

**The Denver International Airport Automated Baggage Handling System: A Case Study in  
Project Cost Management**

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## **The Denver International Airport Automated Baggage Handling System: A Case Study in Project Cost Management**

In the early 1990s, the Automated Baggage Handling System at Denver International Airport (DIA) was intended to provide automated transportation of luggage and increased efficiency with less human intervention (Montealegre & Keil, 2000). The City of Denver hired BAE Automated Systems, Inc., who designed and oversaw implementing an elaborate network of conveyor belts, sensors, and scanners. However, the initiative became a case study of poor cost control and unrealistic planning. Cost escalations led the system's budget to more than double, from \$193 million to over \$400 million, resulting in nearly \$2 billion in total overruns of the airport and delays of over 16 months (Montealegre & Keil, 2000). Ultimately, only one concourse was ready to operate. Major stakeholders in the baggage claim system included the City of Denver, Mayor Wellington Webb, BAE Systems, United Airlines, and federal regulators such as the Federal Aviation Administration (FAA) and Securities and Exchange Commission (SEC).

### **Deficiencies in Project Cost Management**

#### **1. Inaccurate Cost Estimates and Scope Creep**

The baggage system at DIA failed largely because of inaccurate cost estimates and scope creep. What started as a single airline system of United Airlines expanded into a system for the entire airport without changes in budget or schedule. Because BAE and the officials in Denver did not understand the technical complexities of integrating 55 computers, 5,000 sensors, and multiple telecars (Montealegre & Keil, 2000). The terminals were simply on an unrealistic cost refinement schedule which led to unsound baselines and overconfidence in the project feasibility.

## **2. Absence of Ongoing Cost Management**

According to effective cost management, all expenditures should be monitored against the baseline forecast for variances. DIA, however, didn't have any of this scrutiny. When there were delays or technical difficulties, the city ignored them, even considering earlier warnings when BAE stated it would not compete for the original design. As the delays grew, the cost to the city of the bonds and maintenance alone was \$33 million/month (Montealegre & Keil, 2000). There was strong political pressure to meet deadlines, which eroded any adherence to most rules of financial management. Last-minute spending on a backup operational system created further redundancy.

## **3. Ineffective Risk Assessment and Contingency Planning**

Planners did not include contingency reserves for technological risks or unknown contingencies with design. Outside consultants again reiterated that the timeline of the project was unrealistic, but all were dismissed as if that had no consequence (Flynn, 1994; Booth & O'Driscoll, 1994). When the original testing of the operations did not work and bags of luggage were shredded and misdirected, there were no alternate plans. Expensive consultants had to scramble to respond to the failures and to redesign the operations. This increased both costs and scheduling delays associated with the project.

## **4. Repercussions of Cost Overruns**

The cost overruns had consequences that rippled through multiple issues. One of the financial ramifications of the overruns resulted in credit downgrades when the City of Denver's bond rating dropped to near junk status and calls from the City Council for external audits

(Svaldi, 1994). The operational consequences resulted in the airport which was anticipated to be a tremendous asset to Denver failing to open leaving the city with losses of more than \$360 million in direct costs and lost revenue. Furthermore, the political fallout from the overruns captured national media attention, drew investigations from the Federal government, and caused public outrage over the government mismanagement. The extensive media coverage and public criticism surrounding the baggage system's repeated failures and escalating costs heightened scrutiny on city leadership, forcing reactive decisions that further strained the project's financial and political stability.

**Figure 1**

*Comparison of Cost Management Practices and Gaps in the DIA Baggage System Project.*

<b>Cost Management Area</b>	<b>Best Practice Approach</b>	<b>Observed Weakness at DIA</b>
Cost Estimating	Bottom-up estimation and realistic baselines	Relied on top-down political estimates
Cost Budgeting	Defined baseline with contingency reserves	No formal baseline or reserves
Cost Control	Earned Value tracking and variance analysis	No monitoring of cost vs. schedule performance
Change Management	Formal change review and documentation	Scope changes without approval or cost assessment

*Note.* Adapted from *PMBOK® Guide* (PMI, 2021) and Montealegre & Keil (2000).

### **Alternative strategies for cost control**

Multiple cost management approaches may have reduced DIA's cost overruns:

- **Progressive Estimation and Earned Value Management (EVM):** Continuously tracking performance using EVM indicators such as costs and schedule variances would have identified early cost growth and performance issues.
- **Phased Deployment and Prototyping:** The higher risk of deployment would have been mitigated by starting with one concourse and utilizing insights from the first concourse build to furnish evidence for the second concourse, and so on.
- **Contingency and Management Reserves:** Reserving some budget as risk reserve (10-20%) for unexpected design or integration complications would have lessened budget implications.
- **Independent Costs Processes and Reviews:** Independent, third-party intermittent reviews could have assured a level of transparency in DIA's spending to limit, if not stop, political interference and bias in reporting.
- **Clear Stakeholder Communication:** Communicating with stakeholders about agreements made with contractors would have assured the city and public that spending was justified; thereby possibly relieving political pressures.

## **Conclusion and Lessons Learned**

The DIA Automated Baggage Handling System exemplifies how a lack of disciplined cost control can lead to project failure of large technology projects. The overruns were a result of poor estimations; lack of risk planning; and inadequate cost tracking; resulting in a portion of a system for only one concourse of the airport and required significant reallocation of funds which changed future budgeting plans. Future projects need to set realistic baselines, monitor costs on a regular basis, and de-escalate early on when returns diminish. There is a balance between innovation in the supply chain and fiscal responsibility, to avoid the costly lessons of DIA

## References

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