive limitations of the mind, and the time available to make the decision. Firms, in a context of *bounded rationality*, aim to a behavior of *satisficing* rather than maximizing critical decisions (Simon, 1947; 1957; Gigerenzer & Selten, 2002).

In general, a complex problem can provide potential lessons in organizations for contingency planning and training for future crises. To put it differently, critical decisions provide vital material and information for a process of learning for future turbulent situations. Nevertheless, lesson drawing is one of the most underdeveloped aspects of critical decision process for crisis management. In fact, there can be cognitive and organizational barriers to learning, associated with routines of human resources involved in the decision making process of organizations. Moreover, critical decisions are part of collective memory within and between organizations and a source for historical analogiesuseful to leaders and organizationsin future complex situations (cf., Seeger *et al.*, 1998; Shrivastava *et al.*, 1988; Bundy *et al.*, 2017). Overall, then, critical decisions deal with problems that are choicesituations in which what is done makes a significant difference to those who make the choice (Ackoff & Rovin, 2003, p.9). In short, a complex problem can be treated in different ways but the most effective approaches for critical decisions to cope with consequentialenvironmental threats can be, using previous strategies: resolution, solution and dissolution (Ackoff & Rovin, 2003, pp.9-10). In particular,

‒ *Resolution* is when management employs behavior previously used in similar situations, adapted if necessary, so to obtain an outcome that is good enough. This approach for critical decisions is based on past experience, trial and error, and a common sense.

‒ *Solution* means to discover or create a behavior that yields the best, or approximately the best possible outcome, one that optimizes. However, change in environment and new information can cause solutions to deteriorate. In general, solutions do not exist in isolation from other problems.

‒ *Dissolution* means to redesign either the organization that has the problems or the environment in such way as to eliminate the problem or the conditions that caused it, thus enabling the organization to do better in the future than the best it can do today. Moreover, stakeholders might seize upon the lessons of crises to advocate measures and policy and organizational reforms to improve overall efficiency of organization (cf., Bundy *et al.*, 2017).

To conclude, the approach of dissolution of a complex problem requires design of a critical decision that may incorporate research and trial and

error. This may beone of the most effective way of treating systemic and complex problems by private and public organizations operating in, more and more, turbulent markets and volatile environments.

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