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Denver International Airport Baggage Handling System Case Study Report

CIS7008- Technology Project Management

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Group B - Team Number 2

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Introduction

¹³ The purpose of this study is to examine the development of automation baggage system for the airport management and what makes project deliveries successful. It is entirely based on real case study in Denver. The author aim is to understand the value of project management role in the project journey throughout the process.

The case study is about the decision making of Denver Airport management system and how it deals with new requirements. It also includes what problems they faced on fulfilling requirements and how they tried to overcome the difficult situations. The Denver airport is largest international airport in North America and second largest in the globe, mainly serving metropolitan Denver. The company main goal is to become **greenest airport in the world** (Art Pyster, Heidi Davidz, 2022). So the airport management decided to introduce automatic baggage system instead of handling manually to reduce time (Calleam Consulting, 2008).

In this research the author explained about the importance of decision making, resource management for the success or failure of the project and how communication plays role for the successful deliveries. For any organization project success, the key milestone is to make correct decision, does this requirement will execute within the timeline, what will be the future consequences and how much productive is the new requirement. These questions should be in mind for the team manager or client or team lead while proposing new requirement. In this case study the author found that the above key points are missed by airport management team so, in author's point of view this study is very important for further improvement of the industry.

Case study Selection

The researcher analyzed many case projects which are success and failure, but this case study project is very interesting in their point of view. It's because the airport management team is trying to build automatic baggage system, which is very helpful, effective and trending. While making this decision the team had several discussions with internal and external team (stakeholders) after, so many rejections also they started building it with the help of British Aerospace (BAE) team. The aim of studying this case project ¹³ is to analyze Denver international airport baggage handling system

from **project** management view. From this case study the author can learn the importance of decision-making, quality and time management.

Research Methodology

This case study is examined based on a real project. ¹⁸ Research methodology describes the specific procedures or techniques used to locate, select, analyse, and assess data on a subject. (Panneerselvam, R., 2014). In this paper the study is done by group of 4 people. They selected the topic with prior research by using search engines (Google, IEEE, News, Slideshare etc.,). Then after multiple team discussions, group members finalized the topic and initiated the work with proper planning.

The process of research methodology is shown in below flowchart:

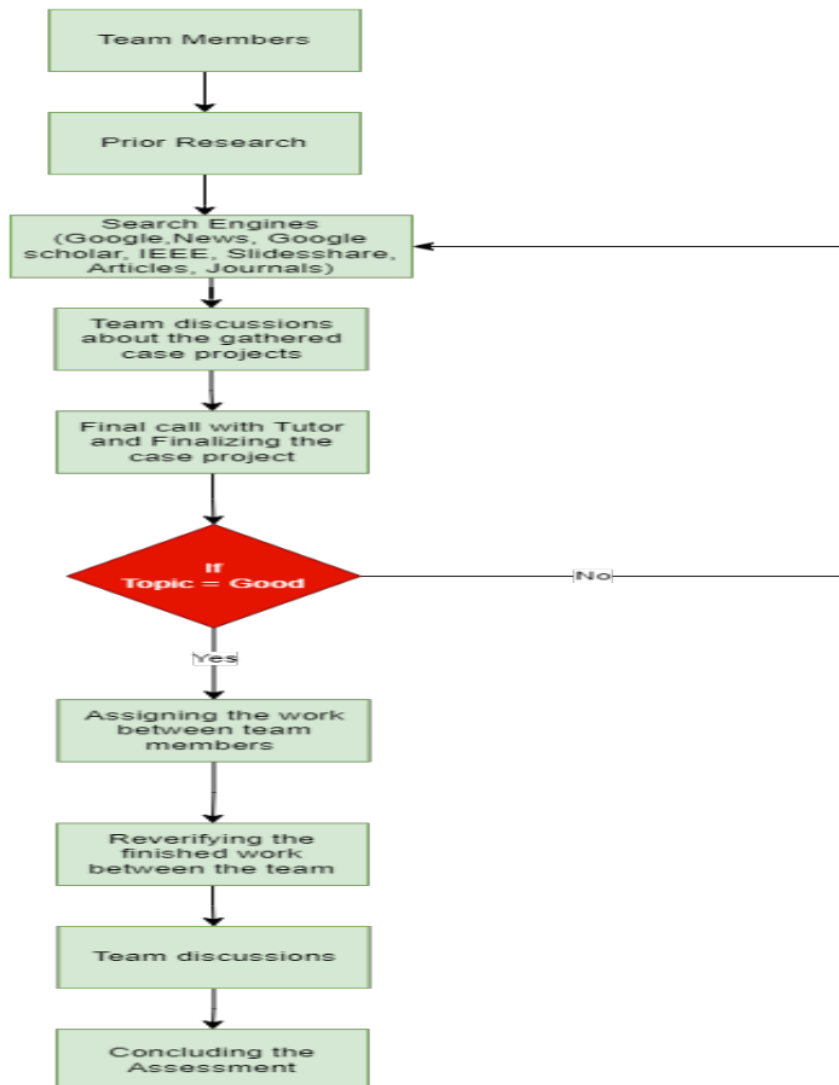


Fig 1: Research methodology

Project Management:

There are several principles for project management. Some of the important features are listed below:

1. Decision making
2. Stakeholder analysis
3. Project Integration management
4. Project Scope
5. Time management
6. Cost
7. Quality check
8. Resource management
9. Risk analysis
10. Communication

Decision making: The major principle in project management is decision making. Entire project delivery is depended on this point. The project management team of the Denver airport underestimated the complexity of the project and decided to take over it without proper analysis.

Stakeholder analysis: Before starting the design, management interacted with many other airport teams but only 3 responded and they mentioned it won't be able to finish within time. Later, only BAE and the Denver International Airport team came to an agreement on the choice. But none of them are engaged while implementing the project.

Project Integration management: It is the process where all the resources can be gathered and analyzed based on the requirements so, that all the employees can have hand on work all the time. The airport administration did not thoroughly examine the needs; they believed the invention would work as intended given the criteria, but when it came time to implement it, they lacked the resources, which created problems (Schloh and Stearns, 2010).

Project Scope: Scope is the overall quantity of work required to produce a service, resource, or outcome with the desired features and functionalities. In this study the

scope is introduce ⁴ “**Integrated Automated Baggage Handling System**”. It would provide service for the entire airport, automatically transferring bags ⁴ between check-ins, the aircraft (on three concourses), and pick-up upon arrival (de Neufville, 1994). The Denver airport management team first believed the scope was appropriate, but as the project was being implemented, the entire scope was altered.

Time management: One of the important principles for successful project is maintaining proper time delivery. The project delivery was delayed by 16 months than the estimated time. Denver team bid BAE to finish the target but still they are doing their own system without contacting BAE because of that there was a chaotic communication happened between them (Hallenborg and Demazeau, n.d.). This is reason for delay in delivery.

Cost: Changing the requirements multiple times will cause financial lose.

Quality check: The system's capacity and efficiency were decreased as a result of design modifications made later in the project. In fact, only 12 percent of the system's capacity or half of the 84 airport gates were serviced (Conway, n.d.).

Resource Management: Resources means either employees or the objects which needs to be there for fulfilling the project requirements. As this is a complex project having more resources will leads to the target finish soon (Conway, n.d.).

Risk analysis: The exposure to risk is **high** in this project because of no proper decision and planning for the initiation of the project. If the automation fails they should think how to solve or identify before it causes problems to the customer (Hallenborg and Demazeau, n.d.). There is no **risk assessment planning** before starting the project.

Communication: As per the case study the communication between both airport team and stakeholders not held in a good manner. The team should have clear communication with BAE team.

The representation of the project management principles is shown below:

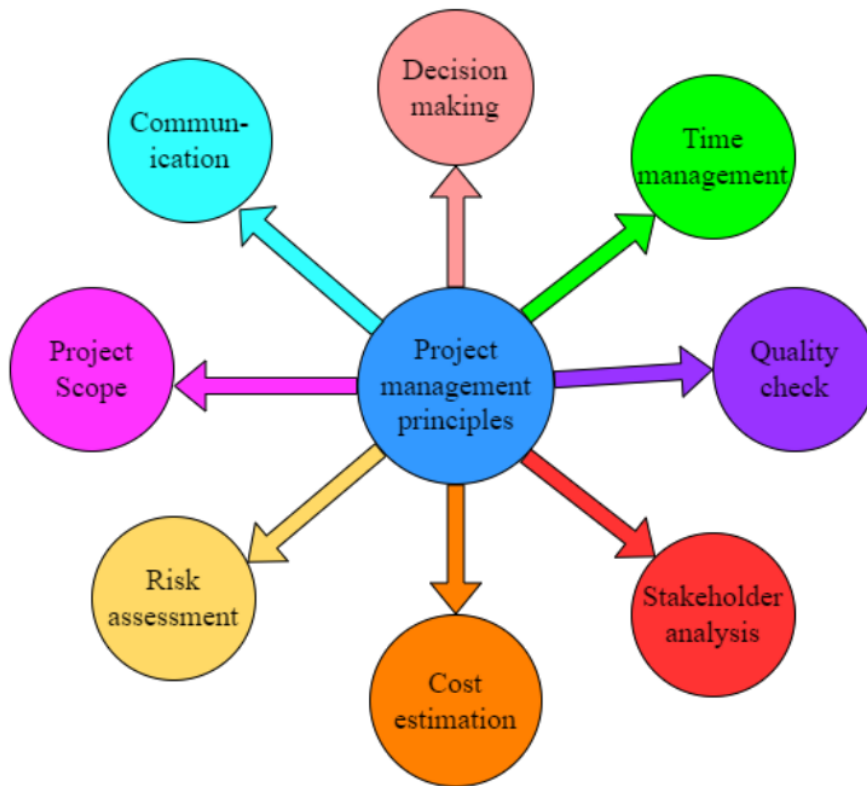


Fig 2: Project management principles

Risks and Benefits

Risks

Risk refers to the level of uncertainty that is involved in estimating the probability that a problem will occur and the severity of the damage that will result from it (Couillard, J., 1995).

Risk assessment is the process of identifying risks that potentially have a negative influence on an organization's ability to conduct business and it improves the workspace.

The risks for the Denver airport baggage system is listed below:

Pre-Risk assessment: The management not analyzed the risk assessment before starting the process of the automation. The lack of risk assessment plan will cause the delays, hazards, financial risk, reputation damage and resource loss etc.

Financial risk: The team has to think about the proper cost estimation while introducing the new requirements in each phase of the development.

Project delay: Denver international airport automated baggage system was expected to deliver in 2 years but delayed by 16 months. As the time increases team should analyze about the budget issues (Conway, n.d., 2011).

Accidents: It was obvious that there was a risk associated in developing an integrated, automated baggage handling system because it requires new technologies in extremely sophisticated ways with highly equipped machines.

Design and Performance risk: The management team might have included input from the airlines and BAE when creating a list of risks, assumptions in design process, and limits during scheduling. While implementing the project, the stakeholders not involved effectively but some are given inputs which are not helped in designing process.

Reputation loss: The airline team should take into account the opinions of other investors so they can't deal with the consequences individually.

Backups: Maintaining backups should avoid a future risk which helps even if the automation fails but the airport team was not able to manage the backup (Conway, n.d., 2011).

The risk assessment table is shown below

SL. No	Main Risk	Owner of Risk	Reasons Caused	Effect	Level of Risk	Risk Response Strategy
1	Financial Risk	Investors	Increase of budget due to no proper planning	High cost than estimated	High	Proper cost estimation before starting the project
2	Time Risk	Investors and employees	Due to insufficient time to finish the project, as only 3 company responded to proposal	Delay in project deliveries	High	Employment of new employees or ordering part of work to another party(BAE) during the contract.
3	Performance Risk	Customers	Due to sharp turns , automation system speed decreased from 60 to 30 cars per minute	Unexpected outcomes	High	Proper quality check before deployment
4	Stakeholder Risk	Investors	Less interaction in the construction of airport baggage system	No new ideas for improvement	Medium	Involving as many stakeholder and convince them to take responsibility in it
5	Accidents Risk	Management, Customers and surrounding people	Improper design and lack of testing	Injuries and deaths	High	Need to pilot testing
6	Assets Risk	Industry owners	Quality less equipments	Damages to the society	Medium	Contracting with best asset provider
7	Software Risk	Laptops, CPU, Hard drives and desktops	Improper design	Cyber attacks	Low	Maintaining up-to-date softwares
8	Hardware Risk	Design machines	Less quality	Accidents and hazards	High	Contracting with best hardware provider
9	Vulnerabilities	Hackers	Improper maintenance of the data stores	Cyber issues	High	Need to maintain safe guidance for cyber attacks and have special team for cyber security
10	Communication Risk	Airport management team, employees, Stakeholders	No proper discussions about the work/requirement in each designing phase	Damages the relationships between investors, management and employees	Medium	Interacting exchange of information among the team

Fig 3: Risk Assessment table

Below represent the schematic diagram of the risks for the automated baggage system:

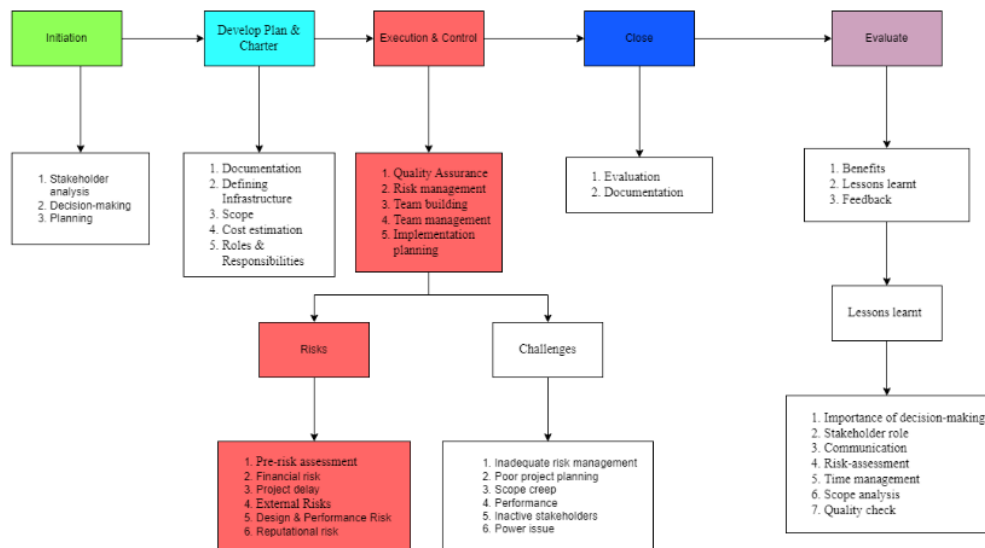


Fig 4: Risks

Benefits:

The team came up with semi automatic baggage systems which run successfully without man power. Introducing automation into the project makes the work efficient and productive. The management has discussed with other airport teams about their opinion on the new requirement this makes project more interactive and will get to know the flaws or key points from other stakeholders (Conway, n.d., 2011). Adapting advanced technology is one of the best milestones for the company growth.

Outcomes

The outcomes of the project are listed below:

Delivery date: The estimated delivery date for the project is delayed by 16 months.

Quality of the product: The automated system only deals with baggage coming from Denver; it did not deal with baggage departing, arriving, or being transferred.

Scope: The original plan is to build an automated baggage system but at the end the airport produced semi automated baggage and some is still handled manually due to the scope changes in all phases.

Challenges

The challenges which all have been faced in Denver automated airport baggage handling system are listed below.

- **Inadequate risk management:** From various published assessments on this subject all agree on one point that the management significantly underestimated the baggage system's complexity while designing the work. The problem of "line balance" was at the core of the difficulty (Dr. R. de Neufville, 1994).
- **Inefficient project planning:** Prior to finalizing the baggage system plan, construction of the airport building began. In the past, airport construction

projects were handled differently than they are today, which has contributed to the delay in developing the proper strategy. Later in project, it was discovered that the structure was unsuitable due to the tunnels being too narrow and having sharp turns, thus making it difficult for the baggage system rails to be built. (Schloh, 1996, p. 9).

- **Performance:** Sharp turns were the primary reason for ejecting bags from carts. Consequently, the speed of vehicles was reduced from 60 to 30 per minute to reduce physical stress in tight curves.
- **Inactive Stakeholders:** ¹⁷ The airlines were significant stakeholders in the project, as they had a strong interest in how the airport would be constructed and provided substantial funding. BAE initially decided not to submit a bid for the airport-wide contract, once the three official bids were turned down, the airport team spoke with BAE directly about the possibilities of developing the United Airlines system further.
- **Power issues:** The frequently crashing electrical system due to power fluctuations was challenge faced while handling baggage system. The estimated \$193 million price tag for the baggage system was upped to \$311 million. Automatically the airport cost also increased from \$1.7 billion to \$4.5 billion (Schloh, 1996, p. 17-19; c).
- ² The airport Project Management team and BAE chose to proceed with the full-scale project despite signs that there wasn't enough time.
- The airport Project Management team and BAE were aware of the lack of time, they chose to go ahead with the full-scale project.
- Lack of preparations, inefficient communication and poor management control was challenge faced at underestimation of complexity. Another challenge was working under pressure and managing timetable which affected the project.

The performance objectives of the system would be compromised if the number of carts was incorrectly anticipated which would cause delays in bag pickup. The project had to be finished in less than two years. It was obvious that this wasn't enough time,

and as a result of this error in judgement, the project was put under tremendous timetable strain (Cal Poly – M. Schloh, 1996).

The challenges for the Denver international airport automated baggage system are shown below:

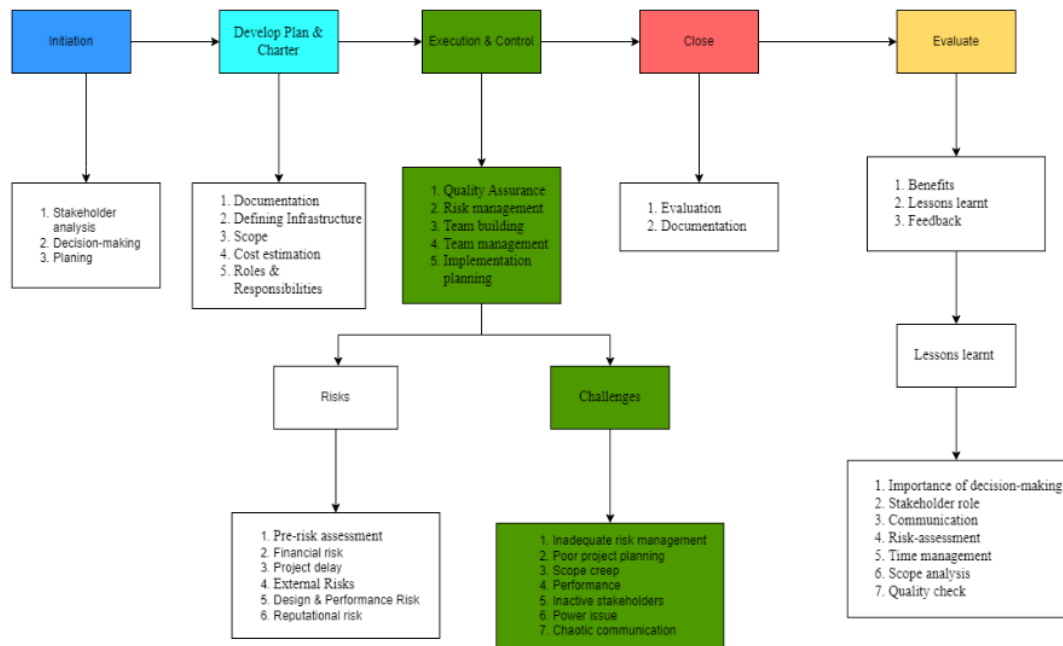


Fig 5: Challenges

Lessons Learned

1. **Importance of decision-making:** After analyzing this case project the team learnt about the importance of decision-making while implementing the project design.
2. **Stakeholder role:** The study analyzed that stakeholder plays very important role in the project initial stage such as their suggestions and feedbacks.
3. **Communication:** One of the key roles for project success is maintaining good communication among the higher management, employees and investors for analysing the task clearly to produce effective outcomes.

4. **Risk-assessment chart:** Analyzing the tasks before executing the project is crucial for improvement / success of the project.
5. **Time management:** To ensure project completion on schedule and within budget, time management is necessary.
6. **Scope analysis:** Never add new requirements to the project in the implementation stage and even if added, the entire people who are involved in that process should know the new requirements. The airport management team added new requirements without informing BAE, after discussion in the deployment meeting system errors occurred.
7. **Quality check:** Before going to release the project team should do multiple pre-tests because automation needs multiple runs so that performance level can be identified without system errors (flaws).

The below figure illustrates the lessons learned from the study:

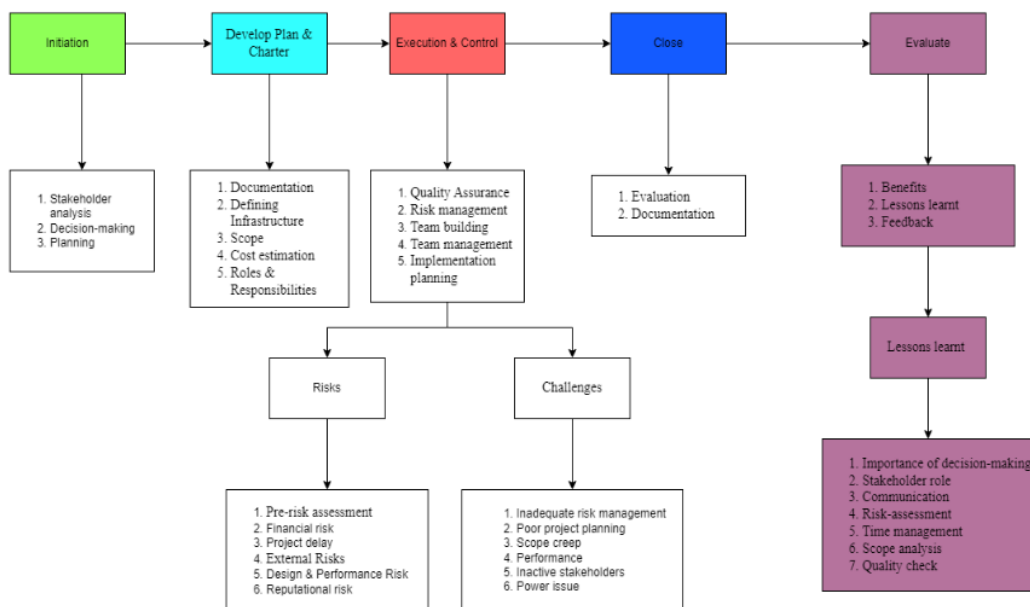


Fig 6: Lessons learned

Conclusion

This case study examines the project management principles while implementing the automatic baggage system. Despite Denver International Airport decided to replace the manual baggage-handling system with an automatic baggage system which will save the time. They suffered more failures from underestimated complexity, poor plan and design, inefficient stakeholder team, inadequate of performance risk due to the improper communication between airport team and BAE, because of that the implementation of automated baggage system is delayed. They learnt the importance of project management principles mainly taking decision and planning.

Gantt chart

The below diagram illustrates the project work schedule:



Fig 7: Gantt Chart

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