Challenger Space Shuttle Explosion in 1986

Al-Ayham Maree
Department of Electrical and Computer Engineering
Birzeit University
Ramallah, Palestine
1191408@student.birzeit.edu
Supervised by: Dr. Abdel Salam Sayyad

***Abstract*— the ethical issues surrounding the 1986 Challenger Space Shuttle explosion are investigated in this paper. It looks into all viewpoints and discusses the worries of the engineers, NASA's decision-making process, and the ethical aspects of whistleblowing. The aim of this research is to improve engineering and spaceflight ethics through extracting principles from the wrong event.**

Index Terms—Challenger Disaster, Space Shuttle, Engineering Ethics, NASA Decision-Making, Whistleblowing, Organizational Pressures, Groupthink, Space Exploration

I. INTRODUCTION

The space operations was forever impacted after the terrible Challenger Space Shuttle disaster on the 28th of January in 1986 that led to the tragic loss of seven astronauts. By a deep investigation of the workplace environment, processes for making decisions, and ethical worries that may have led to the accident, this investigation aims to critically analyze the ethical values behind the event. Therefore, It aim to gain important knowledge and understanding that encourage a secure and more ethically accountable path for the exploration of space through exploring the ethical basis of significant choices.

II. WHO WERE THE INVOLVED ACTOR'S?

A lot of actors participated in the Challenger disaster each of them was important in the sequence of events which resulted in the tragedy. The main actors include engineers, contractors, astronauts, and NASA managers. Those who participated in the process of making decisions included the crew members who tragically lost their lives while aboard the shuttle, engineers at Morton Thiokol, who was the company that was responsible of the shuttle's solid rocket boosts, and the highest degree of managers from NASA[1][5].

III. WHY DID ENGINEERS OPPOSE THE LAUNCH DESPITE MEETING SPECS?

Engineers at Morton Thiokol objected to the launch despite the shuttle satisfying every technical requirement because they had concerns about how the low temperatures could impact the O-rings that were on the shuttle, so The O-rings that acted as seals in the solid rocket boosters of the shuttle were thought to be vulnerable due to the very low temperature on the launch day, according to the engineers [3] [4].

Moreover, the objections occurred from ethical worries about putting safety above technological standards and launch times.

That is important to find an agreement between operational objectives and ethical standards since it would be unethical for engineers to proceed with the launch despite possible risks to safety, violating the ethical responsibility they have to ensure astronaut safety. Furthermore, the ethical problem illustrates the larger challenge of maintaining integrity in processes of making a decision, highlighting how important it is to preserve the highest possible standards of safety and ethical behavior.

IV. Why did NASA push for the launch despite objections?

The choice made by NASA to press on with the launch despite of these engineer's demonstrations reveals ethical challenges associated with interactions, the culture of an organization, and process of making decision, so NASA's ability to take dangers may have been affected by the pressure to keep to the schedules, avoid financial losses, and achieve political standards. Therefore, it presents ethical concerns with providing commercial and political goals priority over safety issues [7] [8].

The process of making decisions showed an absence of ethical responsibility in creating an agreement among the safety of the crew and the mission's achievement through failing to effectively take into consideration and resolve the engineers concerns. This situation describes how important it is to establish an ethical workplace culture that values direct interactions, sets a high value on protection, while making clear that decisions are taken with the best interest of all those affected in consideration. Therefore, possible irresponsibility when dealing with safety concerns, an absence of flexibility, and the failure to set the ethical duty of preserving human life ahead of organizational objectives are some of the ethical issues this situation raises.

V. Was whistleblowing justified in this case?

The Challenger disaster raises questions about the ethical standards of whistleblowing and the engineer's responsibility to protect others by raising attention to safety concerns, so whistleblowing response, reveals additional ethical problems such as poor handling of worries and an absence of organizational assistance in NASA's Managers [2][6].

Therefore, this focuses on the importance it is for engineering procedures to provide a responsive and supportive environment communication that is ethical.

Moreover, the more general ethical importance that organizations prioritize safety and ethical responsibility over other requests, strongly resolving and fixing problems while also supporting recognition of them, and it's additionally makes people thinking about the way ethically companies should encourage an environment that encourages disagreement as a key component of maintaining ethics and avoiding tragic results.

VI. Conclusion

In conclusion, the essential ethical agreement on operational objectives and safety standards has been demonstrated in the 1986 Challenger Space Shuttle disaster research. The accident acts like an alarm regarding how important it's to value astronaut's safety above efficiency. It is unclear if political and business objectives have priority above safety in NASA's process of decision-making, which makes it exposed to outside pressure and indicates an ethical weakness. The accident shows the need it is to consider the ethics of engineering and space exploration, how important it is to give preference to safety, and just how essential it is to maintain wide channels of communication, so Whistleblowing is important due to the fact that it shows how important it is for business organizations to establish environments that respect opposition and prioritize safety and ethics. In addition and finally, The Challenger disaster shows the constant dedication needed to guarantee the safety of people participating on missions into space as acts as an awful reminder of the ethical difficulties related with exploration.

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