Leadership and Management Balance

for Rehabilitating Distressed Construction Projects

by

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved March 2016 by the
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ARIZONA STATE UNIVERSITY

May 2016

ABSTRACT

The objective of this dissertation is to identify a recommended balance between leadership and management activities of a project manager who aims to rehabilitate a distressed construction project.

The data for this research was collected from 338 construction project professionals belonging to fifteen large construction companies who participated in leadership seminars originated by professors from Arizona State University. The seminars contained various leadership games and exercises that were designed specifically to collect data about leadership and management actions taken by the project managers.

The data from one of the games, called "Project from Hell" (PFH), was used in this research. The PFH game presents the participants with a set of fifty-two actions cards written on a deck of game cards and asks them to select the ten action cards they perceive as being most effective for turning a troubled construction project around. Each suit of the deck represents a different category of actions, focusing on either Traditional Leadership (Hearts), Best Value Leadership (Diamonds), Traditional Management (Spades), or Micro-Management (Clubs).

Statistical analysis of the results revealed that only sixteen of the fifty-two actions cards were selected with statistically significant consistency. Of these sixteen actions, six actions were form Traditional Management actions, five were Traditional Leadership actions, and five were Best Value Leadership actions. This rendered a recommended balance of 62% leadership activities vs. 38% management activities for project managers to rehabilitate distressed construction projects. It was also found that the same balance is recommended for the normal condition construction projects. The calculated weighted

scores for ranking the sixteen effective leadership and management actions revealed that the five Traditional Management actions are the top-most effective actions. This demonstrates the importance of stand still management actions in rehabilitating in trouble construction projects

The findings were converted into easy to implement guidelines about how project managers can change habits to increase their effectiveness by focusing on the right type of actions.

A generalization of the methodology for interpreting the results of any study based on selection of activities, was also developed.

ACKNOWLEDGMENTS

I would like to express my acknowledgement for all who supported me throughout my graduate studies.

I want to thank my committee members during this research study journey, especially my committee chair, Dr. Avi Wiezel, who continually conveyed a spirit of positivity to new adventure and excitement in regards to this research. Without his guidance, trust, and persistent help this dissertation would not have been completed.

Special thanks to my committee members, Dr. G. Edward Gibson Jr. and, Dr. Kenneth Sullivan for their patience and continuous support during my graduate studies.

I also wish to express my gratitude to all my family and friends who provided me with their support and vision to continue my higher education in order to achieve my goals in life.

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CHAPTER 1

INTRODUCTION

1.1 Overview

An analysis of 20,821 projects with an average size of $200 million revealed that more than a third of the projects are at the verge of failure if nothing is done to rescue them (Project Management Solutions, 2011).

Almost three quarters of the troubled projects that underwent recovery intervention did, in fact, recover, which shows that there is a high chance of rescuing troubled projects with the help of effective management and leadership actions. This also means, however, that 26% of those projects (worth of $360 Billion) remained in distress. This amount of losing money is equivalent to more than twice the total amount spent by the U.S government on transportation and water infrastructures. (www.cbo.gov, 2011)

The signs of a project in distress include budget overrun, missed milestones, increasing change requests, mounting resolution efforts, poor quality, and poor safety record (Towel, 1999). Whether failure is measured in terms of budget, schedule, or some other requirements, the causes of such troubles are many, but are not always easily recognized (Chan & Lui, 2008).

Project failure is not uncommon in construction industry and, although there are failure avoidance methods such as risk management and quality control, once the project runs into trouble, these preventive actions are of little help. Research to identify actions and methods to remediate troubled construction projects are scarce (Loosmore, 2005). Project managers (PMs) put tremendous effort into reworking distressed projects. Without knowing that corrective actions differ from preventive actions in a way that

responds to consequences of the past events and their influences, the PMs might unknowingly escalate adverse conditions in the project. (Chan & Lui, 2008).

In many cases the turnaround or de-escalation of a distressed project relies on the effectiveness of managerial approaches taken (Keil & Robey, 1999). Although management competencies are critical components, exceptional leadership skills are required at nearly all stages of a project to accomplish sustainable turnaround. (Slatter, 2006). Therefore, leadership knowledge along with management competencies are highly regarded as capabilities that empower project managers to rescue troubled situation projects, especially in IT and construction projects (Muller & Turner, 2010).

1.2 Research Objective

The primary goal of this research study is to identify the balance between leadership and management activities which should be prescribed for project managers to respond effectively to construction projects in crisis situations.

1.3 Research Questions

This dissertation addresses the following research questions:

1. What is the statistically significant balance between leadership and management activities for a project manager to effectively direct a distressed construction project toward a positive result?
2. What are the most effective actions a project manager can take to rescue a construction project in distress?
3. How can a project professional better balance leadership and management activities in order to manage distressed projects effectively?

1.4 The Research Approach

The objective of this research is challenging. As it was mentioned, the studies regarding leadership and project management to rescue troubled situation projects are scarce. Thus, to fulfill the research objective, a new approach of research methodology was developed. Rather than collecting data by utilizing surveys and interviews, the new methodology approach provides all possible answers to study participants and asks them to select the solutions that he/she perceives to be the best based on his/her own experience and knowledge.

The literature review, as part of the research approach for this research, concentrated on two main areas. The first area of concentration was on the effectiveness of leadership activities in the project management with the focus on the balance between leadership and management. The second area of concentration discusses the experiments and tools to examine leadership and management activities. The latter area of the literature review, in fact, exemplifies the new methodology of data collection for this research as explained above.

1.5 Organization of the Research Report

The research report is organized as follows:

- The Introduction explains the research objective, research questions, and the research approach.
- The Literature Review gives an overview of previous studies in regards to the research problems and objectives of this study.
- The Research Methodology presents the approach for collecting, analyzing, and validating the data for this research report.

- The Data Analysis and results describes the answers to the problem statement and questions by providing statistically significant evidence.
- The Conclusions and Recommendations describes the overall report of the research objectives and results, and presents suggestions for areas of further study.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

As mentioned previously, the literature review for this research consists of four parts. In the first three parts, the following subjects relevant to the research objectives and questions were studied:

1. Effectiveness of leadership in project management.
2. The importance of balance between leadership and management activities.

In the third part, as a matter of new approach for data collection in this research report, the following was studied:

3. Tools to examine leadership and management activity perception in an individual.

2.2 Effectiveness of Leadership in Project Management

The study of leadership has been a major concern of project organizations and institutions since the end of the twentieth century. It has been forecasted that by 2022, project managers' competencies will expand from technical skills and proficiency to emphasis on leadership (CII, 2012). Once universities found out that their management models may not be adequate for entering the twenty-first century (Middlehurst & Elton, 1992), they have been looking for a new managerial framework that considers leadership along with management activities for any given situation (Pollitt, 1990). While the review of Muller and Turner (2005) revealed that "the literature has largely ignored the impact of the project manager, and his/her leadership style and competence, on project success," Geoghegan and Dulewicz (2008) found that there is a statistically significant relationship

between a project manager's leadership competencies and project success. Nixon et al. (2011) also found out that leadership has influential impact in the project success, and that project managers need to consider education in leadership skills for continuous professional improvement.

Different project situations demand different leadership styles (Hersey & Blanchard, 1969), especially when the project environment is complex, such as in construction projects where sequences of activities, both planned and unplanned, are performed to meet objectives that are often strictly defined (Larsson et al., 2015). Moreover, when a (construction) project is in distress, leadership competencies along with management activities are highly regarded as capabilities that empower project managers to rescue troubled situation projects especially in IT and construction projects (Muller & Turner, 2010). Muller and Turner (2010) examined the leadership competencies, as shown in Table 2.1, for successful project managers based on different types of projects. The result from Muller and Turner's (2010) data analysis shows that, critical thinking, influence, motivation, and conscientiousness are key capabilities for successful project managers in construction industries.

Table 2.1. *Leadership competencies for successful project managers, construction industry and project type by Muller & Turner*

Successful Project Managers	Construction Industry	Project Type in Terms of Complexity
Critical Thinking	●	Medium & High
Vision		High
Strategic Perspective		High
Managing Resources		Low, Medium & High
Communication		Low & High
Empowering		Low, Medium & High
Self-awareness		Low, Medium & High
Influence	●	Low, Medium & High
Motivation	●	Low & High
Conscientiousness	●	Low, Medium & High

2.3 Importance of Leadership and Management Balance in Project Management

Through the years management has been defined as the functions of planning, organizing, commanding, coordinating, and controlling (Luthers, 1988). However, as work environments become more complex, new managerial concepts are needed that consider the balance between leadership and management activities as an important element in complex projects (Luthers, 1988). Mulcahy and Perillo (2011) also mentioned emerging views of concurrent management and leadership that emphasized the emergent outcome of the collective work of people and processes in their study. There has been tension and difficulty for the leaders of organizations to balance between higher-order tasks, which are designed to improve staff, and performance (leadership), routine maintenance of present operations (management), and lower duties (administration) (Dimmock, 1999).

Leadership types vary based on the situation of a project. While it is assumed by all leadership theories and models that any leadership approach can be effective regardless of the project's situation (Kerr & Jermier, 1978), there should nonetheless be a balance between leadership and management types to optimize the effectiveness of a project manager (Wiezel et al., 2009). Although leadership processes have received frequent discussion, little is known about the processes associated with leadership, management, and the right balance between the two (Lord, 1977), as well as how such balance helps project professionals or organizations to continuously improve project efficiency and effectiveness (Nixon et al., 2011).

2.4 Tools to Examine Leadership and Management Activity Perception in An Individual

According to Wiezel et al. (2009), "Effective leadership and management activities are easier to grasp, and are thus learned, when associated with one's own decisions and their consequences, rather than with the study of someone else's experience". By deploying a simulation that allows participants to experience the real scenarios that happen in a project, and by letting them to decide what sort of leadership or management actions they should take in order to direct the project effectively with respect to the project conditions, one can determine the inclination of the individuals towards leadership and management activities (Wiezel et al., 2009).

Zorn and Violanti (1993) developed leadership educational tools at communication classes to let students assess and notice their inclinations in different leadership and management frameworks.

Utilizing a simulated situation in which an individual can understand systematic behaviors and actions affecting the project environment in a short time is one of the best ways to measure and improve leadership perceptions (Wiezel et al., 2009).

The "Project from Hell" (PFH) Game experiment was developed by a group of professors (Wiezel et al., 2009) at Arizona State University in the school of construction management. It was validated and has been used as a tool for education and assessment of students and project professionals' leadership and management activities perception. The PFH game profiles the leadership or management actions that a project professional determines to be effective, presumably, as a project manager for a new assigned project, or a project which is plagued with different troubles. The PFH game simulation gives opportunity to an individual or a group of project professionals to experience an environment based on the real-life scenarios that exist in different projects types. This lets the individual or group determine a set of (N=10) leadership and/or management actions which, from their point of view, are effective in turning around distressed construction projects' situations into the suitable conditions.

Fifty-two action cards have been developed through extensive research and tested by the developers of the PFH game. The cards comprehensively describe all critical leadership and management actions needed to influence the construction projects' performance effectively, to meet projects' stakeholders' goals. The action cards are written on a deck of cards, (refer to Appendix A for the descriptions of the actions) and, categorized into four main leadership and management types as depicted in Figure 2.1. It is necessary to mention, that each area of quadrant model in Figure 2.1 refer to a combination of leadership and/or management types.

Figure 2.1. Leadership and management types in PFH game.

Traditional Leadership Model. This type of leadership is about making relationships and trust with stakeholders and employees. It deploys actions associated with delegation, influence, motivation, and openness in order make a "want to do" environment instead of a "have to do." (Wiezel et al., 2009).

Best Value Leadership Model. Developed by Kashiwagi (2008), the model focuses on creating transparent environment through Information Measurement Theory (IMT) such as metrics. Its basis is aligning the people in an organizational structure that matches an individual's capabilities so they optimize productivity and performance, which results in higher efficiency.

Traditional Management Model. This is the prevailing approach in project management. The actions that mostly derived from a PMI's book (A Guide to Project Management Body of Knowledge, 2009) and focus on right process such as planning, doing, checking, acting, and making decisions by a project manager on the basis of a "who does what by when" notion.

Micro-Management Model. This is a directive and command based management actions which is entirely about following policies and rules in order to perform a project. Detailed directions and lack of flexibility are the key traits of this kind of management (Wiezel et al., 2009).

Each suit of the deck of cards represents one type of leadership or management type as shown in table 2.2.

Table 2.2. *Suits represents leadership and management types in the PFH game*

Suit	Leadership/ Management Type	Area of Concentration
Hearts ♥	Traditional Leadership	Focus on Trust and relationship
Diamonds ♦	Best Value Leadership	Focus on right people
Spades ♠	Traditional Management	Focus on right process
Clubs ♣	Micro-Management	Prescribes tasks in great details

Badger (2007) found that, when applying more leadership activities, there is shift form "Have to Do" (reactive) project's environment towards "Want to Do" (proactive) (refer to Figure 2.2).

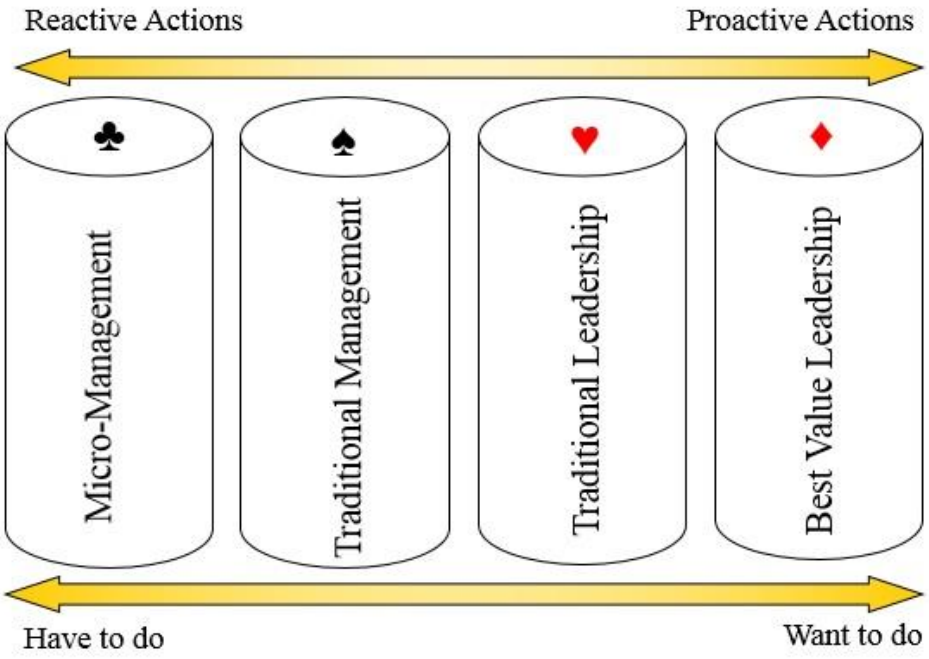

Figure 2.2. Leadership vs. management actions' quality.

Another study (Zaft et al., 2009) used Competing Values Framework (CFV) as an educational tool to assist engineering educators to measure leadership behaviors in the context of self-managed teams. The CVF explicitly describes leadership roles and expectations (refer to Appendix C for the leadership roles description), as depicted in Figure 2.3, in self-managed teams which consist of individuals who are self-regulated and are accountable simultaneously for a number of operations and responsibilities.

As Table 2.3 illustrates, leadership expectations in CVF, can be aligned with the leadership and management models in the PFH game that are indicated in Figure 2.1.

Studies show that leadership behavior has two dimensions (Hemphill & Coons, 1957). One is consideration in which the leader acts in a friendly and supportive manner, shows concern for subordinates, and looks out for their welfare. The other dimension is

the extent in which a leader is concerned with attaining the group or organization's formal goals and completing the tasks.

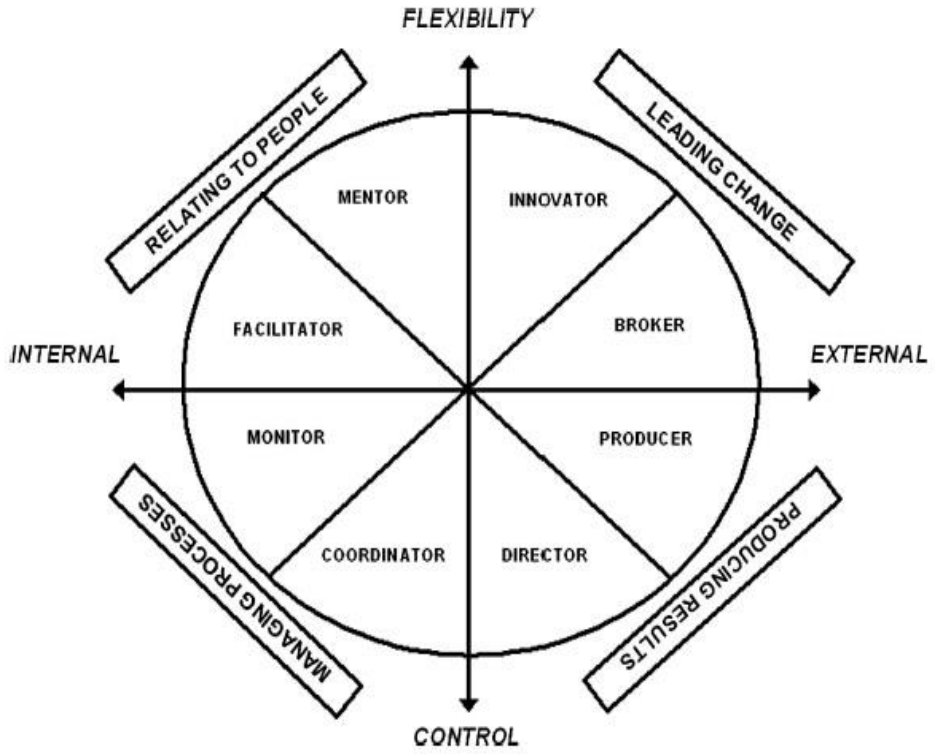

Figure 2.3. Leadership roles and expectations in competing value framework

Table 2.3. *Alignment between leadership types in CVF with leadership and management types in the PFH game.*

PFH game	CVF	Reasoning
Traditional Leadership	Relating to people	Focus is on the human resources
Best Value Leadership	Leading change	Focus is on the flexibility of leader for changing
Traditional Management	Managing process	Focus is on the structure of process
Micro-Management	Producing results	Focus is on forcing for result

The Managerial Grid developed by Blake and Mouton (1970) identifies five leadership traits each one falls into one of the dimensions described above as following:

1. Decision
2. Conviction
3. Conflict
4. Temper & Humor
5. Effort

The above traits describe overall leadership behaviors that can also be found in leadership and management action cards in the PFH game such as, participative decision making, conflict resolutions, communication with subordinates, and promoting ethics.

CHAPTER 3

METHODOLOGY

3.1 Data Collection

The data for this research was collected through leadership seminars as part of the Construction Industry Institute research (CII, 2012) at Arizona State University. A total of 338 project professionals from fifteen CII companies attended these seminars and conducted various leadership and project management games and exercises. 17 percent of the participants were female while 83 percent male. The average years of experience for those project professionals was 19 years with an average of 9 years as a project manager.

The simulations games and exercises were developed from extensive, comprehensive academic research. The simulations were tested and validated in many professional and educational environments. (CII, 2012)

The game simulations in the CII seminar were rooted in self-awareness and introspection. They encourage the participant to reflect on their decisions and actions based on their own experiences and preferences. (CII, 2012)

The game - exercise used for this research is called “Project from Hell” (PFH), which was introduced in section 2.4 of the literature review. The PFH game addresses the subjects of this study in regards to leadership and management activities for turning around a distressed construction project.

The following explanation shows how the PFH game experiment is conducted.

3.1.1 The "Project from Hell" (PFH) Game Experiment

At the beginning of the game each participant is introduced to a hypothetical troubled situation project. The distressed (hell) situation in a construction project that is used in the PFH game is described as following (Wiezel et al., 2009):

> "A lump-sum construction project has a poorly defined scope of work, is behind schedule and over cost. Everybody is working 15 hours a day but the project is falling further behind. Unexpected adverse events have intensified the project situation such as change in governmental jurisdiction regulations, the subcontractors are fighting with the Project Manager (PM). The client is writing letters and delaying monthly progress payments. The change orders are piling up, and work is being done before agreements are completed. The e-mails have acquired a rude and intimidating tone. The architects and engineers are trying to distance themselves from the job. The project is obviously out of control. The PM is an experienced manager and knows that there is a need to take decisive action now. The project clearly needs attention and positive controls. It is time to review all administrative procedures. A well-documented project will help cover the PM should litigation begin."

Wiezel et al. (2009) noted "while the example may seem extreme, the PFH describes a situation that is known to every general contractor in real life".

After reading the project's condition each participant as a player receives a deck of fifty-two shuffled action cards (refer to Appendix A for the fifty-two action cards' description). Now each participant as a player must conduct the following steps:

Step 1: Individual-Level for New Project Assignment. Each player, presumably as a project manager of a new project that is to be initiated, must select ten action cards from the deck (N=52) that he/she believes are the most effective in ensuring a successful outcome.

The selected ten action cards are recorded by each player in a score sheet (refer to Appendix B). For Instance, the ten action cards that were selected by participant #107 are shown in Figure 3.1.

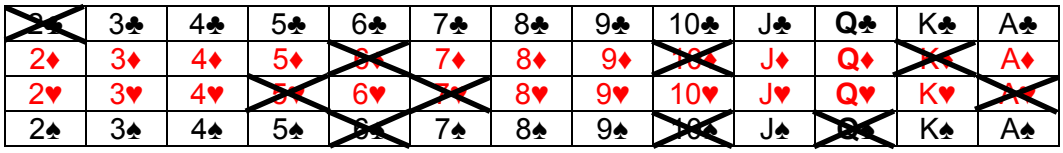

Figure 3.1. Selected ten action cards in step one by participant #107

The actions associated with the selected ten cards in figure 3.1 are described in Table 3.1

Table 3.1. *ten action cards descriptions selected by participant #107 in step one*

Action Cards	Action's Description
2♣	Review and revise the project policies and procedures, clearly stating your management objectives.
6♦	Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
10♦	Practice complete openness by meeting with the owners' representatives and explain problem, constraints, and what to expect.
K♦	Identify staff talent and reassign them to positions where they can turn the project around.
7♥	Live by the new Golden Rule, treat people how they want to be treated.
5♥	Listen to the stakeholders and acknowledge their problems even if they are not yours.
A♥	Immediately schedule meetings with all employees to determine their views and their recommendations of the inherent problems.
6♠	Identify problems; set clear and achievable objectives.
10♠	Review scope, identify all the work required to complete the project successfully, and implement.
Q♠	Conduct a partnering session with all stakeholders.

Note that in order to save time, during the PFH game experiment the participants were not asked to rank-order their selections, hence the sequence of actions in Table 3.1 is irrelevant.

Step 2: Individual Entry-Level for the PFH Scenario. Each player assumes he/she is a project manager of a troubled project with the situation described above. The player must select again the top ten action cards from the entire deck (N=52) that in his/her personal view are the most effective in turning the project around. The result of this step is also recorded individually by each player in the score sheet.

The ten action cards selected by participant #107 for Entry-Level of the PFH scenario are depicted in Figure 3.2. Also Table 3.2 illustrates the actions related to each selected card.

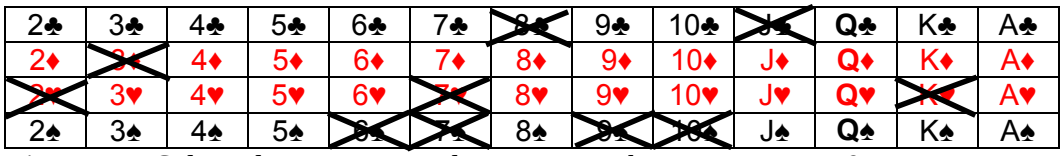

Figure 3.2. Selected ten action cards in step two by participant #107

Table 3.2. *Ten action cards descriptions selected by participant #107 in step two*

Action Cards	Action's Description
8♣	Suspend all vacations and place everyone on mandatory overtime (10 hours a day) until the project is back on schedule.
Q♣	Increase the information flow to allow better centralization of decision making.
3♦	Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty.
2♥	Focus efforts on a few "trusted relationships" to mend the relationship problems occurring.
7♥	Live by the new Golden Rule, treat people how they want to be treated.
K♥	Promote ethical relations and openness.
6♠	Identify problems; set clear and achievable objectives.
7♠	Identify the risk on the project and develop a plan to mitigate those risks.
9♠	Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.
10♠	Review scope, identify all the work required to complete the project successfully, and implement.

Step 3: Team-Level for the PFH Scenario. Participants are asked to form teams of three to five individuals. Each team is asked to discuss and select (again) the ten most effective action cards from the deck that they believe would turn the project around and record those action cards in the score sheets. Additionally, the teams are asked to prioritize the ten action cards that they have selected based on the perceived level of effectiveness in this step (not the case in other steps).

It is necessary to mention that, this step generates a lot of discussion and reasoning until all the team members agree on the set of the ten action cards and their prioritization (rank-ordering).

Upon completing this step, the teams are asked to present their selections and discuss why they perceived that their (ten) selected action cards would improve and rescue the project.

Since the experiment designs was meant to perform statistical analysis on the selection, the data collected did not keep track of which participant belongs to what team.

An example of a team ten action cards selection is shown in Figure 3.3. Table 3.3 also depicts description of each action card selected by a team. Note that the actions presented in Table 3.3 are in order of their effectiveness, with the first action card being the highest, and the tenth action card being the lowest in terms of perceived level of effectiveness by the team.

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	Q♣	K♣	A♣
2♦	~~3♦~~	4♦	5♦	~~6♦~~	7♦	8♦	9♦	10♦	J♦	Q♦	K♦	~~A♦~~
2♥	3♥	4♥	5♥	6♥	~~7♥~~	8♥	~~9♥~~	10♥	J♥	Q♥	~~K♥~~	A♥
2♠	3♠	4♠	5♠	~~6♠~~	~~7♠~~	8♠	~~9♠~~	~~10♠~~	J♠	Q♠	K♠	A♠

Figure 3.3. Selected ten action cards by a team in step three of the PFH game

Table 3.3. *Ten action cards' descriptions selected by a team in step three*

Action Cards	Action's Description
10♠	Review scope, identify all the work required to complete the project successfully, and implement.
7♠	Identify the risk on the project and develop a plan to mitigate those risks.
6♠	Identify problems; set clear and achievable objectives.
9♠	Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.
6♦	Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
K♥	Promote ethical relations and openness.
3♦	Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty.
7♥	Live by the new Golden Rule, treat people how they want to be treated.
9♥	Use participative decision-making processes and share the decision making with subordinates.
A♦	Redefine the job positions and responsibilities.

Step 4: Individual Exit-Level for the (PFH) Scenario. Each player is asked to consider what they learned from the discussions with other groups and select again ten action cards they now believe would turn the project around and record them in the score sheet. No rank-ordering of the ten card is required.

The ten action cards selection of the participant #107 for the Exit-Level of the PFH game are presented in Figure 3.4 with their related actions in Table 3.4.

Figure 3.4. Selected ten action cards in step four by participant #107

Table 3.4. *Ten action cards descriptions selected by participant #107 in step four*

Action Cards	Action's Description
Q♣	Increase the information flow to allow better centralization of decision making.
6♦	Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
3♦	Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty.
2♥	Focus efforts on a few "trusted relationships" to mend the relationship problems occurring.
7♥	Live by the new Golden Rule, treat people how they want to be treated.
9♥	Use participative decision-making processes and share the decision making with subordinates.
Q♠	Conduct a partnering session with all stakeholders.
6♠	Identify problems; set clear and achievable objectives.
10♠	Review scope, identify all the work required to complete the project successfully, and implement.
7♠	Identify the risk on the project and develop a plan to mitigate those risks.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 The Data Analysis Approach

As it was stated earlier, this study was based on the "Project from Hell" (PFH) game experiment. After eliminating the incomplete data and the data with errors (such as selecting nine of ten cards), the original 338 lines of data yielded 210 complete data vectors (71 %).

The following sections explain data analysis and results to fulfill the research objectives and questions:

1. What is the recommended balance between leadership and management activities for a project manager to effectively direct a distressed construction project toward positive a result.
2. How can the recommended balance between leadership and management activities be observed or measured in construction project professionals.
3. How can a project professional better balance leadership and management activities in order to manage distressed projects effectively.
4. Generalization of the PFH game. By conducting a hypothesis data analysis and two-tailed *t* test this section proves that the PFH game can be expanded to more leadership and management activities for further research in this field by providing a formula to examine whether an activity is statistically significant.

4.2 The Recommended Balance between Leadership and Management for Rehabilitating Distressed Construction Projects

The first step of the data analysis was to find out the recommended balance between leadership and management activities for effective project management in troubled construction projects.

A two-tailed *t* test was conducted for each level of the PFH game in order to identify whether an action card is statistically significant to be considered as an effective action for project managers. The number of times (frequency) each action card was selected by individuals or teams was considered for calculating the *t* score. Additionally, according to the action card selection in the PFH game, each of the selected action cards (N=10) are unique, and therefore there is no repeated action cards in the selection. Thus, each action card could be selected between zero times and the size number of the sample (where all the teams select that particular action card). Table 3.1 shows the parameters and their value for finding t value for each action card.

Table 4.1. *Parameters for t value calculation*

PFH game's level	Sample size	Degree of freedom (*df*)
New Assignment	210 (individuals)	209
Entry level PFH	210	209
Team Level PFH	94 (Teams)[1]	93
Exit Level PFH	210	209

The level of significance was set at 0.05 (p=95%).

[1] It should be noted although the teams consisted of 3 to 4 individual project professionals, thus one might think that, therefore the sample size for individual selection levels in the PFH game must be at least consisted of 282, however it has to be said that the sample sizes for each level are based on the completed score sheets that were handed to the participants. There were some scoresheets that the information in the individual selection levels (step one, two and four of the PFH game) scoresheets was not complete so they were eliminated due to false data entry that would be caused by repetitions or omissions.

As an example for *t* test analysis, consider the table 4.2 (pg. 29). The *t* value for the first action card,10♠, was calculated as follows:

- *N*: Number of action cards= 52 (i=1,2,…,*N*)
- *K*: Number of Teams=94 (Sample size)
- *m*: Number of action cards selection in each level of the PFH game= 10
- *K/m*: Minimum number of the PFH game experiment or sample size in order to have a possibility that each action card is selected at least one time =5.2
- *Km/N*: The average number of times each action cards can be selected based on the size of the data sample in the team level of the PFH game= 94/5.2=18 (rounded)
- σ: The standard deviation for the number of times each action cards selected in the team level of the PFH game. (σ was found to be approx. 19)
- *df*: The degree of freedom. As Table 4.1 shows for the team level *df*=93
- Z_i: Number of times action card *i* was selected. *i*=1,2,..,52. Z_1=74 (for 10♠)
- t_{min}: Minimal t value for the action card *N* to be statistically significant. It is set based on the level of significance of 0.05. t_{min}= 1.98 (for df= 93)

From here the t value can be calculated based on the following equation:

- $t = \frac{Z_i - Km/N}{\sigma/\sqrt{df}}$

Therefore the *t* value for 10♠ is: 28.37= $\frac{74-18}{19/\sqrt{93}}$ >1.98

The *t* value showed, 10♠ is statistically significant action cards based on the level of significance of 0.05 which is equal to the probability of 95% in the two-tailed *t* test.

Upon identifying the statistically significant effective leadership and management action cards for each level of the PFH game, the ratio between leadership to management action cards was calculated to identify the recommended balance between them.

The findings of the *t* test revealed that in a new assignment project (refer to Appendix F) the proportion of statistically significant leadership to management activities for project managers is 59% to 41% as Figure 4.1 shows. The consensus of project professionals is that for new (normal) project, PMs must use more leadership than management.

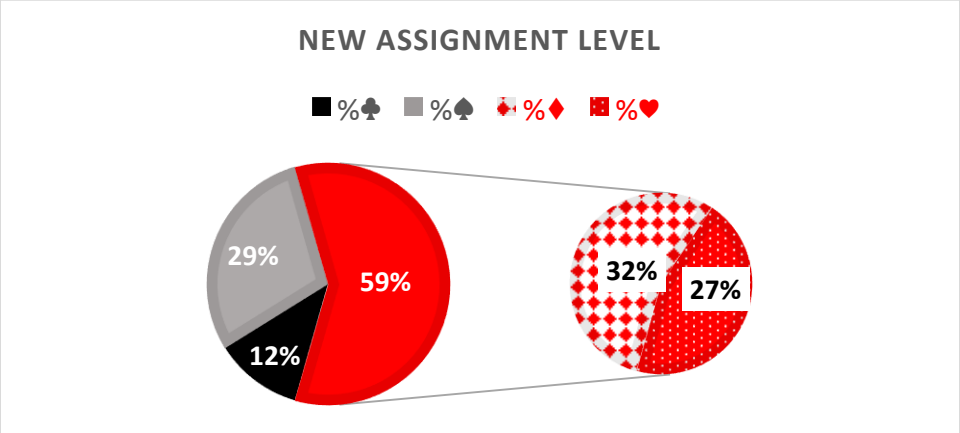

Figure 4.1. Balance between leadership and management activities in the step one of the PFH game.

The result of the *t* test for the Entry-Level PFH (refer to Appendix F) indicated that the percentage of effective leadership versus management activities to deal with the troubled situation project is approximately the same. (51% Leadership vs. 49% Management) as depicted in Figure 4.2

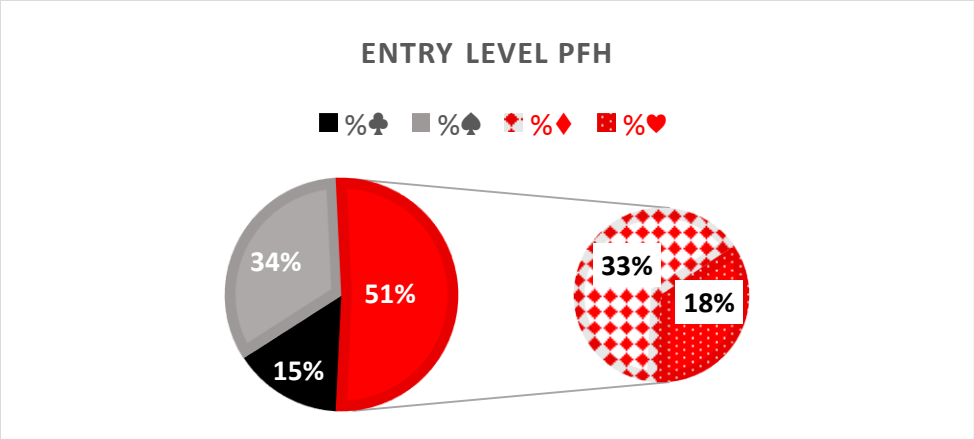

Figure 4.2. Balance between leadership and management activities in the step two of the PFH game.

It is worth noting that when the participants had to discuss their decisions and agree on a set of ten effective action cards in Team-Level (step three) of the PFH game, the result showed a considerable change in balance between leadership and management activity. The findings revealed that the balance between leadership and management activities is 62% to 38% in the Team-Level, which was an increase of 11% in leadership compared to the individual Entry Level PFH. It is also worth noting that the teams' results showed no Micro-Management activity was considered to be effective in dealing with troubled construction projects. Additionally as the Table 3.3 shows, the effective leadership actions were evenly divided between Best Value (Diamonds) and Traditional Leadership (Hearts).

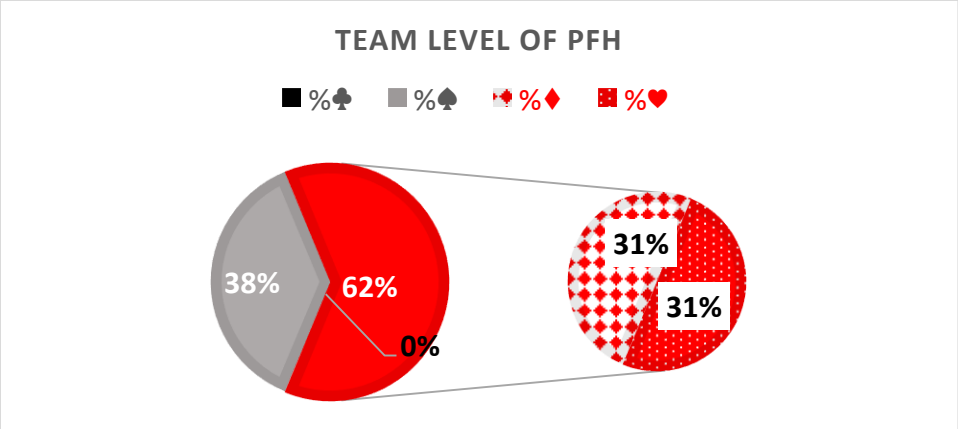

Figure 4.3. Balance between leadership and management activities in the step three of the PFH game.

The result of the *t* test in the Exit Level PFH also indicated the minor influence of the Team Level result that had on individual project professionals based on the result of the Exit Level of the PFH game, where it was expected that each project professional at least retain to his/her team (Team Level) agreement upon the effective action cards where the balance leadership and management actions is 62% to 38% but the balance declined to the Entry Level PFH where the ratio of leadership to management was 51% to 49% among effective action cards. Therefore the individual project professionals were left to their own devices again, as in the Entry-Level PFH. Also The findings showed that the only difference between the Entry-Level and the Exit Level of PFH is that, there is of more Best Value Leadership (Diamonds) and Traditional Management (Spades) activity in the Exit Level of the PFH (refer to Figures 4.4 & 4.2).

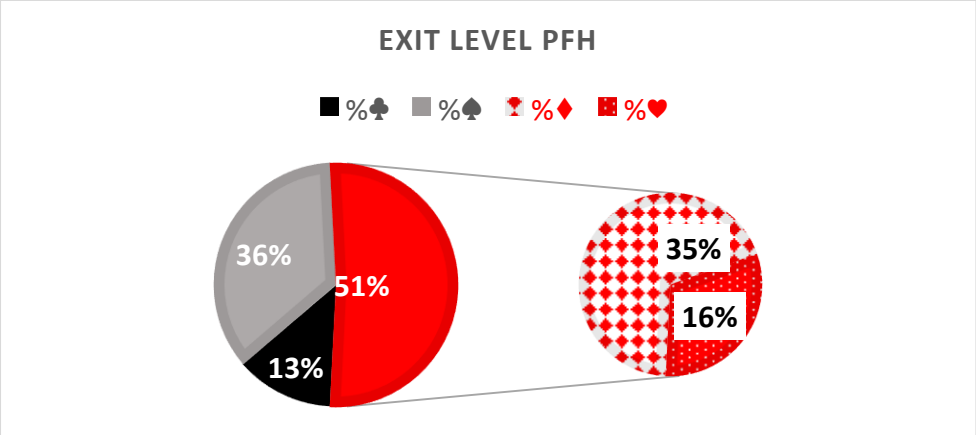

Figure 4.4. Balance between leadership and management activities in the step four of the PFH game.

It is necessary to mention that the similar balances resulted for each category in the data demography. For instance the balance between leadership and management activity in each level of the PFH game for male and female or project professionals with different years of project managers experience was very close to the balance which was found for the overall participants in Figure 4.1 to 4.4.

Based on the findings above, the result of the data analysis in the Team Level PFH game was considered for the recommended balance between leadership and management activity for project managers in order to effectively rehabilitate distressed construction projects. The reason for choosing the Team Level' result is due to consensus of project professionals by the teams upon discussion and debate on what are the most effective action cards in the troubled construction project. This finding is consistent with the finding presented in Figure 2.2 (Badger et al., 2007), in which more leadership activities are recommended for turning the reactive environment in the distressed projects in to the proactive environment which makes the people associated with the distressed project a "Want to Do" aim to recover the distressed projects.

According to the Team Level *t* test result, as Table 4.2 shows, it was found that 31% (sixteen action cards) of all leadership and management action cards (N=52) are statistically significant to turning the troubled construction projects around effectively. 10 cards (62%) of the significantly effective action cards represent leadership actions while six cards (38%) represents management actions (refer to Figure 4.3).

In conclusion the recommended balance for project managers in order to effectively rehabilitate distressed construction projects is 62 percent leadership versus 38 percent management.

Table 4.2. *Statistically significant action cards in the Team-Level of the PFH game. (N=94).*

card #	Action Card	Type of Action	Number of Times Selected	t score	Result
1	10♠	Traditional Management	74	28.3	Sginificant
2	7♠	Traditional Management	66	24.3	Sginificant
3	Q♠	Traditional Management	61	21.8	Sginificant
4	9♠	Traditional Management	56	19.2	Sginificant
5	6♠	Traditional Management	53	17.7	Sginificant
6	9♦	Best Value Leadership	51	16.7	Sginificant
7	A♥	Traditional Leadership	42	12.2	Sginificant
8	10♦	Best Value Leadership	40	11.1	Sginificant
9	6♦	Best Value Leadership	37	9.6	Sginificant
10	8♠	Traditional Management	33	7.6	Sginificant
11	5♥	Traditional Leadership	30	6.1	Sginificant
12	3♥	Traditional Leadership	29	5.6	Sginificant
13	K♦	Best Value Leadership	29	5.6	Sginificant
14	9♥	Traditional Leadership	25	3.5	Sginificant
15	Q♥	Traditional Leadership	23	2.5	Sginificant
16	3♦	Best Value Leadership	23	2.5	Sginificant

Note. See Appendix A for the action cards descriptions. The 16 actions are also described in table 4.4 (pg. 34)

Upon closer observation, one can notice that both leadership types are equally effective in managing distressed projects. In other words, five action cards (31%) of statistically significantly action cards are related to the Traditional Leadership type that

focuses on delegation and on building a relationship and trust with project stakeholders. Likewise, five action cards (31%) of effective action cards belong to the Best Value Leadership type, which concentrates on selecting and organizing the right people. Interestingly, six of the statistically significant management action cards (38%) are related to the Traditional Management style which considers the right process of producing result. Action cards associated with the Micro-Management model, which is about prescribing tasks in great detail, were not found to be statistically significant in successfully influencing project outcomes favorably.

4.3 The Top-Most Effective Leadership and Management Actions in Distressed Construction Projects:

According to step two (Team-Level) of the PFH game (refer to 3.1.1), after teams select ten action cards, they must prioritize the selected action cards from one to ten based on the perceived level of effectiveness. The more effective an action card is perceived to be, the higher position it gets. Prioritized action cards from one to ten are associated with a score. The scores decrease corresponding to the position (level of effectiveness) until an action card ranked as the tenth earns the lowest score of one.

Therefore, in order to rank the 16 statistically significant action cards, the level of effectiveness for each action card in table 4.2 must be determined by verifying the significance of its position upon team prioritization. Two-tailed *t* test was used to identify statistically significant position (rank) of the effective action cards. As an example, the calculation of the *t* value for the last action card 3♦ in the table 4.3 was performed according to following steps:

- *P*: The Average position for all the selected action cards in the Team-Level of the PFH game based on the random events = (10+1)/2=5.5
- *G*: The average position for the action card 3♦ for the number of times it was selected by the teams = 6. Action card 3♦ was selected 23 times
- *df*: The degree of freedom = 22 (23-1)
- σ: Standard deviation from the mean for the action card 3♦ = 2 (rounded), i.e. about two thirds of the 23 times 3♦ was selected, it was ranked between position eight and four, where one is the top position.
- t_{min}: Minimal t value calculated based on the level of significance and the degree of freedom, in this case it is equal to 2.07.
- $t = \frac{\mathrm{P}-G}{\sigma/\sqrt{df}} > t_{min}$ $2.5= \frac{6-5.5}{2/\sqrt{22}} > 2.07$

As the equation above shows, based on the level of significance of 0.05 the *t* value indicated action card 3♦ is statistically significant which verifies that the position (level of effectiveness) of this action card 3♦ is right with the probability of 95%.

Table 4.3 shows the result of the *t* test. 15 action cards out of 16 effective action cards were found to have statistically significant position (perceived level of effectiveness), which means that their position (level of effectiveness) is not attributable to randomness. Only one action card's (K♦) position was not statistically significant. In other words one cannot state that, the fact that card K♦ occupies and average position of three is not due to randomness. At least not with a probability that exceeds 95%. However card K♦ was found a significant effective action card (refer to Table 4.2). It is

only that the card ranking that cannot be established with a certainty that is higher than 95%.

Table 4.3. *Perceived level of effectiveness for each statistically significant action card*

	Action Card	Average Position	Number of times Selected	df	t score	Result
1	10♠	3	74	73	9.3	Significant
2	7♠	5	66	65	2.4	Significant
3	Q♠	4	61	60	5.7	Significant
4	9♠	4	56	55	5.9	Significant
5	6♠	3	53	52	10.7	Significant
6	9♦	7	51	50	3.1	Significant
7	A♥	4	42	41	5.0	Significant
8	10♦	7	40	39	2.7	Significant
9	6♦	8	37	36	6.0	Significant
10	8♠	7	33	32	3.8	Significant
11	5♥	4	30	29	3.9	Significant
12	3♥	3	29	28	5.8	Significant
13	K♦	6	29	28	1.7	Not Significant
14	9♥	7	25	24	4.7	Significant
15	Q♥	8	23	22	7.7	Significant
16	3♦	6	23	22	2.5	Significant

After determining the average position for the 15 statistically significant effective actions cards, a weighted score for each of the 15 action cards, was calculated. The weighted score expresses the influence of both the average position and the number of times each action card was selected. The weighted score was calculated as follows:

j (Effective action cards) = 1,2,….15

$K_{,j}$ (Position of action card j)

S_j (Score attributed to card j) = 11- $K_{,j}$

$N_{,j}$ (Number of times action cards j selected based on the Table 3.1)

WS_j (Weighted score of action card j) = $S_j \times N_{,j} = (11- K_{,j}) \times N_{,j}$

The higher the weighted score (WS_j) of an action card card (j), the more effective the action card is. For Instance the weighted score for the action card Q♥ in Table 4.4 was figured according to number of times it was selected by the teams based on the data from Table 4.3 and the position (level of effectiveness) each time it was selected.

$$WS_{Q♥} = (11\text{-}8) \times 23 = 69$$

The subtraction of 8 from 11 was performed to reverse the scale of the position. While in step three (Team-Level) of the PFH game as explained previously, the top card is in position 1, for this calculation the top card has to receive ten points, while the last (tenth) card in rank-order receives one point.

Table 4.4 shows the calculated weighted scores for all the top-most effective action cards for rehabilitating distressed construction projects. The first five most effective action cards to drive a distressed construction project to success are related to the Traditional Management while the next tier is made up of Traditional Leadership and Best Value Leadership action cards. There was also significant difference between overall calculated weighted scores for leadership versus management action cards.

While the sum total of the management (Traditional Management) action cards (=2398) constituted 61 percent of the total calculated scores for all the top-most effective action cards (=3942), action cards related to the leadership (Best Value Leadership and Traditional Leadership) constituted the 39% (=1544) (Refer to Figure 4.5),

Table 4.4. *Top-most effective leadership and management actions in the PFH game.*

Rank	Action Cards	WS_j	Action Description
1	10♠	599	Review scope, identify all the work required to complete the project successfully, and implement.
2	Q♠	425	Conduct a partnering session with all stakeholders.
3	6♠	422	Identify problems; set clear and achievable objectives.
4	9♠	406	Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.
5	7♠	405	Identify the risk on the project and develop a plan to mitigate those risks.
6	A♥	309	Immediately schedule meetings with all employees to determine their views and their recommendations of the inherent problems.
7	3♥	232	Identify and meet with all internal and external stakeholders, evaluate the status of the relationships, and analyze the relationships to see how you can change your behavior.
8	9♦	221	Start weekly face-to-face communication with the owner.
9	5♥	213	Listen to the stakeholders and acknowledge their problems even if they are not yours.
10	10♦	177	Hire a 3rd party expert to identify the problems and to provide recommended solutions.
11	8♠	141	Organize a cyclical process of Plan, Do, Check, Act, and Implement, into the project team.
12	6♦	125	Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
13	3♦	106	Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty
14	9♥	92	Use participative decision-making processes and share the decision making with subordinates.
15	Q♥	69	Delegate as much of the work as possible to capable people under you.

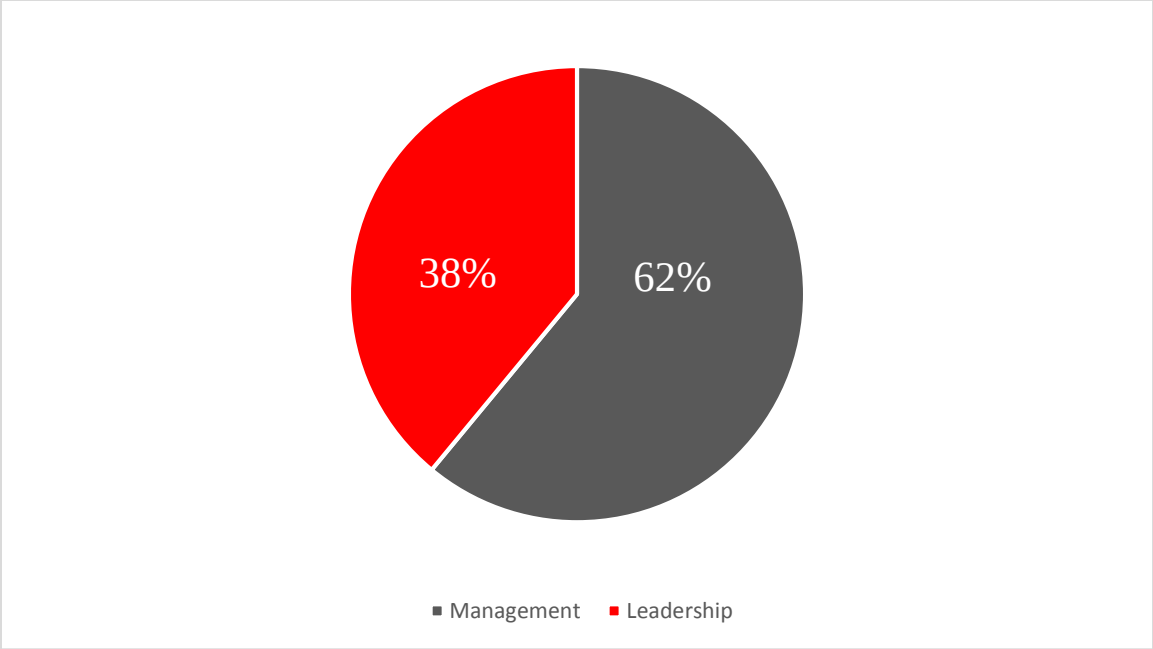

Figure 4.5. Percentage of the total weighted score between leadership and management action cards.

In other words, the percentage of the total weighted score indicates that, on average, the effectiveness of each management action is equal to the effectiveness of one half leadership action when it comes to rescuing in trouble construction projects. However, the overall trend suggests that, once those top five Traditional Management actions were applied to a construction project in distress, the rest of the remediation activity relies significantly on the leadership actions. This finding is in line with the recommended leadership and management activity balance (62% Leadership versus 38% Management activities) that was discussed in section 4.2.

That can also be stated as "for every toe management actions, a project manager needs to add three leadership actions".

4.3.1 Implication of the Recommended Leadership and Management Activity Balance in an Action Card Selection Exercise (PFH)

This section focuses on the implementation of the recommended balance between leadership and management activity into the result analysis of the PFH game. Therefore the purpose is to allow the participants in the PFH game to interpret their own results and change their behaviors to become more effective project managers.

Converting the recommended balance between leadership and management activities (62% Leadership vs. 38% Management activities) for project managers to the ten effective action card selection in PFH game, it is optimal that six to seven[2] leadership action cards and three to four management action cards.

One might state that if only the top ten most effective action cards from Table 4.4 were taken into account, then the ratio between leadership and management action cards among cards is 50% to 50%, therefore it is optimal that five action cards should be selected from both leadership and management. However the reality is that the Table 4.4 just shows the weight of each action cards based on the level of effectiveness. To explain it further, consider Table 4.5. According to this table (Table 4.5), 66% of the total weighted score accounted for the top ten most effective action cards that belongs to the management (Traditional Management) actions while leadership actions got 34% of the overall weighted score for the top-ten action cards. This finding indicates that although both leadership and management are even in number of most top ten effective actions (five actions for each), management action cards weigh as about two leadership action cards in terms of effectiveness accounted for the top ten.

[2] Due to integer nature of cards selection as one cannot select 6.2 action cards

Table 4.5. *Comparison of the weighted score for the top ten most effective action cards*

Rank	Action Cards	WS_j	Percentage of the total WS
1	10♠	599	18%
2	Q♠	425	12%
3	6♠	422	12%
4	9♠	406	12%
5	7♠	405	12%
6	A♥	309	9%
7	3♥	232	7%
8	9♦	221	7%
9	5♥	213	6%
10	10♦	177	5%
Total WS		3409	100%

$$\sum_{j=1}^{5} WS_j \,/\, \sum_{j=5}^{10} WS_j = 2 \qquad \text{j= Effective action cards (1,2,….,10)}$$

Therefore, for each selected management action cards in the PFH game there should be around two leadership action cards to have an optimal balance between the ten selected action cards in each level of the PFH game. This fact is consistent with conversion of the appropriate balance between leadership and management activity (62% Management vs 38 Leadership) into the ten action cards selection PFH game that, three to four card must be management and six to seven leadership action cards in order to have an ideal balance for the ten selected action card.

Three overall ideal balance possibilities between leadership and management styles emerge when ten action cards are selected. As Table 4.6 shows, in the first ideal balance scenario, six out of ten selected action cards must be leadership action cards (♥,♦), while the remaining must be four management action cards, which are solely related to Traditional Management (♠). As the balance possibilities in the Table 4.6 are depicted, there is no Micro-Management action card in any of the balance possibilities. In

the first possible ideal balance is based on the 60% (6 action cards out of ten) leadership versus 40% management. In the second and third possible ideal balance 70% (seven action cards) leadership versus 30% (three action cards).

Table 4.6. *The optimal action card balance possibilities between leadership and management types in the "Project from Hell" game.*

Leadership & Management Types	First ideal balance	Second ideal balance	Third Ideal Balance
Traditional Leadership ♥	3	4	3
Best Value Leadership ♦	3	3	4
Traditional Management ♠	4	3	3
Micro Management ♣	0	0	0
Total action cards selected	10	10	10

In the second and third ideal balances as depicted in Table 4.6, seven of the ten selected action cards must be leadership actions, and three action cards must be related to management actions, specifically to Traditional Management type. The only difference between the last two ideal balances is that, in the second ideal balance the Traditional Leadership actions must be selected four times while Best Value Leadership must be selected three times. In the third balance the Best Value Leadership has one action cards more than Traditional Leadership. One formula can be derived from all the three ideal action card balance possibilities which is 3/3/3 +1. In other words based on the ten action cards selection, all Traditional Management, Best Value Leadership, and Traditional Leadership have one difference in the ideal action card balance.

The three optimal balances in Table 4.6 can also be used along with the extent of leadership versus management activity in an organization hierarchy as suggested by Farr

et al., (1997), (pictured in Figure 4.6). According to Farr et al., (1997) the higher the level of responsibility, the more leadership is suggested versus management activities. Therefore it is possible to evaluate the activity concentration of an individual in order to find out what level of responsibility he/she fits in based on a ten-action-card selection simulation game such as PFH game.

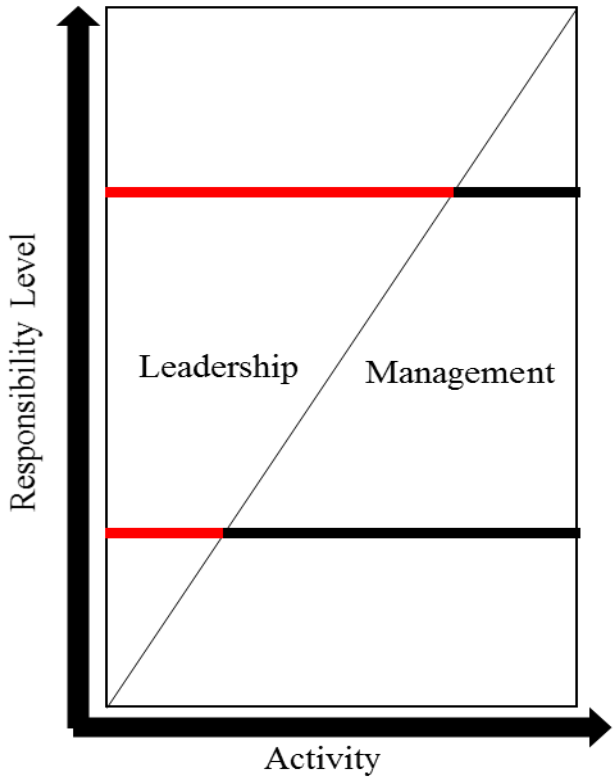

Figure 4.6. Leadership vs. management in an organization hierarchy

4.3.2 General Guidelines to Better Balance between Leadership and Management Activities in the PFH Game

According to the three optimal action card balance possibilities between leadership and management models in the PFH game that were identified in section 4.3.1 of the data analysis, it is possible to measure the perceived balance between leadership and management activities of an individual or group of individuals by conducting the PFH

game experiment. As a means to know which of the three optimal balance possibilities (refer to Table 4.6) is suitable to use for the purpose of measuring and optimizing project professionals leadership and management activity balance perception in construction projects, the following guidelines have been developed.

1. Choose the optimal action card balance from Table 4.6 which the number of leadership and management types' action cards is closest to the individuals' selected action card.[3]
2. If the second and third optimal action card balance possibilities is employed to measure and optimize the leadership and management activity balance perception of an individual, it is necessary to mention that, the only difference between the two balances is that, in the second balance have more emphasizes in leadership on the basis of trust and delegation, while in the third balance focus is on the alignment of the right people with the right task.
3. If the proportion of leadership to management of the action cards selected by an individual resulted in the first optimal action card balance, which is 60% Leadership to 40% Management, then in order to boost the individual's balance perception to the higher level, in which 70% of the selected action cards should be related to the leadership models (Traditional and Best Value). Thus the

[3] If the PFH game experiment is conducted on an organization, based on the Farr et al., (1997) suggestion it is expected that the upper level managers (seniors) would conform to the second and third optimal balance possibilities in which 70% of the selected action cards are leadership and 30% are management, whereas middle project managers are expected to conform to the first ideal balance possibility in which the proportion of leadership to management is 60% to 40%.

individual must consider the second and third optimal balance possibilities (refer to Table 4.6).

4. The quality of an individual's ten-action card-selection in the PFH game experiment can be measured by comparing with the statistically significant leadership and management action cards identified in table 4.2 of the data analysis in order to know what percentage of action cards selected by the individual are significantly effective. Additionally his/her ten action cards can be compared to the top ten most effective action cards that are depicted in Table 4.4 to understand which sort of actions the individual must need to change to be as effective as possible.

4.3.3 Examples

The following examples illustrate the application of the general guidelines explicitly for better understanding.

Example 1. The first example considers the top ten most effective action cards to rescue a troubled situation construction project (refer to Table 4.5).

Table 4.7. *Example 1: balance top-ten effective leadership and management action cards in distressed construction projects.*

Traditional Leadership	Best Value Leadership	Traditional Management	Micro-Management	Total number of Action cards	Leadership Percentage	Management Percentage
3	2	5	0	10	50%	50%

As Table 4.7 shows, the balance between top ten leadership and management actions is 50% to 50%. Therefore, in order to improve the balance, the first optimal action

card balance (refer to Table 4.6) which is closest to this balance was considered. The first optimal balance suggests 60% (six out of ten) of the selected action cards must be related to the leadership action cards. In other words, in order to improve the effectiveness of the balance, one cards from Traditional Management should be exchanged with a relevant action card in Best Value Leadership in terms of action terminology.

Table 4.8 illustrates the one possible exchange between presumably a selected Traditional Management action cards with a Best Value Leadership action card in order to optimize the balance.

Table 4.8. *Potential action card(s) exchange to optimize the balance in example 1.*

8♠: Organize a cyclical process of Plan, Do, Check, Act, and Implement, into the project team.	**Exchanged `with**	6♦: Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.

Example 2. In this example, the balance between leadership and management action cards that were selected by one of the individuals from the data sample was considered for optimization. As Table 4.9 shows, the individual's selected actions card balance inclined more toward management activities (60%). This result does not demonstrate effective leadership and management activity balance for managing in-trouble projects compared to the identified optimal action card balance possibilities in the PFH game.

Table 4.9. *Example 2: selected leadership and management styles' action cards by a project professional.*

Traditional Leadership ♥	Best Value Leadership ♦	Traditional Management ♠	Micro-Management ♣	Total number of Action cards selected	Leadership Percentage	Management Percentage
2	2	5	1	10	40%	60%

There are two problems with the selection:

1. There is a Micro-Management action card
2. The ratio between leadership and management is 40% to 60% rather than the minimal 60% leadership to 40% management.

The following steps are recommended to be taken one at a time, with about three months for each step to allow the action to become habitat. According to Lally et al. (2010) it takes 66 days to form a habit.

1- First, the individual needs to discard any Micro-Management action cards he/she has selected. As it was explained in the data analysis in section 4.2.1, none of the Micro-Management action cards are effective to influencing a projects' performance favorably. Also, as it is indicated in the quadrant model for introducing types leadership and management action in the PFH game (refer to Figure 2.1) the Traditional Leadership model has a contrary point of view to the Micro-Management model. Therefore, the team must exchange it for the closest related classical (traditional) leadership action card with the discarded Micro-Management card.

2- As indicated in the four quadrants model (refer to Figure 2.1), Traditional Leadership is opposite of Best Value Leadership. Therefore, the individual must exchange one of the selected Traditional Management action cards with a Best Value Leadership action card. By exchanging the cards this would optimize the leadership percentage.

Table 4.10. *Potential action card(s) exchange to optimize the balance in Example two*

6♣: Call a meeting to clearly lay down project objectives and let the employees know what will happen if they let you down.		A♥: Immediately schedule meetings with all employees to determine their views and their recommendations of the inherent problems.
9♠: Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.	**Exchanged with**	6♦: Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.

Example 3. In this example, as given in Table 4.11, the selected ten action cards by a project professional, who is optimally balanced in comparison with the first optimal action card balance between leadership and management activities that was found out in section 4.3.1 (refer to Table 4.6).

Table 4.11. *Selected leadership and management styles' action cards by a team construction project professional.*

Traditional Leadership ♥	Best Value Leadership ♦	Traditional Management ♠	Micro-Management ♣	Total number of Action cards selected	Leadership Percentage	Management Percentage
3	3	4	0	10	60%	40%

In order to improve the individual's current optimal leadership and management balance activities into the higher level for managing distressed construction projects, he/she must align the selected action cards with the second optimal action card balance as depicted by Table 4.6. Therefore, he/she needs to initially exchange one of their selected Traditional Management action cards with a Traditional Leadership action card. Furthermore, the team needs to switch one of their selected Traditional Leadership action cards with a Best Value Leadership action card for optimizing the balance between leadership and management action cards.

4.3.4 Generalization of the PFH Game Experiment

In sections 4.3.1, 4.3.2, and 4.3.3 the PFH game was developed further from an interactive game for profiling an individual's leadership and management activities to an instrument that can be deployed by educational institutions or organizations to measure and improve the balance leadership and management activities for students/trainees or project professionals. The findings of this Section focus on expansion of leadership and management actions in PFH game. Although the current 52 action cards used in the PFH game cover all the existing crucial leadership and management actives, the notion behind

this section is that the PFH game experiment can be expanded to include more such activities. This accounts for the possibility that in the future there might be new versions of leadership and management models and their related activities that might be considered in the game experiment.

In fact this Section, through hypothesis analysis and statistical tests, reveals that the PFH game can effectively be scaled in size. A formula that instantly identifies whether an action card is statistically significant was developed. The following explains the process of developing the formula:

Suppose selection is exercised in an experiment (such as the PFH game) and is conducted with *N* action cards and *K* teams (sample size). Each team must select *m* action cards. Consider the definitions below. The numbers in parentheses represent the values that were used for data analysis in this research report (section 4.2).

- Total number of action cards = *N (52)*
- Number of Teams conducting the PFH game (sample Size) = *K (94)*
- Number of action cards that must be selected by each team = *m (10)*
- $\frac{N}{m}$ = Minimum number of the PFH game experiment repetitions needed in order to have all the action cards (*N*) selected at least one time. (5.2)
- $\frac{K}{\frac{N}{m}}=\frac{Km}{N}$; Equivalent number of times action cards are selected during *K* repetitions of the experiment.

  Z_i=Number of times each action card has been selected upon conducting the PFH game experiment on *K* teams (repetition of the experiment).

- $0 \leq Z_i \leq K$; i=1,2,…N (action card). Minimum and maximum number of times each action card is selected by K teams. (18)
- $0 \leq \frac{\sum_{i=1}^{N} Z_i)}{N} \leq K$; Average selection for each selected action card.

The equivalent number of selected times for the all action cards is equal to the overall average of the selection frequency for the selected action cards by K teams.

- $\frac{\sum_{i=1}^{N} Z_i)}{N} = \frac{Km}{N}$

Now by performing *t* test data analysis, it is possible to find out whether a leadership and management action card is statistically significant in effectively governing the project to a favorable result.

- $t_i = \frac{Z_i - Km/N}{\sigma / \sqrt{K-1}} \geq$ T
- T; is identified based on level of significance of 0.05 (two-tailed) and degree of freedom (*df*) equal to *K-1*
- σ = standard deviation of Z_i; $i=1,2,....N$

The formula above can be applied to verify the data analysis in section 4.2, and therefore immediately identifies the 16 statistically significant action cards based on the sample size of ninety 94 teams that conducted PFH game experiment. The following take A♥ from Table 4.2 as an example to verify the righteousness of the above formula:

- N = 52
- K = 94

- m = 10
- $Z_{A\heartsuit}$ = 42
- σ = 19
- $df = k - 1$
- Level of significance = 0.05 (p=95%)

- $t_{A\heartsuit} = \frac{Z_i - Km/N}{\sigma / \sqrt{K-1}} \geq T$ $\quad 12 = \frac{74-18}{19/\sqrt{93}} \geq 1.98$

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Project management has become more complex in the twenty first century due to pronounce increase in the variables that affect a project's outcome and also due to a paradigm shift in what has been regarded as a successful project. This complexity causes many projects to be in jeopardy of crisis if the right sort of project management method is not applied.

According to the literature review for this research, leadership competencies play key roles in distressed projects environments and broadly in all sorts of situations as a means of managing projects effectively. Project managers' activities are expanding from the technical and the administrative towards placing more emphasis on leadership models. Thus, new concepts of project management are emerging on a basis of leadership and management activities alignment.

For this research, critical questions were raised to address the issue in regards to construction projects in trouble. The questions were based on the need to consider leadership activities along with management activities for project managers to respond effectively to this sort of projects. Thus the following questions were developed:

Q1: What is the appropriate balance between leadership and management activities for a project manager to effectively direct a distressed construction project toward positive result?

Q2: What are the most effective actions a project manager can take to rescue a project in distress?

Q3: How can a project professional better balance leadership and management activities in order to manage distressed projects effectively?

The remainder of this section responds to those questions (Q1 to Q3 and A1 to A3 respectively) and presents the methodology developed as a generalization of the research method of this research.

A1: This research found that, in order to rescue distressed construction projects, the appropriate balance between leadership and management activities for project managers is 62% to 38%. Data was collected from 338 construction project professionals from CII companies, who played the "Project from Hell" (PFH) simulation game, a game developed by a group of professors at Arizona State University. The top most effective actions for rehabilitating construction projects in trouble were identified based on calculating a weighted score for statistically significant action cards in the Team Level (step two) of the PFH game. It was found that Traditional Management actions constituted the top five most effective actions. After applying those actions, leadership related actions (Best Value and Traditional Leadership) are the right actions to rescue distressed construction projects. Additionally, it was discovered that, although the number of leadership action cards versus management action cards are even among the top ten most effective action cards (each consisted of five action cards), the weighted scores of the management cards represent 66% of the total weighted score. This leaves 34% for the leadership cards. The interpretation of this result is that for every two management actions (Traditional Management), project managers need to apply three

leadership actions (Best Value and Traditional Leadership) to remediate construction projects in distress.

A2: The most effective actions a project manager can take to rescue a construction project in trouble are:

1. Review scope, identify all the work required to complete the project successfully, and implement.
2. Conduct a partnering session with all stakeholders.
3. Identify problems; set clear and achievable objectives.
4. Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.
5. Identify the risk on the project and develop a plan to mitigate those risks.
6. Immediately schedule meetings with all employees to determine their views and their recommendations of the inherent problems.
7. Identify and meet with all internal and external stakeholders, evaluate the status of the relationships, and analyze the relationships to see how you can change your behavior.
8. Start weekly face-to-face communication with the owner.
9. Listen to the stakeholders and acknowledge their problems even if they are not yours.
10. Hire a 3rd party expert to identify the problems and to provide recommended solutions.
11. Organize a cyclical process of Plan, Do, Check, Act, and Implement, into the project team.

12. Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
13. Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty
14. Use participative decision-making processes and share the decision making with subordinates.
15. Delegate as much of the work as possible to capable people under you.
16. Identify staff talent and reassign them to positions where they can turn the project around.

A3: Using a simulated project environment, such as "Project from Hell", project managers are presented with a set of action cards that have been proved to be effective in project management for turning a distressed construction project around. They are then asked to select a pre-set number of most effective actions (cards). In this research the number of cards to be selected was ten. It was found that the appropriate distribution of action cards between leadership and management styles is 3/3/3+1. In other words, based on the ten action cards selection, the Traditional Management, Best Value Leadership, and Traditional Leadership styles shall have 3 actions each, plus on additional action in any of the three styles.

Generalization: The simulated project environment can be expanded to any number of action cards and any number of cards selection. The statistical significance of the selection made by multiple participants can be calculated with the following formula:

- $t_i = \frac{Z_i - Km/N}{\sigma / \sqrt{K-1}} \geq T_{min}$

- *N*=Total number of action cards
- *I=1,2,…N*
- *K*=Number of participants conducting the action card selections
- *m*=Number of action cards that must be selected
- Z_i=Number of times each action card has been selected upon conducting action cards selection experiment on *K* participants (repetition of the experiment).
- σ= standard deviation of Z_i; *i=1,2,….N*
- T_{min} = is identified based on level of significance of 0.05 (two-tailed) and degree of freedom (*df*) equal to *K-1*

5.2 Recommendations for Further Research

This research was done based on the PFH game experiment. The PFH game can be developed further as an instrument to measure the quality of leadership and management actions in different project managers according to their performance in an organizational hierarchy. Thus the following areas are suggested for further research:

- Study of the influence of the appropriate balance of leadership and management actions on project managers' performance.
- Study the results of the most effective leadership and management action cards on the performance of real projects.

- Study on the action cards that are not selected in the PFH game by the project professionals to understand, what sort of activities could have negative impact on projects outcome.
- Study the difference in the actions selected for normal projects (preventive actions) versus the actions selected for the project in distress (project from hell corrective actions).

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APPENDIX A

LEADERSHIP & MANAGEMENT ACTION CARDS' DESCRIPTION IN THE "PROJECT FROM HELL" GAME

Traditional Management Action Cards (♠)	
A♠	Re-plan the entire project and create a new schedule.
2♠	Create a bonus and rewards program with project team for on time completion.
3♠	Use a wild card to promote someone on the project, the PM's choice.
4♠	Institute one-on-one meetings with all your subordinates.
5♠	Make policies explicit, transparent, and apply them fairly across all employees.
6♠	Identify problems; set clear and achievable objectives.
7♠	Identify the risk on the project and develop a plan to mitigate those risks.
8♠	Organize a cyclical process of Plan, Do, Check, Act, and Implement, into the project team.
9♠	Identify and define the problem; combine, unify and coordinate the various processes and project activities necessary to solve it.
10♠	Review scope, identify all the work required to complete the project successfully, and implement.
J♠	Create, install, and use a performance review system.
Q♠	Conduct a partnering session with all stakeholders.
K♠	Identify conflicts and conduct conflict resolution sessions knowing the PM is responsible to resolve all disputes.

Micro-Management Action Cards (♣)	
A♣	Bring on board a third party "specialty company" for inspection service to control quality issues.
2♣	Review and revise the project policies and procedures, clearly stating your management objectives.
3♣	Fire the worst performing staff person and replace with a new fresh energy employee.
4♣	Reward the individual putting in the most hours in order to inspire others.
5♣	Set up mandatory reporting daily so the PM will have all information to discuss the specifics of the situation and be able to control upcoming events.
6♣	Call a meeting to clearly lay down project objectives and let the employees know what will happen if they let you down.
7♣	Post action items status to reveal to the team who needs help with their work.
8♣	Suspend all vacations and place everyone on mandatory overtime (10 hours a day) until the project is back on schedule.
9♣	Seek to become an expert of the technical aspects of the project.
10♣	Provide additional rules that help your staff make better decisions.
J♣	Hire extra office support staff to deal and help sort through all the documentation, keep records.
Q♣	Increase the information flow to allow better centralization of decision making.
K♣	Focus on the details and personally help with administrative duties to catch up.

Traditional Leadership Action Cards (♥)	
A♥	Immediately schedule meetings with all employees to determine their views and their recommendations of the inherent problems.
2♥	Focus efforts on a few "trusted relationships" to mend the relationship problems.
3♥	Identify and meet with all internal and external stakeholders, evaluate the status of the relationships, and analyze the relationships to see how you can change your behavior.
4♥	Hold a Partnering session with key stakeholders and handle discussions – in person, not through email.
5♥	Listen to the stakeholders and acknowledge their problems even if they are not yours.
6♥	Create a communication plan to improve the communications with all stakeholders and conduct classes in the use of cross communication awareness.
7♥	Live by the new Golden Rule, treat people how they want to be treated.
8♥	Don't kill the messenger; ask for honest and frequent feedback.
9♥	Use participative decision-making processes and share the decision making with subordinates.
10♥	Hire a 3rd party expert to identify the problems and to provide recommended solutions.
J♥	Realign the project team to match employee skill level to job difficulty and complexty.
Q♥	Delegate as much of the work as possible to capable people under you.
K♥	Promote ethical relations and openness.

Best Value Leadership Action Cards (♥)	
A♦	Redefine the job positions and responsibilities.
2♦	Look for controls, rules, and procedures to abolish.
3♦	Perform an analysis of individual employees' strengths and weaknesses and realign jobs within teams to match employee skill levels and job difficulty.
4♦	Give complete reasoning for all directions.
5♦	Insure that the demands for information are passed in simple and non-technical terms.
6♦	Create a performance measurement system with simple measurements that are directly connected to goals of the organization, hold employees accountable, and provide immediate feedback.
7♦	Increase the rewards of the higher performers.
8♦	Create weekly report documentation of risks that you do not control, who caused it, and impact relating to the cost and time of project.
9♦	Start weekly face-to-face communication with the owner.
10♦	Practice complete openness by meeting with the owners' representatives and explain problem, constraints, and what to expect.
J♦	Change the work structure to allow higher degrees of freedom to all levels of staff.
Q♦	Prioritize your activities by being selective with whom you spend time.
K♦	Identify staff talent and reassign them to positions where they can turn the project around.

APPENDIX B

THE SCORE SHEET USED IN THE “PROJECT FROM HELL” GAME

ENTRY LEVEL INDIVIDUAL SELECTION

NORMAL PROJECT (10 CARDS)

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	**Q♣**	K♣	A♣
2♦	3♦	4♦	5♦	6♦	7♦	8♦	9♦	10♦	J♦	**Q♦**	K♦	A♦
2♥	3♥	4♥	5♥	6♥	7♥	8♥	9♥	10♥	J♥	**Q♥**	K♥	A♥
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	**Q♠**	K♠	A♠

PROJECT FROM HELL (10 CARDS)

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	Q♣	K♣	A♣
2♦	3♦	4♦	5♦	6♦	7♦	8♦	9♦	10♦	J♦	Q♦	K♦	A♦
2♥	3♥	4♥	5♥	6♥	7♥	8♥	9♥	10♥	J♥	Q♥	K♥	A♥
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	Q♠	K♠	A♠

CARDS PMs CANNOT USE (ANY NUMBER OF CARDS)

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	Q♣	K♣	A♣
2♦	3♦	4♦	5♦	6♦	7♦	8♦	9♦	10♦	J♦	Q♦	K♦	A♦
2♥	3♥	4♥	5♥	6♥	7♥	8♥	9♥	10♥	J♥	Q♥	K♥	A♥
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	Q♠	K♠	A♠

ACTION CARDS SELECTED BT THE TEAM

PROJECT FROM HELL (10 CARDS)

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	Q♣	K♣	A♣
2♦	3♦	4♦	5♦	6♦	7♦	8♦	9♦	10♦	J♦	Q♦	K♦	A♦
2♥	3♥	4♥	5♥	6♥	7♥	8♥	9♥	10♥	J♥	Q♥	K♥	A♥
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	Q♠	K♠	A♠

EXIT LEVEL INDIVIDUAL SELECTION

PROJECT FROM HELL (10 CARDS)

2♣	3♣	4♣	5♣	6♣	7♣	8♣	9♣	10♣	J♣	Q♣	K♣	A♣
2♦	3♦	4♦	5♦	6♦	7♦	8♦	9♦	10♦	J♦	Q♦	K♦	A♦
2♥	3♥	4♥	5♥	6♥	7♥	8♥	9♥	10♥	J♥	Q♥	K♥	A♥
2♠	3♠	4♠	5♠	6♠	7♠	8♠	9♠	10♠	J♠	Q♠	K♠	A♠

APPENDIX C

LEADERSHIP ROLES IN COMPETING VALUE FRAMEWORK

(ZAFT ET AL., 2009)

Leadership type	Leadership Role
Relating to people	Mentor: Acknowledge personal needs, develops people, caring, empathetic. Facilitator: Acknowledges personal needs, develops people, practices, participation and team building. Focuses on consensus building. Manages conflict and encourages participative decision-making.
Leading change	• Innovator: Inspires, anticipates customer needs, initiates significant changes, new ideas, experiments, problem solves, adaptable. • Broker: Same function as innovator including, sells ideas, influences decisions at higher level, and acquires needed resources, strong negotiator.
Managing processes	Monitor: Clarifies policies, expects accurate work, control projects, monitor progress, develop measures and checkpoints. Coordinator: Same functions as the monitor including brings order, plans schedules, provides stability, control and continuity.
Producing results	Producer: Focuses on outside competition, emphasizes speed, hard work ethic, motivates people, initiate action. Director: Same functions as producer including provide clear direction, clarifies priorities, communicates the vision, plan and prioritizes.

APPENDIX D

TWO_TAILED T TEST RESULTS IN ENRTY LEVEL OF THE "NEW ASSIGNMENT PROJECT" SCENARIO

#	Action Card	Times Selected	T value
1	10♠	189	173.599
2	7♠	161	145.599
3	6♠	149	133.599
4	Q♠	116	100.599
5	9♦	99	83.5989
6	9 ♥	98	82.5989
7	5 ♥	83	67.5989
8	6♦	82	66.5989
9	9♠	80	64.5989
10	K ♥	79	63.5989
11	10♦	79	63.5989
12	A ♥	78	62.5989
13	3 ♥	76	60.5989
14	8♠	71	55.5989
15	5♠	67	51.5989
16	Q ♥	60	44.5989
17	7 ♥	57	41.5989
18	Q♣	53	37.5989
19	8 ♥	52	36.5989
20	4 ♥	50	34.5989
21	3♦	47	31.5989
22	4♠	46	30.5989
23	6 ♥	42	26.5989
24	2♣	34	18.5989
25	K♦	33	17.5989
26	5♣	32	16.5989
27	5♦	28	12.5989
28	7♣	26	10.5989
29	2♠	25	9.59892
30	K♠	25	9.59892
31	8♦	23	7.59892
32	4♦	22	6.59892
33	J ♥	21	5.59892
34	Q♦	21	5.59892

#	Action Card	Times Selected	T Value
35	6♣	16	0.59892
36	J♠	16	0.59892
37	9♣	10	-5.4011
38	J♦	8	-7.4011
39	J♣	8	-7.4011
40	7♦	7	-8.4011
41	10♣	7	-8.4011
42	A♣	5	-10.401
43	3♠	5	-10.401
44	2 ♥	4	-11.401
45	A♦	4	-11.401
46	A♠	4	-11.401
47	K♣	3	-12.401
48	2♦	2	-13.401
49	10 ♥	1	-14.401
50	3♣	1	-14.401
51	4♣	1	-14.401
52	8♣	1	-14.401

Note. Degree of freedom (*df*) = Times Selected - 1

APPENDIX E

TWO_TAILED T TEST RESULTS IN ENRTY LEVEL OF THE "PROJECT FROM HELL" SCENARIO

#	Action card	Times selected	T score
1	10♠	172	156.22
2	6♠	149	133.22
3	9♠	141	125.22
4	7♠	138	122.22
5	9♦	108	92.222
6	A ♥	104	88.222
7	Q♠	99	83.222
8	10♦	89	73.222
9	8♠	82	66.222
10	5 ♥	81	65.222
11	3♦	76	60.222
12	K♦	75	59.222
13	6♦	69	53.222
14	3 ♥	66	50.222
15	5♣	55	39.222
16	6 ♥	50	34.222
17	5♠	50	34.222
18	K ♥	49	33.222
19	9 ♥	47	31.222
20	K♠	47	31.222
21	7 ♥	43	27.222
22	Q♣	42	26.222
23	4♠	39	23.222
24	8 ♥	37	21.222
25	2♣	37	21.222
26	J ♥	36	20.222
27	7♣	28	12.222
28	Q ♥	25	9.222
29	4 ♥	24	8.222
30	8♦	23	7.222
31	A♠	23	7.222
32	2♠	23	7.222
33	6♣	22	6.222

#	Action card	Times selected	T score
34	10 ♥	18	2.222
35	J♠	15	-0.77
36	5♦	14	-1.77
37	10♣	14	-1.77
38	A♣	11	-4.77
39	4♦	10	-5.77
40	J♣	10	-5.77
41	Q♦	9	-6.77
42	3♣	9	-6.77
43	2 ♥	6	-9.77
44	7♦	4	-11.7
45	8♣	4	-11.7
46	9♣	4	-11.7
47	4♣	3	-12.7
48	K♣	3	-12.7
49	A♦	2	-13.7
50	2♦	2	-13.7
51	J♦	2	-13.7
52	3♠	2	-13.7

Note. Degree of freedom *(df)* = Times Selected - 1

APPENDIX F

TWO_TAILED T TEST RESULTS IN EXIT LEVEL OF THE "PROJECT FROM HELL" SCENARIO

#	Action card	Times selected	t score
1	10♠	179	164.412
2	7♠	163	148.412
3	6♠	147	132.412
4	9♠	145	130.412
5	Q♠	123	108.412
6	A♥	106	91.412
7	9♦	106	91.412
8	6♦	95	80.412
9	10♦	87	72.412
10	8♠	86	71.412
11	3♥	80	65.412
12	Q♥	74	59.412
13	3♦	73	58.412
14	K♥	64	49.412
15	5♥	58	43.412
16	K♦	56	41.412
17	6♥	54	39.412
18	9♥	52	37.412
19	J♥	44	29.412
20	2♣	35	20.412
21	4♠	35	20.412
22	5♠	33	18.412
23	K♠	33	18.412
24	7♥	32	17.412
25	4♥	31	16.412
26	8♥	31	16.412
27	Q♣	30	15.412
28	2♠	27	12.412
29	7♣	25	10.412
30	A♠	25	10.412
31	5♣	22	7.412
32	8♦	17	2.412
33	Q♦	17	2.412
34	J♦	14	-0.588
35	5♦	13	-1.588
36	J♠	13	-1.588
37	10♣	11	-3.588
38	6♣	10	-4.588
39	7♦	7	-7.588
40	A♣	7	-7.588
41	10♥	6	-8.588
42	2♦	5	-9.588
43	9♣	5	-9.588
44	J♣	5	-9.588
45	2♥	4	-10.58
46	4♦	4	-10.58
47	A♦	3	-11.58
48	3♣	2	-12.58
49	4♣	1	-13.58
50	K♣	1	-13.58
51	3♠	1	-13.58
52	8♣	0	-14.58

Note. Degree of freedom (df) = Times Selected - 1