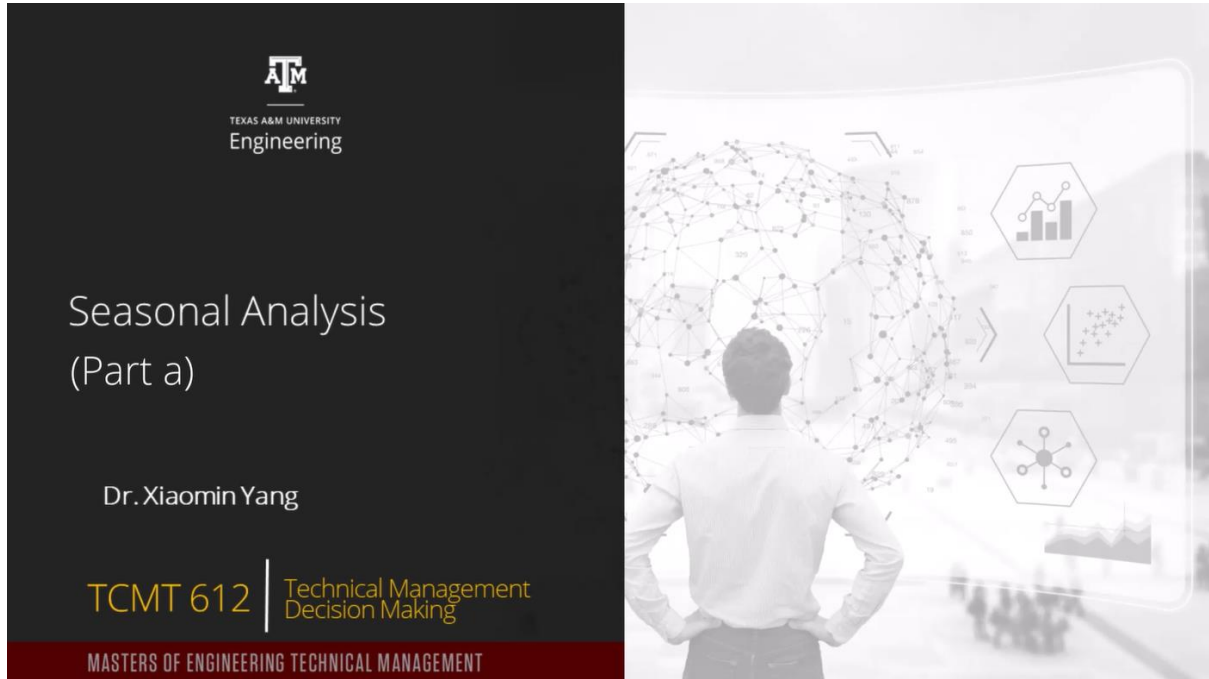


M6L6a. Seasonal Analysis

Slide #1



The slide cover is divided into two main sections. The left section is a dark grey rectangle containing the Texas A&M University Engineering logo at the top, followed by the title "Seasonal Analysis (Part a)" in white, the presenter's name "Dr. Xiaomin Yang" in white, and the course information "TCMT 612 | Technical Management Decision Making" in yellow and white. At the bottom of this section is a red banner with the text "MASTERS OF ENGINEERING TECHNICAL MANAGEMENT" in white. The right section is a light grey image showing a person from behind, looking at a large screen. The screen displays a complex network diagram with many nodes and lines, and several smaller charts and graphs, including a bar chart, a line graph, and a pie chart.

ATM
TEXAS A&M UNIVERSITY
Engineering

Seasonal Analysis
(Part a)

Dr. Xiaomin Yang

TCMT 612 | Technical Management
Decision Making

MASTERS OF ENGINEERING TECHNICAL MANAGEMENT

In this topic, we will discuss seasonal analysis.

Slide #2

We discussed the moving average method for short-term forecasting, and regression analysis for trend analysis in the previous lectures.

This lecture will focus on the combination of both methods for long-term seasonal forecasting.

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Slide #3

Seasonal Forecasting in Decision Making

Seasonal fluctuation is normal in the business world. Some examples:

Weather driven: Lawn care, Snow removal, Recreation facilities

Event driven: Retail, Tax preparation

Financial planning driven: Health care capital projects, public projects, defense industry

Operation driven: Oil & Gas well drilling, Construction

Seasonal fluctuation is normal in the business world.

Lawn care, snow removal, and recreation facilities are some examples of businesses that are weather driven. The sale of lawn care equipment and materials ramps up from spring and reaches peak in summer. The sales reach their low point in the wintertime.

Snow removal equipment sale pattern is the opposite. It peaks in the wintertime and reaches its bottom level in the summer.

Some businesses are event driven. Retail sales are seasonal and always peak at the end of year holiday season. Tax preparation services are driven by the tax filing schedule, and it always peaks at the end of March and early April in the U.S.

The projects in nonprofit organizations are financial planning driven. For example, health care capital projects, public projects, and defense projects. The capital expenditure is tied to the budgeting schedule of these nonprofit organizations, or the federal and state governments. Some businesses are operation driven.

For instance, the oil and gas well drilling operations always avoid the hurricane season in the Gulf of Mexico.

The construction businesses slow down in the wintertime.

Businesses follow their own life cycles, and executives must make decisions based on the forecast of the seasonal trend.

Slide #4

Business Underlying Performance Data

Monthly sale of OCT
retina diagnostic
equipment

Why do sales increase in
3Q every year?



In this lecture, we will discuss how to forecast the seasonal trends.

Many businesses sales exhibit seasonality or a regular repeating pattern.

For example, when studying the sales pattern of the OCT equipment, we observed that the sales always increase during the third quarter each year.

Before developing a seasonal forecast model, we need to understand what factors contribute to the seasonal effect.

Here, I would like to emphasize the importance of understanding the business.

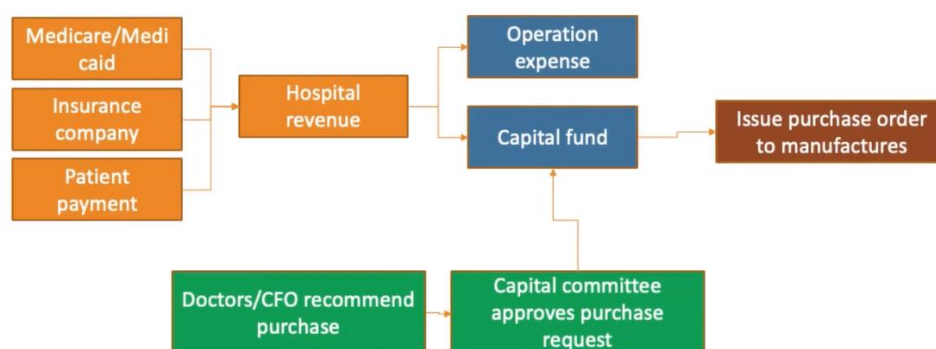
When building forecast models, generally speaking, a business analyst can build an analytic model to identify the mathematical trend of any data set.

What distinguishes an experienced manager and a data analyst is that a manager understands the underlying business drivers of the trend and can make decisions accordingly.

This is the practical knowledge that I would like to convey in this course.

Slide #6

Healthcare Capital Investment Process



The primary customers of the OCT machines are eye clinic hospitals.

So we need to look at the healthcare capital investment workflow process of a hospital to investigate its purchase pattern and understand why the sales always increase in the third quarter every year.

This flowchart is the healthcare capital investment process.

The three blocks at the leftmost side of the flowchart are the sources of income of a hospital.

Medicare and Medicaid reimbursements are income from government programs that cover the patient's medical expenses.

Also, private insurance companies pay for their share of the patient's medical expenses.

Patients also pay for their co pays.

After providing medical services, a hospital receives the corresponding payment from those entities with different payment time frames.

The hospital uses the revenue to support the operations of its facility and to pay for the salaries of doctors, nurses, and so on.

The remaining income is used for capital projects such as equipment, construction, and so on.

When doctors or the chief financial officer of the hospital recommend purchasing a piece of equipment, their proposals are sent to a capital investment committee to decide.

The committee generally makes decisions when significant capital funds become available, typically during the second half of the year.

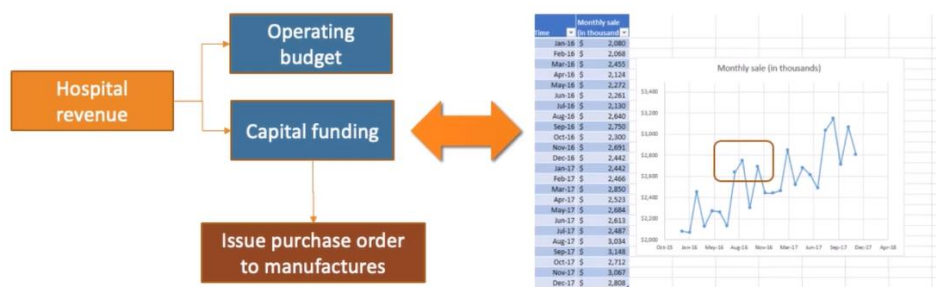
After the committee's approval, purchase orders will be issued to the equipment vendors.

This is the workflow of decision making and purchasing in a hospital.

By looking at the workflow we can understand why the sales of OCT machines always increase at the end of the year because hospitals make their purchase decisions after they feel confident about the remaining income in their capital project pool and they make decisions when they see the money in their pool.

Slide #7

Link Sale with Business Insights



B2B: Understand customers' decision making cycle and process

The hospital's business decision making process clearly explains why the sales of OCT equipment jumps in the third quarter.

The sale trend and the hospital's decision-making cycle match with each other.

Identifying the seasonal pattern of sales and understanding the underlying business insights are the key benefits of forecasting.

I would like to point out the difference between seasonal pattern and cyclic pattern.

A seasonal pattern occurs when our time series is affected by seasonal factors such as the time of the year.

A cyclic pattern occurs when the data exhibit rises and falls that are not of a fixed period.

Those fluctuations are usually due to economic conditions and are often related to the business cycle.

Business cycle analysis is a subject of macroeconomics.

It is important to distinguish cyclic patterns and seasonal effects.

Seasonal patterns have a fixed and known length, while cyclic patterns have variable and unknown length.

The average length of a cycle is usually longer than that of seasonality, and the magnitude of cyclic variation is usually more variable than that of seasonal variation.

In this lecture, you will learn the seasonal forecasting models.

If you are interested in the business cycle analysis, you can read some macroeconomic articles to understand how you project the business cycle.