MAC CASE STUDY

CONTENTS

INTRODUCTION

OVERVIEW OF MAC PROJECT

Murasaki Aircraft Corporation (MAC) is new Aircraft manufacturer from Japan that produces Regional jets and supplies Wings for Boeing's 787 aircraft. The company is currently looking to produce an aircraft which is lightweight using Boeing's 787 Dreamliner lightweight construction technologies through international consortium with Boeing and Airbus. Before a concept for this new aircraft can be developed, the management needs to study the cases of 787 and A380 aircraft development projects to identify problems they face such that steps can be taken to avoid those issues in the new MAC project. The assessment of projects would involve exploration of major phase of the project management cycle including initiation, planning, execution, monitoring and control. Lessons learned from the two cases would be used for making recommendations to MAC to ensure that same mistakes are not repeated by the company in its ambitious project.

STAKEHOLDERS – KEY PLAYERS & THEIR ROLES

MAC has some major stakeholders that have different percentages of ownership in the company and these include Murasaki Heavy Industries (MHI) with 64%, Toyota Motor Corporation with 10%, Mitsubishi Corporation with 10% and Sumitomo Corporation shareholding and Mitsui & Co with some minor shares. Roles and responsibilities of each of these project owners included:

MAC: MAC is the owner and key decision maker for the aircraft development project and is responsible for development, production, and sales of the aircrafts.

MHI: it is one of the major suppliers for Boeings and it manufactures Wings of the aircrafts. The company is into manufacturing of aerospace components, hydraulic equipments, air conditioners, power generation equipments and more. Having a major share on the project, the company had a major decision making power in terms of project and could also be one of the major suppliers for the current project.

Mitsubishi Corporation: the company develops, produces and provides support for regional jet airline passengers. The company has a small share in the company and would provide the support for sales for the aircraft project.

Sumitomo Corporation: it is a technology developer that also has business in trading and real estate. It has a minor share in the project and thus, was a part of communication that was sent about the project to them.

AIRBUS A380 CASE

BACKGROUND

Airbus A380 made its debut in October 2007 with an Aircraft that flew from Singapore to Sydney. By 2008, the company took another route between Melbourne and Los Angeles. Airbus has Air France, Emirates, and Lufthansa as its major customers. Emirates had ordered 120 aircraft the Airbus and the company had also received other major orders from Air France, Qatar Airways, and Virgin Atlantic. However, company faced several issues related to production and delivery.

The project involved development of the first "triple-decker" freight aircraft for long-haul flight market that could challenge Boeing as it was designed to carry 35% more passengers, consume 12% less fuel per seat, weigh less with the use of GLAss-REinforced fibre metal laminate, and was powered by Rolls-Royce Trent 900 or Alliance GP7200 turbofan engines. The average list price of A380 was decided to be $347m (£215m). The aircraft was to carry 555 in separate seat classes and 850 passenger's economy class. It was to include various facilities like duty free shops, bars, lounges and beauty salons.

FACTORS THAT CONTRIBUTED TO FAILURE

Factors that caused failure of the Airbus project included incompetence of the company, overambitious timelines, lack of buy-in from staff and management, miscalculations, part failed communication, design complexities, and part denial of the management.

Incompetence of the company: The Company was unable deal with the issues causing delays otherwise; it would have caused only minor delays. Because of this in competency, the delays were increased to 2 years.

Overambitious timelines: The delivery schedule was also too ambitious as it was planned to be delivered by 2006 when it started in 2000. It involved thousands of engineers working across 16 sites in four countries and was planned to be launch with latest technological advances such as lightweight composite materials and state-of-the art systems for avionics, electrical and hydraulics. Normal time for normal aircraft production and delivery was found to be 5-6 years but with the new aircraft that had functionalities like never to be launched, this time was insufficient.

Lack of buy-in from staff and management: For the company to deliver production in this timeline there was a need for the use of state-of-the art computer-assisted design technology that could produce 3D models. However, the engineers were not accepting this change and wanted to use old system, Computervision that could only produce 2D blueprints. These older systems were labour intensive and saved jobs while the new system would result into loss of some jobs. So, despite resistance, company installed Catia and Circe that was two powerful modelling software developed by Dassault Systèmes. Because of lack of engineers buy in and support from top management, the changeover to new software turned out to be costly as well as time consuming.

Miscalculations: Most of the technical issues faced on the project could be attributed to the problems that were faced by the company back in 2004, when 200 German mechanics were involved in installation of copper and aluminium wires around the floor panels and walls of the airframes but after taking many efforts, they were found to be too short. The cause behind this problem was the mistakes in calculation and the result of replacement of all wires from scratch. The problems were escalated at later stages of development causing several manufacturing issues and the company had to announce a 6 months delay. This delay resulted from the problems of wiring, cabin design complexities, and weight issues.

Failed communication & Management Conflicts: Airbus was formed by a combination of 16 companies from 4 different countries including France, Germany, Britain, and Spain. When all these entities were to work in an integrated environment, there were communication lapses. The project demanded integration for which reorganization was planned with introduction of new administrative structures where top managers were located from each of the 16 divisions. However, this increased conflicts in management. By the year 2005, management problems escalated with the battle of ownership between Airbus, EADS, DaimlerChrysler, Enders and Forgeard. Different customers demanded different functions in the aircraft. Two largest groups of stakeholders including DaimlerChrysler and a French Holding Company had conflicts of interests leading to months of negotiations that went into balancing their requirements (Clarke, 2006).

Design complexities: A major reason behind delays was the level of complication in manufacturing design caused by the use of 100,000 different wires running over 330 miles and performing 1,150 functions. In designing the wiring harnesses, Hamburg plant used older version of CATIA while

Toulouse used the updated version. This cause compatibility issues and the design specifications could not flow between two plants resulting into the failure of the wires to fit in the frame. As a result, the production had to be halted. Wiring had to be redone because of which costs were escalated by $6 billion (Shore, 2009).

ANALYSIS OF KEY ISSUES

The Airbus product suffered major delays after its launch in 2005. Initial delays were caused different software was used for installing 330 miles of wiring than those used for British and French producers. The first production was delivered in October 2007 to Singapore Airlines.

Originally planned for 2006, the first planes suffered three major delays, with the launch customer, Singapore Airlines, finally getting hold of the first production model in October 2007 followed by Emirates with 20 planes and Quantas with 15 planes delivered by 2008 (Dörfler & Baumann, 2014).

After the planes got operations, there were some more major problems that were faced. In a Quantas A380 plane, one of the engines exploded after takeoff and the flight had to take an emergency landing. In 2011, one of the Quantas flight faced an oil problem forcing shut down of engines post which the flight was diverted to Dubai. In 2012, investigations were made on 68 aircrafts by European Aviation Safety Agency that revealed problems like cracks in the wing components and lack of grounding.

In subsequent months, there were more delays and the delay extended to 2 years. By 2007, the company could deliver only 9 out of 25 aircrafts promised. The delivery delays resulted into reduction in earnings by €2 billion and reduction in the share value by 26% (BBC, 2012).

AFTERMATH & DEALING WITH PROJECT FAILURE

Despite the major problems in production and deliveries, the company was in denial and only announced the plan to fight back. The ambitious project failed as the production completion was delayed by 2 years that resulted into a loss of confidence of stakeholders and customers of airbus. Moreover, the development costs escalated to $13 billion which the company could not recoup anytime before 2017. On the market side, the market for such a huge aircraft was not sufficient as it demanded more of fuel-efficient jets. By 2005, the company could get only 172 orders as compared to 354 orders received by Boeing for its Dreamliner. The financial pressures were increasing because of which Airbus implemented a cost cutting program involving negotiations with suppliers and labor unions (Rochfort, 2016).

LESSON LEARNED

The lessons that could be learned from the Airbus case include:

- It is not always the technical problems that is the main cause of failure
- Organizational culture is very important aspect in any project and affects its success majorly.

- A positive organizational culture is needed for project success that is characterized by multiple factors including identity, team emphasis, management focus, unit integration, control, risk tolerance, reward criteria, conflict tolerance, means versus ends orientation, and open system focus. Airbus failed to establish member identity, achieve unit integration and tolerance for conflicts.

BOEING 787 DREAMLINER CASE

BACKGROUND

Dreamliner 1 was introduced by Boeing in January 2003 with a latest design of the airplane that was to build a fuel efficient jetliner made of composite material. The Dreamliner was a success after it's launched as it was rated as the most efficient commercial airplane by Boeing with 20% increase in fuel efficiency, better in-flight experience, reduced maintenance costs and 30,000 to 40,000 pounds lighter in weight. The launch turned out to be most successful in aviation business and the company bagged orders for 500 aircrafts within 3 years of the launch of 787 Dreamliner.

However, from the point of view of project management, it was a failure because it proved out to be the project with longest delays suffered, escalated costs, loss of revenues, loss of customers, loss of investor confidence and reshuffling of management. An initial 6 months delay itself caused extra costs of $1 billion and revenues reduction of $3.5 billion. As the problems escalated, the delays were increased to 3 years and the cost escalated manifolds (Denning, 2013).

FACTORS THAT CONTRIBUTED TO FAILURE

Initial problems were seen in 2007 that caused six months delay. The company put in more money and resources to resolve issues but could not do so as subsequent events revealed that the problems were much deeper than the management's observation. There were six more delays announced post this six months delay and the final aircraft could be launched only by December 2009. These delays coupled with increased costs of development reflected the project failure which could be attributed to a number of causes such as:

Supply chain problems: The count of fasteners needed by the Dreamliner program was 80% lower in new design and thus, suppliers were not very enthusiastic on deliveries as they preferred larger orders. Thus, the Dreamliner program deliveries were given low priority by suppliers which threatened the Dreamliner program with shortage of fasteners. Moreover, problems were escalated as the workforce did not receive sufficient training on installation of fasters leading to improper installations. Further because of incomplete or substandard sections made, there were flaws caused in manufacturing off structures. To resolve these issues, engineering had to travel to places for applying patches for correction (Shenhar, et al., 2016).

Outsourcing Complexities: The development of new plane was not done in house by the company but its manufacturing activities were outsourced that included designing, engineering, and integration. The role of Boeing was limited to general design and assembling while 90% of manufacturing activities were outsourced. Major suppliers of Boeing included Spirit AeroSystems and Vought Aircraft Industries from USA, Alenia Aeronautica from Italy, Kawasaki Heavy Industries, Fuji Heavy Industries, and Mitsubishi Heavy Industries from Japan. These suppliers further outsourced the contracts to sub-contractors. Some of these sub-suppliers were unable to supply

materials of the high standard demanded by the project. As a result of these complexities, only 16% of the aircraft structure could be completed after receiving the first supply. There were also more problems with sub-suppliers like Brake Control Monitoring System (BCMS) which was developed by Crane had serious feedback problems and a designing of code was demanded. This lead to an additional cost of $18.9 million for Boeing as Crane was not willing to take the ownership of risk. Several other suppliers causing delays were pushed to invest more to speed up deliveries, the impact of which in turn was on Boeing as it had to raise their pay by 15% for the four year contract (MarketLine , 2012).

High Cost of Development: The initial cost of development was itself high caused by several desired of Boeing such as reduction in risks, a system integrator role, and availability of suppliers willing to invest in development. To achieve this objective, Boeing decided to use GSP model.

Lack of competency: The Company chose to play a role of a system integrator which was not its core competency. The current development project was not similar to those handled by Boeing in past as the new project was more complex, had multilayered supply chain structure, and designing as well as integration was majorly done by suppliers (Elahi, et al., 2014).

ANALYSIS OF KEY ISSUES

The Boeing product suffered major delays after it was announced with initial delay of 6 months announced after which there were 6 more announcements with total of 3 years of delays. Another major cause of concern in this project was the huge escalation in the cost of development. Major causes of delays on the project included:

- Lack of enthusiasm for orders of fasteners in suppliers caused delays as they were least motivated to deliver small amounts of fasteners when they were used to getting big orders. This problem could have been anticipated earlier and schedule could have been adjusted for the same to ensure it did not contribute to developmental delays. An alternative could have been getting the supplies from smaller vendors who would have been willing to deliver even small orders with efficiency and enthusiasm
- Because of multilayered supply chain structure that involved a large number of suppliers caused delays as they acted independently and made deliveries with their own speeds.
- Complexities were increased because of core activities of the project outsourced and the company became dependent on suppliers for completing the project which added to delays in assembling that could not begin without getting all supplies aligned.

Causes behind increase in the costs include:

- Lack of training and competency of workers caused rework that incurred extra costs
- Initial development cost was already more and with the first six months delay, the company invested more into project for speeding up the work despite the losses faced.

AFTERMATH & DEALING WITH PROJECT FAILURE

Production delays had many consequences on the company and some of these were huge increase in the cost and reduction in the stock prices post first delay announcement. To deal with the project

costs, the company decided to use cost cutting to save on the expenses. The company was more ignorant about the problems at the initial stages as they were minor. The company invested more to speed up the work.

LESSON LEARNED

The lessons that could be learned from the Boeing case include:

- Identification of core competency is essential as it can affect the success of the project
- Using existing core competency is always more beneficial than creating a new competency to deal with a project.
- Developing new core competencies can result into the reduction in the strength of the existing core competencies of an organization
- If high value adding functions of a project are transferred to suppliers such as designing and manufacturing can lead to increase in dependency over suppliers

RECOMMENDATIONS FOR MURASAKI AIRCRAFT CORPORATION (MAC)

Based on the lessons learned from the two cases, certain recommendations can be made for MAC such as:

- MAC should identify its core competencies and develop a strategy to make the best use of it for the project. The company can choose to outsource activities that are not the core for the company.
- It is very important to gain buy-in from the staff as well as from the top management for which the company must clearly communicate the cultural and procedural changes as well as benefits to each stakeholder including the staff and the management and ensure that they are willing to accept the additional responsibilities and provide support.
- The employees must be provided with sufficient training on things they need to work before they are given the responsibilities to handle new activities
- The development process can follow an iterative methodology such that it is developed in phases and tested to ensure that if there are any problems or bugs in the system, they are removed before the development follows
- Selection of the contractors or vendors has to be a sound process and thus, a strong assessment procedure must be used for checking their profiles and performances which may include exploration of their financial positions, their past experience, their record of making timely deliveries, their technological capabilities, and more.
- The company should have a very in-depth requirement gathering involving all the major stakeholders of the project such that the final development proposal satisfies most of the stakeholder needs and expectations. This would ensure that conflicts between stakeholders during development are reduced.
- If the minor problems occur on the project, the project must be explored deeper to understand the causes behind the problem and solve them so that they are not escalated at later stages. For this, the company should have a strong risk management strategy in place.

CONCLUSIONS

This report explored two cases of aircraft production companies and the lessons learned from their major failed projects, recommendations were made for MAC which is another aircraft manufacturer from Japan. The objective was to ensure that the company did not make similar mistakes on the project as done by the two cases discussed including Boeing and Airbus. Both project saw major delays in deliveries and cost overruns that made the projects unprofitable. It was found that the major causes of the failures in the two projects were lack of buy-in from the management, incompetence of the project organization, inaccurate estimation or inefficient designing. Some recommendations made for MAC included use of core competencies for in-house development, outsourcing of activities that are not core to the company, training to employees on equipments, use of iterative methodology for development, in-depth requirement gathering, and use of strong assessment procedure for project vendors and contractors.

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