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Project Planning for Opening New Destinations for Global Air Carriers

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Abstract

Announcing new flight routes for promising overseas destinations is a sign of stepping into global business for airlines. Opening new flight lines means expanding the product line for any airline. New destinations in turn mean gaining new customers while retaining the existing ones. That is the main reason why global airlines continually seek for new destinations to extend their flight network. This process is a very complex one with a lot tasks and resource requirements. The projected opening date sets the deadline for all the activities. Project management principles needs to be employed to meet these deadlines in order not to experience any delay. To illustrate this problem a new destination project for Turkish Airlines (THY) is explored in detail. THY, as a global network carrier, is planning to expand its operations spectrum and in achieving that makes intensive use of PERT method. This process is illustrated briefly in the paper.

Keywords

project management, flight networks, flight routes, PERT diagram

1. Introduction

Air transportation has become an important component of worldwide transportation for long-distance as well as short-distance travel. It has eventually evolved into a major part of transportation infrastructure across the world and thereby having enormous impact on the national and international economies. The study of the flight networks, the backbone of air transportation, is therefore becoming increasingly important. Furthermore, there has been a significant increase in new airline routes in the past 20-25 years. At the current time, long-distance scheduled air services carry about 1 million passengers per week out of Europe on approximately 5000 flights (the same numbers apply in the inbound direction).

Opening direct flight routes to new destinations is quite similar to product development or launching new products for an airline company just as the case for goods manufacturing companies. This process is a non-routine, complicated one with a lot of tasks, and uncertainties in it. Project management is an ideal and indispensable tool in such cases.

Project management is the major philosophy for dealing with change. General attributes of this philosophy are as follows: work is organized around processes, temporary teams are drawn from a range of functional expertise, workforce is trained constantly and so on. The result of project management usually takes the form of a new or improved product, service, or process (Cleland & Ireland, 2007, p. 37).

A new product line requires financing, design, development and production-clearly an opportunity for project management particularly if the emerging opportunity constitutes an effort that is too large to manage in a "business as usual" approach or product is very important to the company's future. If such an emerging product carries high risk and has apparent direct relationship to the company's objectives, then project management is usually required. When ad hoc activity has high risks and uncertainty factors then the use of project management techniques such as PERT may be required.

In this paper, we will discuss how project management could be used as a measure to reduce risks in opening new destinations on flight networks.

2. New Destinations

The current organization of the world traffic is the result of various processes of liberalization that took place in air transport. Since the deregulation of air transport, started in 1978 with the United States and which is spreading over the world since 1993, the routes followed by planes do not depend any more solely on the capacities of the places to exchange, nor to the "technological" limits of the apparatuses (Rozenblat et al., 2000). Other logics participate to structure the organization of air exchanges; economical logics of competition between the companies or partnership inside "alliances" of which most known are Sky Team, Star Alliance and One World. These alliances organize the division of air networks between various companies, and offer larger destinations for the passengers. The economical logic of these alliances is to develop consumer loyalty by various programs proposing specific advantages; airport logics, through agreements between companies and airports, define hubs and spokes, where shorter or average routes are concentrated in order to feed connections of long distance flights more regularly.

The deregulation of US aviation resulted in the reconfiguration of airline networks into hub-and-spoke systems, spatially concentrated around a small number of central airports or "hubs" through which an airline operates a number of daily waves of flights. A hub-and-spoke network requires a concentration of traffic in both space and time. In contrast to the U.S. airlines, European airlines had entered the phase of spatial network concentration long before deregulation. Bilateral negotiation of traffic rights between governments forced European airlines to focus their networks spatially on small number of

"national" airports. In Europe, capacity was regulated and the existence of the major flag carrier in each country meant there was already a tendency to hubbing.

Burghouwt and de Wit (2003) investigate the trend in the European aviation network after deregulation and concludes that a temporal concentration trend exists among European airlines. With the deregulation of the EU air transport market from 1988 on, a second phase of airline network concentration started. Temporal concentration may increase the competitive position of the network in a deregulated market because of certain cost and demand advantages. European deregulation has resulted in the adoption or intensification of wave-system structures by airlines. These wave-system structures as well as the overall traffic growth have significantly stimulated the number of indirect hub connections. Airline hubs with wave-system structures perform generally better than airline hubs without a wave-system structure in terms of indirect connectivity given a certain number of direct connections.

Airlines can strengthen their competitive position and market power by opening new routes. However, additional routes also mean an increase in costs. For example, negotiation costs with airports, operating costs and costs to overcome possible entry barriers. Therefore net effect of opening one extra route is not always clear. Tsai et al. (2008) have developed a framework to evaluate the net welfare impacts of new routes. They used a methodology to quantify these effects of 230 new route announcements made by 27 US-based carriers between 1993 and 2002. By taking the variation in the stock price after a new route announcement as the dependent variable they observed a positive impact on the stock price on the day of the announcement. In general, a positive impact on the stock price on the day of the announcement is observed but in the days before and after, no significant impact has been found, meaning that the positive effect is only on the day itself. On the other hand a first entrant on a route has a higher positive impact on the share price (Tsai et al., 2008).

Dennis (2005) examines the recent development of long-distance scheduled air services from Europe and identifies the increasing dominance of the major hub airports. The changes taking place in the long-distance aviation arena have been neglected in recent years—the main focus of interest being competition from new entrant "low-cost" carriers on short-distance routes. Dennis (2004) analysed the recent development of long-distance air services in Europe and identify the key changes. Forecasts of long-distance traffic are discussed and the scope for low-cost airlines in the long-distance market is examined.

Because of changing environment such as penetration of internet technology, growing travel volumes beyond the hubs, large numbers of value-seeking traveller VBAs (Value Based Airlines) or LCCs (Low Cost Carriers) have strengthened their positions. LCCs have certain advantages over full service carriers such as point-to-point service, less complexity, lower prices, unbundled product, simple fare structure & cost efficiency. LCCs have created a unique value proposition through product and process design that enables them to eliminate, or "unbundle" certain service features in exchange for a lower fare. These service feature trade-offs are typically: less frequency, no meals, no free, or any, alcoholic

beverages, more passengers per flight attendant, no lounge, no interlining or code-sharing, electronic tickets, no pre-assigned seating, and less leg room. Most importantly the LCC does not attempt to connect its network although there may be connecting nodes. Product design in this context refers to the "look and feel" of a product, and is the most visible difference between low-cost and full service carriers to the airline passenger (Burghouwt & de Wit, 2003).

There are several key areas in process design (the way in which the product is delivered to the consumer) for a LCC that result in significant savings over a full service carrier. One of the primary forms of process design savings is in the planning of point-to-point city pair flights, focusing on the local origin and destination market rather than developing hub systems. In practice, this means that flights are scheduled without connections and stops in other cities. Low-cost carriers also tend to focus on secondary airports that have excess capacity and are willing to forego some airside revenues in exchange for non-airside revenues that are developed as a result of the traffic stimulated from low cost airlines. In simpler terms, secondary airports charge less for landing and terminal fees and make up the difference with commercial activity created by the additional passengers. Further, secondary airports are less congested, allowing for faster turn times and more efficient use of staff and the aircraft.

3. Worldwide Multi-Level Networks of Air Traffic

The network structure is founded under the supervision of airline companies, following their own strategy. As most airline companies are private companies, they organize their network to optimize profit neglecting the development of a territorial homogeneous flight network. Companies being less and less national, the routes followed by companies exceed national borders and create new transnational structure of equivalent territories (i.e., connected to the same focal point or hub). Thus territorial logics which prevailed before the deregulation are becoming obsolete and new territorialities emerge.

New reticular territories implicitly defined in air transport networks leads to a multilevel presentation of the most connected cities in the world, underlining the necessary steps to go through when travelling worldwide, described as a path through the different levels and components. These "new reticular territories", defined by inter-connected overhead grids which divide the world in various levels of road service through obliged steps through hubs support the emergence of a system made up of multiple air platforms. Already strong centers often became more powerful through this new organization (New York, London, Chicago, Paris), while it helped secondary centers to emerge as well (Seoul, Fort Lauderdale) (Amiel, 2005, p. 266).

Networks linking cities worldwide are becoming denser and more complex at all levels of the geographical scale. Rozenblat et al. (2000) remarks that their analysis bring a challenge on three different aspects which actually depend on one another. These are producing readable visualizations of flows between cities, showing which cities play the most important role; identifying subgroups of closely interrelated and interdependent cities; helping the identification of organizational logic of urban

territories at every geographical scale.

Indeed, while representations of the network can help identify its logical organization, understanding the logic first can determine the most appropriate spatial configurations for their analysis. New methods were developed to exhibit reticular structures of spatial networks, based on the concept of "small worlds" or "scaling networks". This approach is based on properties that can be measured: a high degree of connectivity between nodes and a small average distance between nodes characterize "small world networks" (Watts, 1999). So, the world air network has specific properties of "small world". It is necessary, for example, to borrow 15 different flights to go from Mount Pleasant (in the Falkland Islands) to Wasu (New Guinea): this is the longest shortest path of the world air network (Guimera et al., 2005). However, these networks have an intrinsic complexity and each node of the network participate in its very own way to the dynamic of the global configuration.

4. Development of Flight Networks

Expanding an airline's flight network may involve providing more frequent flights to a destination or adding new destinations to its service. It is possible to do either of these in a cost effective manner by signing a code share agreement with another airline. Fixed costs are likely to be high which also tends to intensify rivalry. Some leading players have diversified into carrying airfreight and into other transport businesses, which reduces rivalry by making them less reliant on passenger airline ticket sales, and market revenue growth has been strong.

In complex systems domain, flight networks are modelled as graphs (networks) comprising of airports (vertices or nodes) that are linked by flight connections among the airports. A flight network is represented as a graph comprised of "n" nodes (vertices; airports) and "e" links (edges; connections) (Bagler, 2008). Flight network could further be represented as weighted network by considering the number of flights plying on a route as the "weight" of that particular link. Various network parameters give an idea of the performance of the network as well as risks involved in the functioning of the network.

There are three possible structures for the supply of air travel services: a complete (fully connected) point-to-point network (all travel constitutes a direct link between two nodes); a hub-and-spoke network (travel between A1 and A2 requires a connection through A2) and limited (or partial) point-to-point network (Selective direct links between nodes). These are illustrated in Figure 1 below. The network effects that favoured hub and spoke over linear connected networks lie in the compatibility of flights and the internalization of pricing externalities between links in the network. A carrier offering flights from city A to city B through city H (a hub) is able to collect traffic from many origins and place them on a large aircraft flying from H to B, thereby achieving density economies. In contrast a carrier flying directly from A to B can achieve some direct density economies but more importantly gains aircraft utilization economies.

There has been an evolving literature on the economics of network configuration. Hendricks et al. (1995) shows that economies of density can explain the hub-and-spoke system as the optimal system in the airline networks. The key to the explanation lies in the level of density economies. However, when comparing a point-to-point network the hub-and-spoke network is found to be preferred by the companies when marginal costs are high and demand is low but given some fixed costs and intermediate values of variable costs a point-to-point network may be preferred.

Nowadays it is debated intensively that creating a global hub would in turn create more problems particularly environmental issues. For a global carrier whose network is much larger than the low-cost carriers to take advantage of long-distance flights by creating a hub where the passengers are accumulated and flown to different points is an effective solution to economic and service considerations of the business.

Airline economics could be shifted against the environmentally damaging hub-and-spoke system that relies on transfer passengers changing planes at airports such as Heathrow, in favour of the direct "point-to-point" services operated by airlines such as Ryanair, Virgin and easyJet. Ball (2005) argues that, if consumers care about travel time, then for shorter routes point-to-point structures are faster and thus more efficient than the hub-and-spoke structure. This runs counter to most of the theoretical literature on airline networks which predict that point-to-point carriers can't compete with hub carriers.

When it comes to a choice between flying directly from one big city to another, or changing at a "hub", most passengers will prefer the direct route. On the other hand, the literature shows that profit maximizing airlines with market power (in many cases monopoly airlines are modelled) will choose either a single hub or a point to point network if demand and cost are symmetric. The hub and spoke network is profit maximizing if passengers' value travel time is low and their value of flight frequency is high. The forces behind hubbing are moderately strong economies of aircraft size, a high valuation of flight frequency, low variable cost per passenger and low value of travel time.

Dennis (2007) examines whether the traditional network carriers airlines have adapted new strategies or copied measures from their new competitors on the short-distance services. The most successful strategy seems to be focusing on the hub, outsourcing services and increase crew and aircraft productivity. The power of the network carriers lies in the connectivity and the protected position on the hubs.

Perhaps the most important factor that now affects network evolution is the growth of LCCs in domestic markets. Hub carriers now face erosion of their domestic market as well as fractioning of their markets (David Gillen, 2005). After all, market growth is served by more airplanes not bigger airplanes.

LCCs' route networks were strictly based around very short distance, point-to-point sectors (average of 400 nautical miles) and a high number of daily frequencies in each direction. However, this culture has been rapidly changing (Alamdari & Fagan, 2005). Although the culture of low-cost air travel today is still short-haul based there are a number of successful LCCs now breaching the 1000 nautical mile

barrier, with two US LCCs even breaching the 2000 nautical mile barrier. Virgin Express and easyJet are the only LCCs in Europe that operate a sector exceeding the 1000 nautical mile barrier. For instance, easyJet's London Luton to Istanbul Sabiha Gokcen service is no exception to that.

5. The Case of Turkish Airlines

Although airline transport has undergone a radical change after 9-11 turbulence it nevertheless has gone to extreme dimensions thanks to the ever-expanding global business and tremendous improvements in the airspace technology. Global competition in the airline industry continued to be even more challenging. This situation has led Turkish Airlines (briefly known as THY) to become a global network carrier within the world market serving passengers on an international level rather than a national airline confined itself to the local market. In this respect, THY have set its goal as to "provide a bridge between the Turkic countries, the Balkans, Near East and Far East, America and Europe". Turkish Airlines' flight network has been expanded to provide more connections between these geographical regions and to establish Istanbul as an important international hub.

Since the Turkish Airlines monopoly for domestic flights ended nearly six years ago, then many private companies have forced their way into the market and eventually fares gone down drastically. Turkish Airlines began scheduling flights between cities with high passenger potential and flights to or from Istanbul and Ankara.

Growing competition in the international market, plus successive economic crises has forced airlines build stronger network structures. Turkish Airlines continued to add new destinations to its international network, thus further promoting its corporate identity as a "global network carrier". As of today, Turkish Airlines has flights to New Delhi, Toronto, New York, Rio de Janeiro, Beijing, Shanghai, and Tokyo. India and China, few of the fastest growing markets in the world that helped strengthen Turkish Airlines' flight network, continues to exceed the general growth trend in the market. Turkish Airlines has restructured its flight schedule to maximize the use of its long distance fleet and take advantage of this growing market. In this regard, Turkish Airlines began channelling the new capacity toward the Beijing/Shanghai route. For the summer season, Turkish Airlines has increased the number of flights to these destinations from three to five per week. As a result of a careful research number of flights per week to Dubai, one of the favourite holiday spots of the last few years, have been increased. Turkish Airlines' flights revived quickly after the war in Iraq and have regained previous load factors.

In 2003, a total of 10.4 million passengers were carried 48% of which was domestic while 47% was international passengers, 4% charter flight passengers and 1% pilgrims visiting Saudi Arabia for holy places; Europe 70% Far East 11% North America 4% North Africa 4% Middle East 11%. A total of 123,000 tons of cargo and mail were carried throughout the year. By the end of 2003, Turkish Airlines had flown to 103 destinations and travelled 137 million kilometers. Number of landings were 49,959 (domestic) 50,848 (international) distance flown (in 000 kms) 28,087 and 109,305 for international

flights. Revenues for years 2003 and 2007 respectively were 15,380.0 and 16,988.4 (in dollars).

6. The Project Management Approach

Project Management is a useful tool that is applied in many diverse industries to fulfill customer needs and reduce costs has been used across a wide variety of product and service applications including training/education, software development, information technology systems and other management undertakings, new aircraft project, airport construction project, airlines merger project (Fluoris & Lock, 2008).

Research has found that project management techniques can provide some short-term benefits such as reducing the cross-functional barriers associated with product development teams and aiding changes in corporate culture. However, over the long-term, it has been shown to address the more tangible benefits of reduced cost, and increased productivity. An important benefit of project management tools has been its effectiveness in monitoring activities and completing the work on due dates. Detailed discussion of the benefits of project management can be found in many textbooks and papers (e.g., Cleland & Ireland, 2007; Fluoris & Lock, 2008).

7. The Project Phases

A new destination project is a five-month process involving many departments of THY. Activities pertaining to new flight routes can be summarized as follows: Feasibility study (short-term/long-term market analyses, socio-economic analysis, political conditions, facilities, competitors, state of markets at connection points, resources required, etc.) comes first f in the case of a "go-ahead" decision physical conditions of airports, air-traffic status, seasonal effect, competitors' capabilities, alliances, operational costs, and available services. To be able to make a schedule, during daytime and follows the classes in the evenings.

New destination survey is carried out in two parts feasibility study (in office) and new destination (on location). The market analysis provides detailed information on; evaluating customer needs, assessing competitive position and identifying areas of new opportunity to drive the customer's perception of value.

Approval of decision (board) determining the flight schedule (operations) start of flight sales (revenues) completing the infrastructure tasks (finance, human resources, information technology, public relations, technical services, legal services, handling, etc.).

The activities in this project are outlined in Table 1 with corresponding durations. The more detailed activity information is given in Table 2.

Table 1. The Main Activities of the New Direct Route Projects

Activities	No	Duration (in days)	Responsibility
New route feasibility study	**1**	**14**	Network planning
Market research on location	**2**	**16**	Marketing
Authorization	**3**	**7**	Board decision
Flight schedule	**4**	**38**	Flight operations
Start of flight sales	**5**	**6**	Revenues
Completion of the infrastructure	**6**	**74**	Finance, HR, Sales, IT, PR, Technical, Legal, Services (cargo, handling, etc.)
Opening ceremony of first flight	**7**	**1**	Public Relations

Table 2. The Detailed List of Activities of the Project

Nodes	**Activity code**	**Activity Description**	**Duration**	**Earliest start time (in days)**	**Latest finish time (in days)**
1-3	A2	New route study	14	0	30
2-3	**A3**	**Feasibility study**	30	0	30
3-4	**B5**	**Authorization**	7	30	37
4-5	C7	Aircraft type evaluation	10	37	53
5-6	D	DUMMY	0	-	-
4-6	**C8**	**Traffic rights approval**	16	37	53
6-7	**D9**	**Flight schedule approval**	7	53	60
7-8	**E10**	**Getting slot permission**	16	60	76
8-9	F30	Recruiting flight technicians	8	76	94
8-10	F26	Press (national-international)	10	76	90
8-11	F16	Hotel & Transport Services	11	76	90
8-12	F25	Advertising and P&R	30	76	109
8-13	F28	Announcement of flight fares	21	76	119
8-14	**F15**	**Recruitment of office staff**	14	76	90
10-14	D	DUMMY	0	-	-
11-14	D	DUMMY	0	-	-
14-15	D	DUMMY	0	-	-
14-16	**G17**	**Banking Agreement**	22	90	112
15-16	G18	Legal Services Agreement	16	90	106

16-17	D	DUMMY	0	-	-
16-18	D	DUMMY	0	-	-
16-19	D	DUMMY	0	-	-
16-20	H23	Agreement with Sales Agents	15	112	130
17-20	H21	Catering Services Agreement	10	112	130
18-20	H22	Handling Services Agreement	10	112	130
19-20	H27	Cargo Services Agreement	10	112	130
9-20	H31	Maintenance Service Agreement	10	84	130
12-22	G29	Loyalty programs	16	106	125
16-22	**H19**	**Airport office agreements**	13	112	125
13-21	G12	Flight Reservation systems	3	97	119
21-22	H13	Sales via web	3	100	122
20-23	I24	Fuel supply agreement	21	94	151
22-23	I20	**Furnishing the office**	26	125	151
23-24	J32	**Preparations for opening**	1	152	152

Activity-on-Arrow (AoA) notation is used in diagrams to better understand the relationships between activities. A PERT diagram of the project is given in Figures 1 & 2 at the end of the paper. The activity times are taken from real data although the name of the destination is not disclosed in this paper.

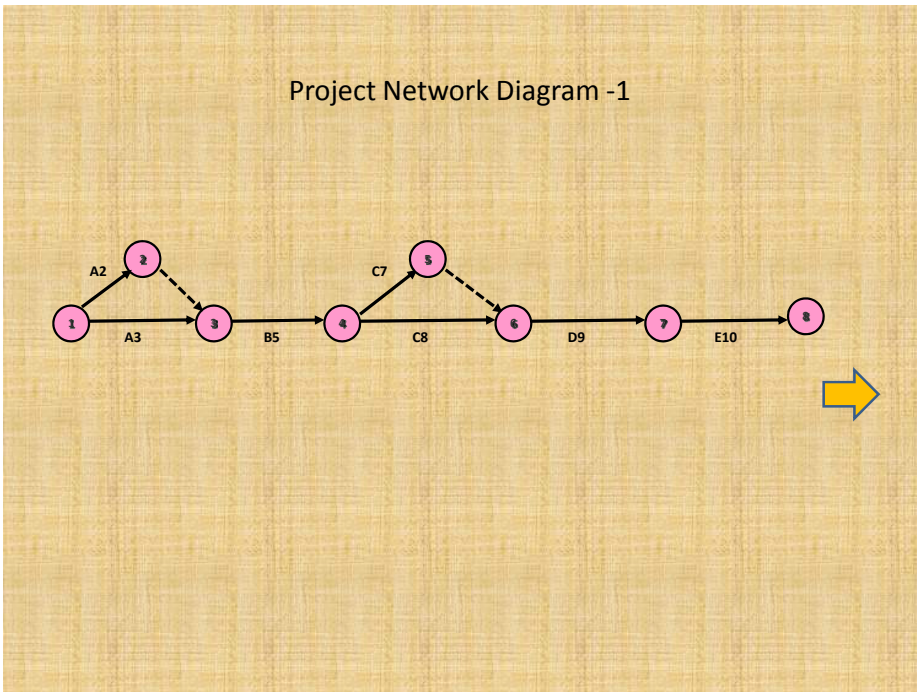

Figure 1. PERT Diagram of the New Destination Project

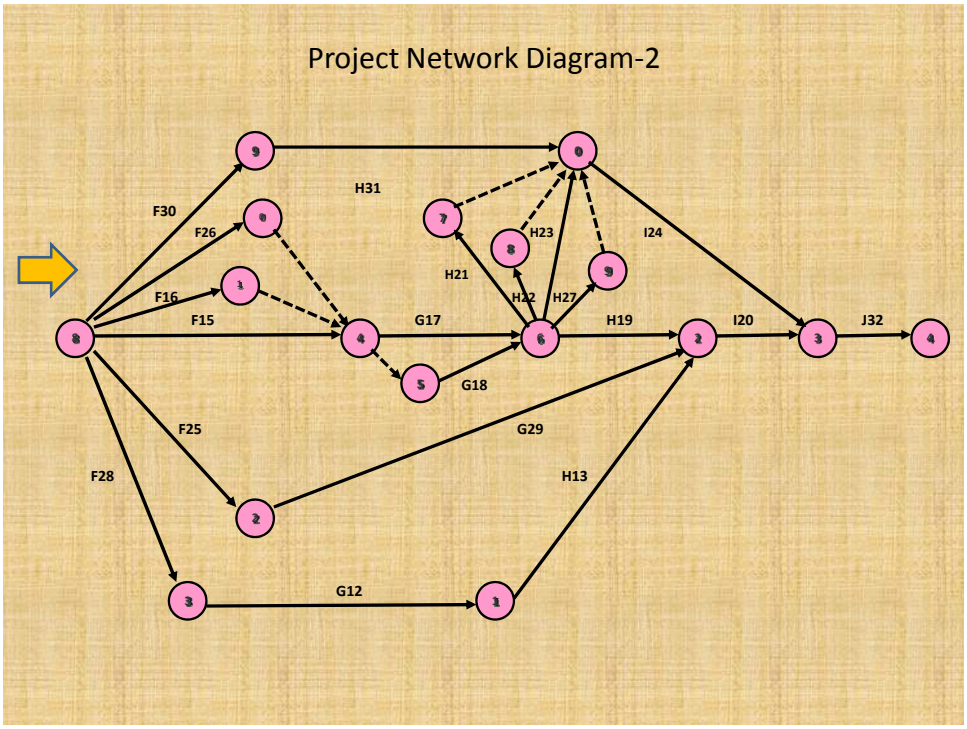

Figure 2. PERT Diagram of the New Destination Project (cont'd)

The critical activities and the relevant start and finish times for each activity are shown in Figures 3 & 4. The computed project time is 152 days.

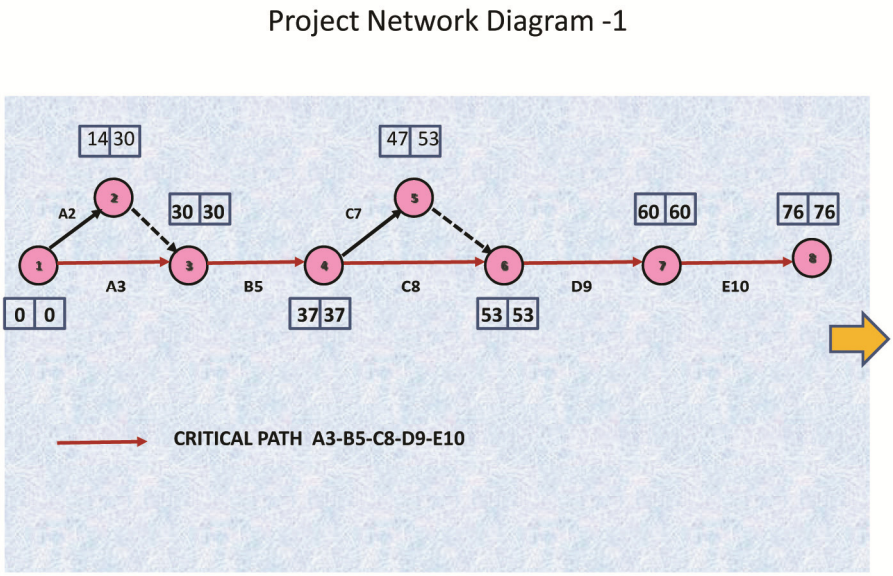

Figure 3. PERT Diagram with Earliest and Latest Start/Finish Times

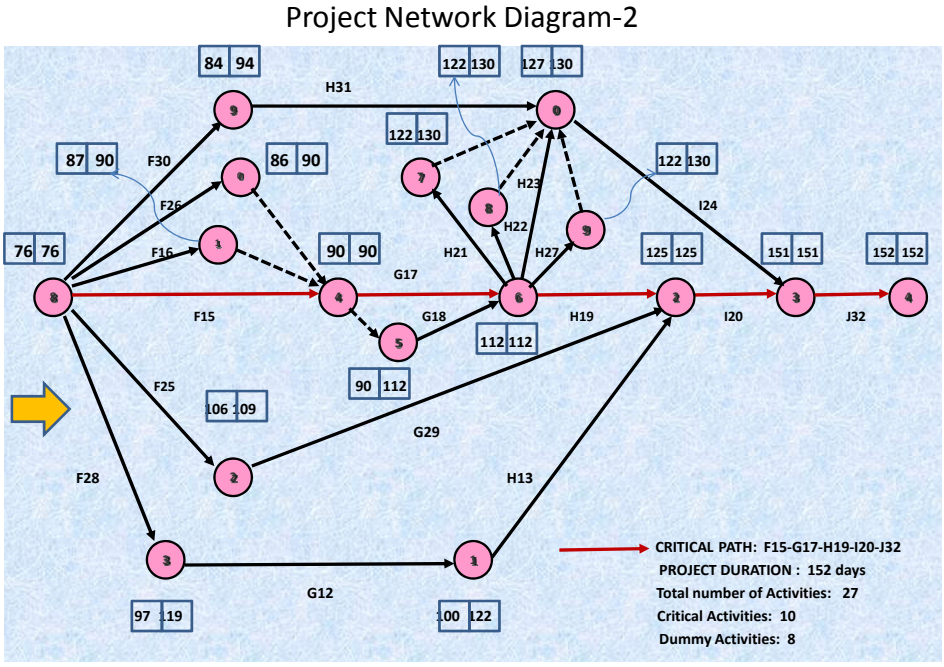

Figure 4. PERT Diagram with Earliest and Latest Start/Finish Times (cont'd)

8. Conclusions

Adding new destinations to flight networks is an entirely new and risky endeavour for global airlines. To reduce the amount of risks and costs of such non-routine tasks project management tools must be employed. PERT provides an excellent platform where you can direct and control the resources of activities on a new route development project. New route projects present an ideal case for the application of PERT networks because every destination has its specific conditions and costs; therefore must be tackled in a different way.

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