

***6th ANNUAL INTERNATIONAL CONFERENCE & EXHIBIT
"GLOBAL SECURITY & GLOBAL COMPETITIVENESS:
OPEN SOURCE SOLUTIONS"***

WASHINGTON, DC

***REDUCING RISKS IN FORECASTING
THROUGH
PRACTICAL SOURCES AND METHODS***

September 5, 1997

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REDUCING RISKS IN FORECASTING THROUGH PRACTICAL SOURCES AND METHODS

Introduction

Being the last speaker presents some unusual questions, such as – “What is left to say?” When you think of it being the last session of a four-day meeting it even seems worse. Finally, my thoughts turned to you the audience. You have had four days of OPEN SOURCE SOLUTIONS! I can just imagine that during lunch with one hand on the flight schedule and the other on the OSS program guide – not to mention the anticipation of another “Dutch Dinner” – you must have evaluated your options. To those who resisted the temptation to leave, I must say “Thank You.”

After looking at the OSS program and the previous speakers involved, I feel that I have been primarily involved in using old fashioned methods of forecasting – not a lot of computer modeling, etc., but rather one step up from French Curves, Ship Curves and Hockey Sticks!

My professional experience has centered on aerospace, first as an engineer, then in market planning, and then corporate planning. When our son was in kindergarten, he came home one day and related to his mother that he told the class that his father made airplanes. My wife corrected his statement by telling him that I worked in an office and prepared studies and wrote reports regarding airplanes. The next day our son came home and said he told his kindergarten class that he had been in error and that actually his father made paper airplanes. Maybe I should have pursued this direction and written a successful book on paper airplanes like Mr. Eiji

Nakamura. However, I continued in industry, devising plans and preparing forecasts. By the time our son was in first grade, he had revised his thoughts on what his dad did. This time he related to his first grade class that I sit in an office making guesses all day about airplanes. I hope forecasters in general are thought of as being a little more sophisticated than guessers.

The title of my presentation is Reducing Risks in Forecasting Through Practical Sources and Methods. This topic is something that should be of interest to anyone who forecasts or uses forecasts.

Just what is Forecasting? Of this practice, it has been said:

Forecasting is Very Difficult--Especially If It's About the Future

Regarding those who forecast, Mr. David Sarnoff, who was not a forecaster but rather a great visionary at RCA, had some advice for those involved in forecasting. It was:

When You Get the Urge to Predict the Future, Better Lie Down 'Til the Feeling Goes Away.

David Sarnoff, 1956

It might be good advice, but for those whose job is forecasting, they must still forecast.

To reduce the risk in forecasting, we must first know the definition of forecasting. I searched through several "open sources" for a definition, and concluded that it was best I steal from several sources and come up with my own. The result is:

Forecasting: Providing information concerning the future by interpretation of slender evidence about which no doubt is necessarily suggested.

I don't think this definition will appear in the next edition of Braude's Handbook or The American Heritage Dictionary, but I like it.

Much of forecasting involves open sources. Even though the term "Open Source Solutions" was coined only a few years ago by Mr. Robert Steele, most forecasters have been using open sources for years. As a matter of fact, 50 years ago (1947) on location for filming Red Stallion, the entire movie company was amazed at the unfailing weather predictions made by an old Indian. He was consulted daily, and his forecast proved most reliable. Then one day he refused to predict the weather. "Is anything wrong?" inquired Robert Paige, the star of the movie. "Yes" said the Indian, "radio broke." As we can see, the old Indian had an open source solution for his weather forecast! It is interesting to note that all those on the set could have used that source. And as Dr. Samuel Johnson once said:

Knowledge is of two kinds. We know the subject ourselves or know where we can find it.

Dr. Samuel Johnson, 1780

Obviously, the old Indian knew where to find it.

Practical Sources and Methods

As an engineer, we are taught that to solve a problem, we should:

- Collect pertinent data
- Analyze the data
- Reach a conclusion
- Make recommendations

Forecasting is very similar in that we collect data, analyze the data, determine the validity of the data and the analysis, apply weighted values for the lead parameters, and then generate the forecast. The example I will use in the presentation will involve airline passenger demand as a means of forecasting the demand for aircraft. This is an area with which I am most familiar.

The starting point for determining a strategic plan or a marketing plan is the demand. In commercial aviation, that demand is defined as the Revenue Passenger Miles or RPMs. RPMs are the number of passengers multiplied by the number of miles flown. To give you an idea of the magnitude of this market, in 1996 there were approximately 1600 billion RPMs flown. This was accomplished by 10,600 aircraft employing a total of 1,670,000 seats.

To better understand the methods employed, we will follow the chart of Forecasting Methodology that depicts the process employed in producing a forecast. This chart is rather basic, and is used with some variations by several.

I will walk you through the steps necessary to arrive at a World Market Forecast. We will see what goes into the analysis of each point, giving sources as well as ideas to reduce the risk. Through many reiterations of the methodology, by skilled analysts, a high level of confidence can be achieved. Looking at the Forecasting Methodology flow diagram, we see the various analyses that take place in the forecasting process.

Review of 18 charts/tables/etc.**Risk Management**

The key factors in reducing the risk of forecasts are the selection of sources of information, the analyses of that information, and then the analyst's application to the forecasting model.

We have found that multiple sources of information are essential. Also, a stable work force is necessary for continuity of the analysis and methodology process. Since aviation is a world market, the analyst must be aware of known and anticipated political/economic factors that would have an impact on the market. At Forecast International, we have found that to reduce the risk to a minimum in forecasting, analysts from various disciplines (aircraft, engines, avionics, economics, geopolitics, etc.) work together during the final stage. Besides boosting the adrenaline levels and the decibel level, we have found that we can achieve a higher level of confidence for the forecast. This does not necessarily mean that a small or even a one-man team cannot produce a good forecast, but the chances are that it will not be as reliable.

As one would expect there is more doubt in a long range forecast than in a short range forecast. We saw in the case of the forecast of commercial airline deliveries, there is already in place firm orders or options of a 3-to-4-year period that would automatically support a high level

of confidence in the forecast. However as we go out 10, 15 or even 20 years the confidence level will decline. There are just too many variables such as geopolitical and economic concerns as well as technology breakthroughs. Forecast International, in their long-range forecasts brackets the values as to the level of confidence. As an example for a 10-year forecast, the breakout would be:

Near Term	(0-4 years)	High Level of Confidence
Mid Term	(5-7 years)	Good or Reasonable Level of Confidence
Far Term	(8-10 years)	Fair Probability

While a long-range forecast may well imply risk in magnitude of the number and the precise timing, it serves a useful purpose if it alerts the planner to the additional suppositions and conjectures that are elaborated for consideration.

Other items that are important in reducing the risk level are:

- Multiplicity of sources
- Ongoing evaluation of sources
- Verification of information
- Development of new sources and maintaining present sources
- Periodic update of forecast methodology
- Sensitivity analysis of parameters – change weighted values when necessary

All of these items are an on-going activity. The forecasting group must always maintain a level of readiness to satisfy requests and to up-date existing forecasts.

An item of particular concern to me is that of development of new sources and maintaining present sources. The current buzz word for this activity is NETWORKING. The OSS conference program addresses “Networking” and allocates time for this valuable source of information. I believe that Networking is not completely understood by many people. An

example of my belief is that not long ago, I received a call from a person I did not ever recall meeting. He asked me for what I considered to be highly proprietary information concerning the company I worked for at the time. He said he met me at a meeting about two months previous, a meeting that I did not attend. When I questioned him about our meeting, he retreated somewhat, but recovered by saying he did not remember exactly where he met me but that did not matter. Even when he realized I did not know him, he proceeded to ask for additional information concerning profit margins so that I wouldn't have to look for it at a later date. He was shocked when I told him I could not give him the information he requested. Then he gave me a lecture about Networking. He said I just didn't understand what Networking was all about, and advised me that I should get with it. At that point, I broke the Network. In the old days, we developed contacts--we maintained contacts--we developed trust. It takes time to develop a contact--possession of a business card does not constitute a contact and certainly isn't networking.

Summation

A few golden rules for forecasters are:

- Use computers with discretion
- Disregard baseless assumptions
- Avoid ambiguity (multiple interpretations)
- Accept responsibility
- Keep your nerve, and
- If you're ever right in your forecasts, never let 'em forget it

I hope I have provided you with ideas for reducing risks in forecasting. There is no quick cure, but rather a continuous awareness of the factors that make up a forecast. "Open sources" are readily available and should be used with discretion. Know your sources, evaluate your sources, seek new sources, because failure to do so has been known to be career-limiting.

However, on the other hand, there is nothing as rewarding as having your senior vice president say to you, sometime after submitting a controversial forecast, "YOU HAD IT RIGHT!"

Jack P. Wiegand, 9/5/1997

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Highlights For The Graphics

Graph I

The approach used in determining the Traffic Forecast uses Economic and Demographic variables such as GDP, population and distance yields in a multiple technique to explain past traffic growth hence project future traffic growth.

Takes into account the current base fleet, trends in productivity, firm orders and trends in airline aircraft requirements. On the basis of analysis of unit productivity, this capacity is converted into number of aircraft required. The open market is that part which is not already satisfied by aircraft currently in source, on order or to be returned from storage.

Graph II

The changes in the composition of the active fleet has been dramatic in the past 10-years as compared to the price of 20-years.

In the next 10-years, the Narrow-Body fleet will become basically a Stage 3 fleet with only a few Stage 2 aircraft and the Wide-Body fleet will double in size.

Graph III

Influence of Orders/Options on Open Market will last about 5 years

Graph IV

Tremendous growth in trips per capita is expected especially in the high GDP growth countries, such as China, Korea, Taiwan, etc.

Graph V

The big swings in GDP rating chart are shown for China, Korea, Taiwan, Turkey and Hong Kong.

Graph VI

In mature economies, GDP growth will average between 2% and 3% p.a. in contrast, GDP growth in developing regions may average more the 7% p.a. over the long term. (GDP explains about 2/3 of world aircraft travel growth.)

Graph VII

Passenger demand relationship with GDP.

Graph VIII

The progressive reduction of growth sales experienced over the last 30 years is expected to continue into the first decade of the next century.

Graph IX

North America represents the biggest region. However, with it domestic market reaching maturity, it market share will fall from 42% in 1994 to 34% in 2014. The largest growth will

occur in the Asia/Pacific region due the high levels of economic growth. Asia/Pacific will increase its share from 20% in 1994 to 30% in 2014. Europe will maintain its current market share.

Graph X

North America requires the highest number of airplanes, mostly narrow body. In Asia/Pacific, wide body have edge over narrow body aircraft – making it No. 1 in seats delivered. Asia/Pacific pre-empts Europe as No. 2 in total demand (next 15 years).

Graph XI

China will not be able to maintain extremely high load factors. Productivity gains from higher speed aircraft and utilization (longer flight distances) and shorter stops (quicker turn times).

Graph XII

Worldwide Travel will average a 4.9% p.a. growth over the next 20 years. Because of increases in lead factors and productivity, airplane capacity will increase by only 4.6% p.a. (16000 airplanes @ \$1.1 trillion through 2016.)

Graph XIII

A large part of the 900 aircraft in storage will not return to active service because of: age, non-Stage 3 compliance, and general condition. Approximately 250 Stage 3 aircraft and less than 200 of the newer Stage 2 aircraft will return to airline service.

Graph XIV

98% of aircraft over 32 years old are removed from passenger service

First Owner 22 years

Second Owner 3 years

Freight Up to 7 years

Wide body out of systems quicker than narrow body

Graph XV

The fleet is forecast to exceed 16700 aircraft by 2014 – a 78% increase over the 1994 base fleet. In 2014, 27% of the fleet will comprise aircraft that are in service today, 9% represented by current firm orders, and 65% of fleet is open market (10700 aircraft).

Graph XVI

Seats rather than ASMs because productivity improvement make a ASM comparison useless.

Graph XVII

1995-2014

Smaller aircraft - North America and Europe - 70% of deliveries

Larger aircraft - Asia/Pacific 65% of deliveries

Graph XVIII

Next 10 Years - Wide body decline from 8.4% to 7.6%. Single aisle declines from 78% to 71%. Intermediates increases from 18% to 21%.

Extra Info

18 airlines account for 50% of fleet

Cargo 1990 61% of cargo carried in passenger aircraft

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