The Impact of Individual and Organizational Biases on Risk Resistance and Management Styles in Multi-Shareholder Corporations: A Case Study of the Challenger Disaster

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Abstract. Risk assistance ability is always based on degree of sophistication and applicability of the management style, and based on this, an indispensable factor that in the business management mode is biases. According to the research, most the papers introducing type and functions of biases in their theory, however, few of them make an analysis on the affect of biases on corporation's performance with a realistic case. The main goal for this article to excavate and identify the underlying biases hinting behind those theories and explain the relationship between biases and the corporate risk-bearing ability. The content will mainly focus on which and how individual biases and group biases affect corporate managing modes, as well as further researching the effect on risk-resistance ability by using the Challenger disaster as a case study to better understand the interrelated and inseparable relationship between individual and organizational biases with management mode and risk assistance ability of a multi-shareholders corporation. The paper will split the analysis in several dimensions: conceptual interpretation of different biases, how biases affect the decision making in the case study, how the drawbacks in management styles affect the effectiveness of corporate risk resistance capacity and how can they be demonstrated with the Challenger disaster. This article will also summarize and clarify the major biases affecting business decision-making and suggest modifications to the management of a multi-party holding company.

Keywords. Individual biases, Organizational biases, Risk resistance, multi-shareholders corporation, Challenger disaster

1 Introduction

Risk assistance ability is a key factor considered by managers and can be directly related to the future prospects of enterprise, as well as affecting the performance in their stock market and affecting the interest of individual shareholders and even the government's income as a nationalized business. Management style can be the main elements leading to various outcomes from the decision. The term *management style* refers to the specific methods and approaches a manager utilizes to achieve their

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objectives. A suitable management system can help an enterprise protect themselves and achieve their goal Overconfident or over pessimistic managing style or decision can drive to the failure of a project or loss the best opportunity for investment. Especially for a multi-shareholders company, every single individual might hold different opinions, A harmonized, and rational management model is of particular importance. Management style of a company depends more or less on the biases existing in the individual and organizational level, these biases indirectly affecting the tendency of the corporate development and deciding the future prospect for company.
According to the research of related studies, this part reached a conclusion of the points they made. Firstly, according to essays related, the existence of biases can misguide people to a misconception side their cognitive scope, in this case, it’s hard for people to see the uncertainties and other aspects. For individual bias, confirmation bias is the most prevalent among managers, many fatal decision-making can be made because that they are too convinced with their own prediction and only search the information that supported their own judgment. However, in our further investigation, in a multi-shareholders company, the organizational biases are more important factor in corporate strategies deciding. Workplace biases is not new, from new hires a to senior decision makers, from a little customer selection decision to deciding the development strategy of a company, every single decision making, or business strategy is fraught with it. It was inevitable. Under this condition, when managers deciding the strategies, once implemented, these decisions cannot be withdrawn and even influence the performance of entire company. Research on management indicates findings management modes are varied in the different situations; different companies are applying different strategies based on their own strengths and weaknesses. However, after we found several essays about management styles in distinct types of businesses, we found that each of those management styles have pros and cons and hardly to maximize efficiency or prevent information gap in each stage and one of the major contributories lead to such an outcome is biases.

In our further research, we found the vast majority of papers describing the pros and cons of different management models and their impact on companies when making risky decisions or analyzing different levels of bias from a psychological perspective. Yet how do these elements relate to each other? How do they interact with each other? There are few articles that logically organize and attribute the relationship and degree of influence of bias, management style and corporate resilience. So, in this passage, we are going to make an analysis on how do individual and organisational biases affect the risk resistance and management style of multi-shareholder companies to have a clear understanding on how those factors affect and drive each other.

From the author’s perspective, understanding the basic relationship and linkage between these factors can help managers to have a more comprehensive cognition of the the sources of the management model's shortcomings and the precise measures to improve them, in order to increase the efficiency of the organization's risk strategy decisions and to provide new perspectives for assessing risks.

The Challenger shuttle crew, of seven astronauts—including the pilot, aerospace engineers, and scientists—died tragically in the explosion of their spacecraft during the launch of STS-51L from the Kennedy Space Center about 11:40 a.m., EST, on January

28, 1986[1]. The direct cause of this disaster was the loss of sealing effect of the O-ring device due to the influence of temperature, but when we dig deeper into the reasons behind it, we will now find that NASA in the organizational culture and decision-making system there is a neglect of risk and ineffective communication indirectly led to the disaster and other important reasons, which is fundamentally due to the existence of bias. Of course, we can't draw the conclusion that all the blame should be attributed to bias, but it's undeniable that NASA's unscientific decision-making model and bias were the catalysts that led this otherwise avoidable disaster to a bad end.

2 Conceptual interpretation

Biases and management models are the underlying theories that help to understand corporate resilience and decision making and are the topics that this paper aims to cover, so before describing the mechanisms by which they operate in the example, this paragraph will specifically talk about the definitions of these elements.

2.1 Biases

Starting from the assumption that the perception of determined environmental events affects the way in which decision-makers decide to implement specific strategies, we explore the interface among cognitive biases, strategic decisions and environmental transformations. To do this, we start by defining "cognitive biases," "strategic decisions" and "environmental transformations" in order to investigate their potential interrelations. According to Simon (1993)[2]. Biases can be divided into different levels depending on the different targets they are acting on. We will focus on biases in individual level and organizational level.

Individual level. Biases existing in individual level refers to the systematic bias of individuals in the process of cognition, judgement, decision-making, etc., due to factors such as personal experience, knowledge, emotion, cultural background and other personal factors else. Individual biases alone contain hundreds of different types of bias, and they are similar in that they all play a role in personal decision-making. For instance, there are confirmation bias which enforced the stereotype of people, action bias led people to finish some behavior even opportunity cost is pretty high and so on. One of the most typical examples is confirmation bias which is regarded as the catalyst for the Challenger case.

Organizational level. Organizational bias, also known as organizational prejudice, refers to a systematic deviation from objectivity, accuracy, or rationality in decision-making, practices, or attitudes within an organization. 9 types of biases formed the organizational bias system, and those biases lead to the tendency of decision making based on favor certain beliefs, attitudes, or practices over others. Take groupthink bias as an example, while they try to make a consensus by ignoring the different opinions of few people. In this process, the diversity and comprehensiveness that should characterize team decision-making is compromised. The combination effect of those organizational biases has decreased the efficiency and precision of the decision-making in Challenger case.

2.2 Management style

Studies have shown that decision making is considered germane for productive daily existence. Putatively too, innovative management decision making is deemed central to organizational success [3]. The effect of management mode to organizational decision making is comprehensive. Discussed from various perspectives, we conclude that management mode provides the process of decision making with a clear and effective structure which allow the team to achieve a desired consensus.

In general, the effect included 5 main points in our conclusion. Firstly, it clarifies the procedure and process for determining. Secondly, provided information and evidence. Other effects included encourage or limited behavior of decision maker; provided feedback and improvements and it also help the decision to adapt to the environment.

However, there are different types of management modes, and each enterprises choose the most appropriate based on their own strengths and weaknesses. Democratic management strategy which highly appreciated by entrepreneurs can increased the engagement of all members and make the conclusion and consensus much comprehensive, however, it's such a time-consuming process to listening and giving responds for everyone, so It's usually refused to be adopted for a large group with many members. From this example, undoubtedly, it's a great management model. However, we can't ignore the limitations and constraints of the method.

3 Case description

The Challenger shuttle crew, of seven astronauts—including the pilot, aerospace engineers, and scientists—died tragically in the explosion of their spacecraft during the launch of STS-51L from the Kennedy Space Center about 11:40 a.m., EST, on January 28, 1986. The explosion occurred 73 seconds into the flight as a result of a leak in one of two Solid Rocket Boosters that ignited the main liquid fuel tank[4].

3.1 Background of the launched of the challenger disaster

The Challenger incident was an avoidable disaster, yet the managers were not rational in their decision-making. I do not think that all the faults can be attributed to the bad judgement of the management, but in order to have a more objective understanding, I think it is essential to know the background of the incident. This paragraph will describe and analyze the background from different perspectives.

Social Aspect. The emergence of the United States after World War II and following the Cold War as a hyper-power, while conditioning the production of social knowledge, has allowed it to proclaim the triumph of capital accumulation [5]. The war between the two countries has been an arms race and aerospace engineering research has been an extremely important plank. The United States, due to public opinion and political pressure, is bound to maintain its leadership in research and innovation in the field of space. The U.S. desperately needed a successful launch to prove itself to the world and to preserve its superpower image. And according to research, the State of the Union address in the United States should have been delivered shortly after the launch of Challenger; success in space can have a positive political impact on the country, which is one of the key reasons why administrators are eager to launch.

Economic pressure. NASA is under the heavy pressure of lack of funding, the large amount of budget was needed in the field of aerospace. However, to control the spending below the budget, NASA tried to avoid mentioning the potential risks. Besides, contractor of the project also under the pressure of getting financed. They are seeking for contract which provides maximum profit. During this process, as they want the contract provided best return. They exaggerated the safety and reliability of the Challenger to enhanced people's confidence and selective neglect the uncertainties and risks associated.

Organizational problem. Organizational problem was the most basic problem causing this disaster, It was an avoidable disaster that came to a bad end, in which the imperfections of their management mechanism and the existence of bias were important catalysts that led to such an outcome, and also the important factors affecting the soundness and accuracy of decision-making and their potential relationship, which this article is trying to illustrate through the Challenger disaster.

3.2 The teleconference

The teleconference was called for 8:45pm on January 27th, 1986, between the Marshall Space Flight Centre in Florida (part of NASA) and the contractor in Utah, Morton Thiokol, which had built the solid fuel rocket boosters. The shuttle was due to be launched the next morning, after having had its launch delayed by 24 hours because of strong winds. The teleconference had been called because Thiokol was concerned about the weather forecast showing temperatures below freezing for the shuttle launch the next day [6]. This teleconference provided them with a channel for communication for managers and technical experts. Based on past reports, the risk of O-ring accessory of losing its ductility has been pointed out by engineers of NASA and they have tried to stop the launch tomorrow. However, here we have to mention the flaws in NASA's management model, on the one hand, based on prejudice, the management didn't pay enough attention to the risks they raised or conducted any evaluation, but respected their own ideas that such high risks would not occur. On the other hand, their communication was not efficient; engineers such as Aaron communicated in a direct and aggressive manner and lacked effective communication skills and tactics, resulting in their suggestions not being fully understood and accepted. The conference call arguably gives the most graphic picture of the management patterns and biases contained in the Challenger incident and is the focus of this paper's discussion of the incident. The specific biases and contributing factors to low risk tolerance will be explained later in this paper.

4 Analysis

The Challenger incident can be regarded as a typical example of irrational decision-making due to the existence of bias and inappropriate management style. In the previous section, we have analyzed and given a preliminary overview of the causes and development of the incident, while in this paragraph, we will focus on analyzing and analyzing the influence of bias and the imperfections of the management style behind the incident and examining the relationship between these factors.

4.1 Individual biases

Individual biases can be generally regarded as a type of cognitive misunderstanding which affect individual's rationality in the micro perspective. They subjectively affecting people with their decision-making process to deviation from objective situation and made the final consequence to be less accurate and fair. There are hundreds of individual biases, and we only discussed which of them that playing a main role.

Confirmation bias is a kind of biases that belong to both individual and organizational level, and it is also the bias that most widely applies in public, and it also plays an important role in Challenger disaster. The effect demonstrated in the case study is a that managers are only focusing on those data and research which support their decision of launching and selective ignore opposing ideas. It can be regarded as the basic factor of leading to the bad outcome and the effect of it is significantly crucial.

So how will this type of bias affect decision make in multi-person holding firms. Firstly, cognitive bias can lead to a mismatch of information and scenarios between reality and what managers expect. Without management being aware of the process, because they are misjudging events, they will make decisions that are either overconfident or overly pessimistic from a realistic perspective, resulting in investments that do not maximize profits or do not achieve the goals of the business well. It may seem that such biases can be avoided, as long as there is someone who can provide a counterargument or more objective advice to influence the outcome of the decision. However, because of these biases, even though in many cases ideas have been put forward that could help management to refine their decisions, there are very few cases in which corporate decisions have been changed to be more rational because managers tend to favor their own perceptions and find it difficult to accept different points of view. Secondly, everyone in management has varying degrees of cognition and rationality, yet they need a unified and compelling consensus. This greatly increases the cost of time required for communication, and there are not a few real-life examples of missed market moments due to inefficient management communication. Challenger case interprets these phenomena very well that junior engineers has mentioned the seriousness of the problem of O-ring accessory, however, existence of confirmation bias and inefficient communication lead to the tragedy.

However, in reality there are far more biases at the individual level, and their true workings in reality are far simpler than the theories or articles portray, they often interact and guide each other in ways that are difficult to fathom. In the challenger case, there are biases included overconfidence bias (The tendency for individuals to overestimate their abilities, performance, or level of control), Normalization of deviation (A tendency to gradually accept risks). The case can be the combination of their effect instead of a single bias, this also lead difficulty in analyzing and can be a reason why people can't realize they stuck into a fraud of individual bias. This makes the risk-assistance ability of an enterprise to be lower because of the irrational management style caused by biases.

4.2 Organizational bias

There are only several types of organizational biases compared to the wide variety of individual biases. However, in an organization's decision-making process, these biases provide a great deal of variability and uncertainty in the judgement and formulation of a decision. The impact of organizational bias is serious and unavoidable in a multi-owned or multi-managerial organization. Another definition that should be known in the Challenger case is the groupthink. "Groupthink is a quick and easy way to refer to a mode of thinking that persons engage in when they are deeply involved in a cohesive in-group, when concurrence-seeking becomes so dominant that it tends to override critical thinking or realistic appraisal of alternative courses of action." (Irving l. Janis, 1982) [7]. According to the report of NASA, they have concluded the causes on organizational level. We divided these 8 symptoms into two main categories, the first type which can be regarded as the inefficient communication inside the leader group. Simply can be contributed to the leader try to make a consensus by rationalize people's idea of what majority was thinking as a group level, also some individuals afraid of offering opposite that differ from those crowd from personal perspectives.

The specific symptoms included collective rationalization, Belief in inherent morality, self censorship, illusion of unanimity and self-Appointed Mind-guards. These five types of groupthink symptoms fully demonstrated the effect and consequence of communication barriers and information unsystematic. From group level, even they have known the risk of O-ring accessory getting lose its function which may lead to a disaster, considered from their own perspective, the option that maximized their value is to launch as what they planned to do. So, the members in the group generate a preference to become risk taker and making choice that satisfied their own interests. During this process, although it's really difficult to uniform people's ideas and opposing views may existing. They rationalize members to follow the opinions or decisions of majority by giving pressure or unilaterally focusing on the benefits of the decision while ignoring the risky side of the equation. They try to make sure that those who don't take a stand follow the majority view without giving them time to think about it. Under the pressure and urging of the team, these people tend to listen to the others and lose the opportunity to analyze and take a position themselves. From individual level, people who control more information can lead the consequence of decision to be more towards to his desired outcome by act of intentionally and voluntarily suppressing information from others when formal impediments are absent.

The second type can be concluded as individual problem and styles of decision making (too optimistic or too pessimistic). Symptoms like illusion of invulnerable, obviously due to the overconfidence of decision makers in the outcome. For those people who are over-confident in their decision making, they underestimate the risk and has exaggerated the interest. This led them to be the risk taker even in a situation contains a lot of uncertainties. Out-group stereotypes can be another key factor especially in the Challenger case. They do not emphasize the warning of junior engineers that accessory being lost it ability because of discrimination, this bias that existed in each managers affect the final outcome of the decision and lead the tragedy indirectly. Immediate pressure can be an important factor in the rationality of a decision. Under the pressure of time constraints, managers do not have the opportunity to analyze the problem rationally and comprehensively, and this is one of the factors that creates the risk of ignoring the risk and launching the failed decision.

All these elements whether in communication level or private level, contributed to the lack of objectivity as well as perfection of their decision and become the important catalyst contributing to the tragedy. However, in the real-life cases, their presence is essential to the decisions of the company, both big and small. They also work in a system instead of a single bias is working, they affect the management style of a corporation to some extent and deciding the risk-assistant ability at the same time.

4.3 Combined effect on corporation's risk-assistant ability

Biases is an important factor that affects the decision making and risk tolerance of a company, however, it is not directly reflected, but requires a medium, and in our analysis and understanding, this important medium is the management style of the company.

This failure in communication, combined with a management structure that allowed NASA to bypass safety requirements, was the organizational cause of the Challenger disaster [8]. Management failure is the final outcome of the bias system operating together. Management model in the Challenger disaster revealed authority pressures, data-driven decision-making bias, communication barriers, lack of organizational culture, and environmental pressures on decision-making [9]. From leadership level, the existence of the authority (Superior, public or political level) can make the decision lack of comprehensiveness but just follow the decision what those people want. Also, there are the phenomena of conforming slavishly without having their own opinions. These reasons both affecting the decision-making process of the management level. As not all people have or use their right of giving their opinion, the previous useful management mode become less efficiency because lack of various idea and equality. From information transfer level, the mode has the obvious disadvantage in this. Firstly, there is an information gap between engineers because of the communication lack of efficiency, the wrong data or the past experience convinced managers opinion and the warning mentioned by those engineers was ignored. Secondly, even inside the management group, there is also an inequality between managers' information [10]. This directly caused self-censorship which mislead some people's choices. In the mode our hypothesis is that information is equal for everyone in the group, however, it seems failed to achieved in this case. Thirdly, Prior to the Challenger disaster, NASA may have established an overly optimistic and confident safety culture that downplayed the technical risks associated with flight. Because they haven't failed before, they even haven't considered the possibility of failure of the Challenger case. This kind of bias is different from the perfectly rational assumptions in the management mode. However, from all these three perspectives we can see that there are many uncertainties and limitations in the management system. These modes seemed to be perfect and reasonable in the theory, however, it's totally different in the real-life case like the Challenger disaster we discussed here, we can call this as the imperfection or impractical of modes. We can have an intuitive vision of how those limitation lead to the decreased of the risk-assistant ability of a multi-shareholder's corporation. Managers and organizations are to believe in their management, and they can't realize their mistakes or limitations because they think they get all the information or having the efficiently communication (actually they do not), As we analyzed from the third-person perspective, we can see that actually their mode still exists some problems. However, managers or organizations cannot realize that they hardly make the rational and comprehensive decisions. This directly led to the decreased in risk-assistant ability that corporation have more chances to make the mistakes, and they have fewer chances to find or resolve the errors.

5 Recommendation for refinement

In response to the common phenomenon whereby biases in management models deviate from their theoretically predicted usefulness, thus further affecting the soundness of corporate decision-making and resilience to risk, this paragraph discusses how to effectively minimise the impact of biases and how to enhance the effectiveness of management.

Our research indicates that biases are an inherent and unavoidable factor in any decision-making process, particularly in a multi-shareholder corporation. In such an environment, the clear hierarchical distinction between labour and multi-decision-maker management systems can serve to amplify the effects of biases. It is possible to reduce the likelihood of bias occurring and its subsequent impact. There are a number of perspectives that can be adopted in order to perfect these modes of operation. However, based on research and self-experience, different methods can achieve varying degrees of success.

It is imperative that all employees feel fully heard and are able to respond in a constructive manner to comments with which they may disagree. It is recommended that organizations provide their employees with training in the recognition and management of bias. This represents the initial method presented here: provide training and enhance internal communication. The corporation can provide technological solutions or guidance to facilitate the reduction of bias among employees. This may entail modifying individual characteristics or enhancing sensitivity, or it may involve encouraging basic communication between employees and managers. Regardless of the approach, the goal is to foster a sense of engagement and respect among employees, thereby creating a positive work environment. These methods facilitate the creation of a more amicable and egalitarian work environment. However, empirical evidence suggests that their efficacy may not align with expectations. One possible explanation is that individuals are not engaged with the activities or may not possess the requisite characteristics to thrive in a democratic environment. The second category can be defined as the establishment of objectives and the provision of more detailed guidance to management. This method primarily affects the managerial approach, with the primary objective being the reduction of biases. Managers are identified as the key group responsible for facilitating this change.

Secondly, for each management link and function, a specific management system content should be formulated. This should include the purpose of the system, the scope of application, the subject of responsibility, the workflow, the operation norms, the reward and punishment mechanism, and so forth. It is of particular importance to give close consideration to the stipulations pertaining to prejudice, with a view to ensuring the fairness and efficacy of the system. Nevertheless, it is evident that the absence of penalties in regulations can result in the disregard of such measures by individuals. The final type, which I consider having the most promising potential and should be embraced or adopted by the majority of corporations, is the utilization of intelligent analysis tools to facilitate the development of anti-bias tools. In parallel with the accelerated pace of societal development, artificial intelligence (AI) has reached a more advanced stage of maturity. It will be highly feasible for corporations to accept and utilize technology with minimal costs. If AI technology can be employed by corporations as a means of reducing bias, it has the potential to achieve significant success.

6 Conclusion

The passage primarily addressed the impact of biases on decision-making processes within a multi-shareholder corporation, with the Challenger disaster serving as a case study to substantiate the aforementioned conclusions. The research findings indicate that the biases influencing the corporation's decision-making processes are primarily individual and organisational in nature. These biases are inherent to any decision-making process, regardless of its perceived importance. It is important to note that any decision that is influenced is not the result of a single bias, but rather the output of a complex system of biases that operate together. In light of our findings, it can be concluded that the management mode is the medium through which the existence and operation of biases are manifested. Consequently, the management mode exerts a direct influence on the comprehensiveness and quality of the corporation's decisions, as well as on its risk-mitigation capabilities

However, according to our research on the background of the Challenger disaster we learned that although biases are really crucial factors leading to this tragedy, We can't unthinkingly and without any analysis attribute all the blame to the effects of biases. Organizational environment and their pass experiences also contribute to the tragedy. Limit time also plays an essential role. This reminds us that in the real-life cases, there are various elements that we should considered affecting the consequence of decision but not only considered from a single perspective, and it also shows that the effect of biases is limited, without other catalysts, the influences of those biases on decision making are still uncertain.

We have given the suggestions from three perspectives (corporation's training, corporation's management and objectives and usage of AI) and among them, the one that have the greatest prospect is the usage of AI. We not only list how it helps in an organization but also have mentioned the limitations of those tools and how effectively they are in the realistic. However, we just give some suggestions do not mean that those methods mentioned are the best solutions. According to the different environments, different departments division, different nature of companies, the general management mode can not be suitable for every corporation, the best management mode minimizing the effect of biases and making the most rational decisions should be concluded by companies themselves based on their or other's experiences.

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