APPLICATIONS OF DATA ANALYTICS IN BUSINESS DECISION MAKING



DIRECTORATE OF ADVANCED STUDIES THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

Statutory Body under an Act of Parliament

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Behind Every Successful Business Decision, there is always a CMA

MISSION STATEMENT

"The CMA Professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting."

INSTITUTE MOTTO

असतोमा सद्गमय तमसोमा ज्योतिर् गमय मृत्योर्मामृतं गमय ॐ शान्ति शान्ति शान्तिः

From ignorance, lead me to truth From darkness, lead me to light From death, lead me to immortality Peace, Peace, Peace

VISION STATEMENT

"The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally."

The Institute of Cost Accountants of India

The Institute of Cost Accountants of India is a statutory body set up under an Act of Parliament in the year 1959. After an amendment passed by Parliament of India, the Institute is now renamed as "The Institute of Cost Accountants of India" from "The Institute of Cost and Works Accountants of India". The Institute as a part of its obligation regulates the profession of Cost and Management Accountancy, enrolls students for its courses, provides coaching facilities to the students, organizes professional development programmes for the members, and undertakes research programmes in the field of Cost and Management Accountancy. The Institute is headquartered in Kolkata having four Regional Councils in Kolkata, Delhi, Mumbai and Chennai, 105 Chapters in India and 10 overseas Centers. It is under the administrative control of Ministry of Corporate Affairs, Government of India.

PRM Fincon Services Pvt. Ltd.

PRM Fincon is an organization which offers innovative risk solutions through a mix of sophisticated products and bespoke services. Headquartered in Calcutta, India, we have worked with clients from diverse industries and geographies. We also have representative offices in the UAE and US. We thrive on superior quality of our offerings and by ensuring high availability, we are the preferred partners for our clients.

We aspire to be a nimble organization that offers end-to-end solutions to meet the diverse risk management needs of our clients. We strive to challenge conventional turnaround times, while exceeding quality benchmarks. To this end, we wish to attract and retain best-in-class talent and be an employer of choice.

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"Data is the new oil. It's valuable, but if unrefined it cannot really be used. It has to be changed into gas, plastic, chemicals, etc to create a valuable entity that drives profitable activity; so must data be broken down, analyzed for it to have value."

- Clive Humby (Chief Data Scientist at Starcount)

he live in a data driven world where organizations, irrespective of their size or area of operations, cannot ignore the impact of data analytics in the way they run their businesses. Whether it is to improve customer experience or managing resources better, data analytics is being used at every level of the organization to make informed decisions.

This is true, of course, only for organizations that have already started on their digital transformation journey. Others who have not adapted will soon realize that they have missed the bus to the next era of decision-making. When organizations invest in formal training, communities to foster continued learning, and certifications to measure data literacy, people can thrive with data and make a greater impact on the business – better prepared to be agile as digital transformation demands data literacy at all levels.



Data analytics initiatives can help businesses increase revenues, improve operational efficiency, optimize marketing campaigns and customer service efforts, respond faster to emerging market trends and gain a competitive edge over rivals – all with the goal of making businesses smarter. With nearly two out of three companies now adopting data analytics, the process is strongly shaping the modern business world and is something most brands want to utilize.



Directorate of Advanced Studies, The Institute of Cost Accountants of India

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Data that is analyzed can consist of either historical records or new information that is getting generated continually or continuously. It could come from within the organizations or from external sources. It could be structured or unstructured.

Being proactive, however, is key. Traditional reporting & BI is gradually **maturing into advanced analytics. It's no longer enough to retro**-actively analyze what happened and why. Instead, systems and partnerships need to be put in place which leverage high quality data and interpret the data to make predictions around what is likely to happen next, with concrete evidence to back up the claims.

"One of the hardest parts about AI projects is identifying the questions you want to ask."

Rachel Kalmar, Data Scientist & Staff Software Engineer, Tableau

While the sources as well as the nature of data will vary from business to business and case to case, the approach to problem solving will follow the same set of principles in most cases.

- 1. Enunciate the problem statements
- 2. Set clear measurement priorities
 - a) decide what to measure
 - b) decide how to measure it
- 3. Identify sources and collect data
- 4. Analyze data
- 5. Storytelling



Types of Data Analytics to Improve Decision-Making

Data analytics is broken down into four basic types.

- 1. **Descriptive analytics** describes what has happened over a given period of time. Have the number of views gone up? Are sales stronger this month than last?
- 2. **Diagnostic analytics** focuses more on why something happened. This involves more diverse data inputs and a bit of hypothesizing. Did the weather affect beer sales? Did that latest marketing campaign impact sales?
- 3. **Predictive analytics** moves to what is likely going to happen in the near term. What happened to sales the last time we had a hot summer? How many weather models predict a hot summer this year?
- 4. **Prescriptive analytics** suggests a course of action. If the likelihood of a hot summer is measured as an average of these five weather models is above 58%, we should add an evening shift to the brewery and rent an additional tank to increase output.



Data Science at Netflix - A Case Study for Aspiring Data Scientists

Brands apply narratives to consumer data for more authentic and enlightening engagements



Why a Business needs Data Analytics?

Data Analytics aids an organization to tackle the data and utilize it to find new opportunities. This leads to more smart business moves, higher profits, efficient operations, and happy customers. The idea is to share the business prospects in a better way in the future and to use it with analytics concept. Data is increasing at a rapid speed and the rate of growth of information is very high. Data generation occurs through many users, industries, and businesses. It is crucial to amalgamate this data that have been generated through the business. If it gets wasted, lots of valuable information will be lost.

Previously, skilled analysts were required for processing the data but these days there are tools used for high-speed data and this helps in incorporating the data analytics at the time of making decisions. As far as the audience is concerned you can make different decisions. Social media has enhanced data growth in the organization and thus changes can be made based on that.

Business vulnerability and their solutions

There are a number of ways to assess the vulnerability of a business, as businesses have myriad processes with various weaknesses and solutions to overcome it:

Competition: It is the rivalry among the business selling similar products and targeting the same target audience to get more sales, increase revenue, and gain more market share as compared to others. Knowing and understanding your competition is a critical step, if you are not aware of who the competition is and knowledgeable about their strengths and weaknesses, it's likely that another business could enter the picture and provide a competitive advantage.

A business can take edge over its competitors by focusing on strengths, studying the market, Build a strong relationship with customers, providing good quality products and services at optimal price.

Demanding customer: Keeping customers satisfied is the primary objective of a business but dealings with demanding, dissatisfied or otherwise difficult customer is a challenge.

Remaining respectful and courteous at all times when dealing with difficult customers. It can be possible through **Customer value management** which **is a measure of customers' view of the perceived value for money delivered** relative to that of their competitors' customers.

Evolving product and process: Business focuses not only on the vision to see a product idea, but also how that product can evolve over time. Increasing competition, reduced customer loyalty and pressure on margins have made time-to-market more crucial over the last few years.

Business must put in place a clear product evolution strategy by creating a profitable product requires a combination of successful product development, **sales based on customer's need** and **price segregation.**

Regulatory guidelines: Increase in regulation and government-imposed formalities in businesses, the results often been disappointing. Violations of regulatory compliance regulations often result in legal punishment including federal fines.

Some businesses are proactively adopting their own privately enforced rules in an effort to head off further government interference and **prudent policies can be adopted to optimize risk return trade-off**.

Increasing cost base: As the cost of manpower and materials are increasing and reducing the profit margin. Companies typically launch a new product without focusing too much on cost.

Cost Control and Reduction can be done without compromising with the quality of the products and services.

Requisites

"By 2020, 80% of organizations will initiate deliberate competency development in the field of data literacy to overcome extreme deficiencies"

Technology: It helps businesses maintain data flow, manage contacts, track processes and maintain employee records. It helps businesses to operate efficiently and effectively with minimal manpower and helps to reduce the cost of doing **business**.

Talent: Although organizations are becoming more data driven but held back by a shortage of skilled staff, considered as a most notable challenge nowadays. Data scientists are in high demand as companies across all industry try to leverage data to power business success.

This course will help you to acquire talent supporting a variety of initiatives for data and analytics success, including code-free and code-friendly analytics to deep learning/machine learning, and explainable AI, all while developing a robust culture of data and analytics. **Technique:** There are different techniques depending upon the type of data, and the amount of data gathered. Each focuses on strategies of taking onto the new data, mining insights, and drilling down into the information to transform facts and figures into decision making parameters.

Capturing value from data requires excellence in each element of each link of the "insights value chain"

Tec	hnical found	ndations				Business foundations			15	T.			
	Data	Э	Analytics	Э	π	Э	People	Э	Processes	Value captured			
You are only as good as the weakest link in the insights value chain									n	a series a series and a series of			
	New data sources	0	Descriptive statistics	G	Cloud sourcing	iti	Cultural change	ł	Adaption business processes	1510			
÷.	Orchestration of data	Þ	Classical predictive statistics		Horizontal scaling (No- SQL, Hadoop		Data-enabled decision making		Automation business processes	50			
H	Unstructured data	23	Machine learning	•	Analytical program languages	0-0	Role profiles	2	Data and analytics governance				
â	Privacy and legal con- siderations	1	Cognitive modeling		Data visualization	4	Organization		Cross- functionality	is multiplicative, i.e., you are only as good a			
0	Data security		Optimization		In-memory analytics	Q	Analytics talent		Agile processes	the weakest link in the chain			
		R	Simulation		IT stack	1			Ecosystem management				

- Mckinsey

Our approach towards training

Based on our practical experience and interactions with industry practitioners, the data analytics profile requires a mix of business knowledge, domain expertise, exposure in statistics (theoretical and practical) and hands-on experience in different tools (Excel, R, Python etc.).

Most of organizations face difficulties, where the resources are having sound statistical background with limited or no exposure to real-life business problems. The primary step towards fruitful implementation of analytics, is to understand the business scenario and to appreciate the business problem. The analytics, no matter how complex it is, will be proven to a futile attempt if it is not solving the business problem. Our approach for this course is going to be use case based, where we will discuss the real-life scenarios. We will primarily focus on the below areas

- 1. Situations where we can suggest analytics as a solution
- 2. Practical issues with data we receive from client
- 3. Data structure and how it varies with different sources
- 4. Techniques to deal with data quality issues
- 5. Statistical tools used for variety of business problems and how to adapt the techniques with changes in the scenarios
- 6. Hands on training using MS Excel, Power BI
- 7. Deriving inferences and insights from the outcome
- 8. Communicating the statistical outcome in business language
- 9. Presentation of the analytical process to the client or stakeholders
- 10. Story telling

For every training session / module, we would start with a business scenario and will identify the potential problem areas. The scenario under discussion will have strong resemblance to what organizations face while making decisions.

Stages in retail consumer life

Customer acquisition: The process of persuading a **consumer** to purchase a goods or services of the business. Maintaining a meaningful customer relationship by employing a mindset of collecting feedback and analyzing the responses to inform the design and experience of products.

Portfolio management:

Brand loyalty: Loyalty models are intertwined with multiple analytical techniques, such as survival analysis, profitability models, and retention models. Marketers mostly use loyalty marketing as a retention tactic, but they need to elevate loyalty as a brand strategy to reap the benefits of driving customer value through the life cycle. For example, one international hotel brand built and deployed a loyalty model that successfully increased wallet share and engagement.

Data is the new oil! Analytics is the combustion engine!

Data – the next natural resource

Much like the vast, untapped lakes of oil of earlier millennia, we are now sitting on massive seas of facts, figures and detail. In addition, our technology continues to stream ever-increasing rivers of new data into this pool every second of every day.

Yet, unlike fossil fuels, data isn't depleted when you use it and has a miniscule environmental footprint.

In fact, knowledge derived from data has enabled us to develop clean, renewable energy sources, which are inexhaustible and significantly healthier for us all.

Harness the power of **data analytics**

In the same way as **engines** are required to convert oil into energy, so **analytics are required to extract the value form data.**

Only then can insights follow, which, when applied, can be used to produce business benefits such as:

- Eliminating the cost of waste or downtime e.g. identifying when resources/teams/individuals are under-utilized. Why is one more productive than another? Where is this occurring?
- **Identifying new revenue opportunities** by examining sales margins on products/services or by salesperson. Why do we have more market share in one area than another? What are the demographics and motivations of customers? Which customers are likely to buy again if
- we offer something to them?
- **Reducing risk** by identifying types of repeated safety incidents, areas of non-compliance with processes, anomalies, and unusual activity.

ALL enterprises are

- **Collecting data** in marketing, finance, sales, entertainment, human resources, payroll, risk, operations etc. Some of this even happens automatically e.g. Google **Analytics on a company's web site, items in** your Inbox, or click-throughs on a newsletter.
- **Storing data**. Much of a company's data is held in database systems, ERP systems, spreadsheets, disparate cloud systems, text files etc.

Every enterprise collects and stores data.

Data Analytics – Forecasting

Forecasting is the process of making predictions of the future based on past and present data and most commonly by analysis of trends.

The reliance on data driven decision making will continue to grow. Just like the widespread usage of metrics and reports today, companies will start expecting to see some **predictive analytics** insights as part of regular dashboards. As analytics becomes more and more prevalent in the corporate consciousness, a basic awareness and understanding of analytical techniques will become a required skill for career growth at the middle to senior management tiers, irrespective of industry and function. There will also be an increased demand for some super specialized roles. These will require intensive expertise with programming and technology to support the actual analytics implementation. In the next decade we will witness technological advances that will play an increasingly important role in the ability of companies to mine data for real time insights and actions in the context of the rapid pace of data produced and the variety of data that is being captured.

Business problems:

Almost all **forecast** tools rely on historical data to predict future outcomes due to this business must face certain problems.

Case:

The management of& Co, manufacturer of dairy products, was facing issues of excess inventory holding cost. In order to get rid of it, they planned to reduce the production. But, in next couple months, the demand increased, and the company was unable to meet up the excess demand. It had the below repercussions:

- Profitability decreased.
- Loss in market share, as competitors took the advantage.

Based on the above scenario, decision had been taken to increase the production. But, again decline in sales impacted the profitability, mainly driven by increased holding cost and normal loss, due to the perishable nature.

Breaking down the Business problem:

 We observed that, the holding cost is a substantial percentage of the total cost

- Since the product is perishable in nature, it is difficult to hold the products for a long time
- We checked that production plan is not driven by the sales plan of the coming months
- The planning for the top-line (sales quantity) was required, which will optimize the production plan and in effect it will minimize the cost
- Such plan was also required, to ensure there is no loss in the market share and customer confidence.
- The sales plan will also help in budgeting.

Finalizing requirements

- Prepare monthly forecasting for the sales quantity (10 months forward)
- The forecasting needed to be presented for different product types, geographies and at the total level
- The forecasting should take care of the fluctuations in demand
- Sales forecasting should take care of incremental data and adjust the forecasted numbers

Approach to overcome the noise

Noise is unwanted data items, features or records which don't help in explaining the feature itself, or the relationship between feature & target. Noise often causes the algorithms to miss out patterns in the data.

- Current observations are preferred over historical observations because of its more chance of accuracy, integrity and reliability which will improve the everyday decisions of the business.
- Seasonality is seen in the data which experiences regular and predictable changes that recur every calendar year. Seasonal adjustment is a statistical method for removing the seasonal component of a time series that exhibits a seasonal pattern.
- If you have a time series with a clear pattern, you could use moving averages — but if you don't have a clear pattern you can use **exponential smoothing** to forecast.
- One approach that commonly used for the treatment of this missing item is adoption of imputation technique. There are three interpolation methods that are linear, quadratic and cubic

What we got - Data

We got the monthly sales data for the regions say as Kolkata, Chennai, Delhi, Mumbai for each product they are Curd, Cheese, Ice cream, Butter and the necessary forecasting is made.

Data used over here includes 12 months of 2018 & 2019 each and 2 months of 2020. It means, total 26 (12*2 + 2) unique months had been captured.

1. All Product & All Regions

As we are considering **prediction for ten future months** for all the **four regions and products** depending on the historical data which are collected. Forecasting is never accurate 100% but it can be reliable as prediction made at 95% confidence level regarding the sales of the products in each region. **Seasonality** means the data experiences regular and predictable changes that recur every calendar year. It is incorporated in the forecasted periods. There is a upper boundary and a lower boundary for the prediction as mentioned above about the 95% confidence level on the forecasting which actually means the predication may fluctuate between this boundaries.

2. One Product & All Regions

As here we are dealing with the data of four products, but Product C is selected as its showing upward trend as compared to other products in all the four regions.

3. Same Product & One Region

Product C is been selected of the region Mumbai; we can see that the trend is downward for this region. Confidence interval tells more than just the possible range around the estimate. It also tells about how stable the estimate is. Here relative confidence interval increases which leads to lower prediction more accurate and reliable.

Careers in Analytics

Add some graphs and charts regarding industry demand

Share of Data Science and Analytics jobs – by category by industry 2020 outlook

DSA Framework Category	Professional Services	Finance & Insurance	Manufacturing	Information	Health Care & Social Assistance 6%	Retail Trade
Data-Driven Decision Makers	23%	17%	16%	10%		
Functional Analysts	23%	34%	9%	5%	8%	4%
Data Systems Developers	41%	14%	14%	10%	5%	3%
Data Analysts	34%	25%	9%	6%	7%	3%
Data Scientists & Advanced Analysts	31%	23%	12%	10%	6%	4%
Analytics Managers	21%	41%	9%	9%	6%	3%

Source : IBM

- 59% of all Data Science and Analytics (DSA) job demand is in Finance and Insurance, Professional Services, and IT.
- Annual demand for the fast-growing new roles of data scientist, data developers, and data engineers will reach nearly 700,000 openings by 2020.
- By 2020, the number of jobs for all US data professionals will increase by 364,000 openings to 2,720,000 according to IBM.

What does a data scientist do?

Data analysts and scientists perform a variety of tasks related to collecting, organizing, and interpreting statistical information. This would of course vary depending on the exact nature of the job and the sector or industry the analyst is working in, but simply put data scientists assign numerical values to different business functions, and are responsible for identifying **efficiencies, problem areas, and possible improvements. Let's quickly list** some of the basic tasks most data scientist performs:

- 1. Explore data, play with data, understand data and compile information from data
- 2. Ask lots of questions
- 3. Define and test hypothesis
- 4. Develop predictive models and algorithms
- 5. Provide powerful Visualizations and create interesting business stories that will aid business decision making

ABOUT THIS COURSE

This course will expose you to the data analytics practices executed in the business world. We will explore such key areas as the analytical process, how data is created, stored, accessed, and how the organization works with data and creates the environment in which analytics can flourish. What you learn in this course will give you a strong foundation in all the areas that support analytics and will help you to better position yourself for success within your **organization. You'll develop skills and a perspective that will make you more** productive faster and allow you to become a valuable asset to your organization. This course also provides a basis for going deeper into advanced investigative and computational methods, which you have an opportunity to explore in future courses of the Data Analytics for Business specialization.

What you'll learn

After taking this course, students should be able to:

- approach business problems data-analytically. Students should be able to think carefully and systematically about whether and how data and business analytics can improve business performance.
- develop business analytics ideas, analyze data using business analytics software, and generate business insights.

DIRECTORATE OF ADVANCED STUDIES THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

🔀 advstudies@icmai.in

C +91-33-4036-4779 +91-33-4036-4736

Statutory Body under an Act of Parliament

14 March 2020, Saturday

WORKSHOP ON

APPLICATIONS OF **DATA ANALYTICS** IN FINANCE & COSTING

J N BOSE AUDITORIUM

The Institute of Cost Accountants of India CMA Bhawan, 12 Sudder Street Kolkata - 700016

10 A.M. to 6 P.M. Registration starts at 9.30 A.M.

in association with

Vriksh A PRM Fincon Initiative

KEY TAKEAWAYS FROM WORKSHOP

- Understanding of changing business realities
- >> Use of data-analytics to answer new-age business problems
- >> Importance of defining the problem-statement
- >> How to choose the most appropriate data-analytics tools
- The need for effective storytelling

WHO SHOULD ATTEND

- Members of the Institute of Cost Accountants of India
- ► CMAs
- ▶ Final level students of the Institute
- Other professionals
- >> Faculty Members & Research Scholars from University / College / Institutes

CMA Balwinder Singh President The Institute of Cost Accountants of India **CMA Biswarup Basu** Vice President The Institute of Cost Accountants of India CMA Debasish Mitra

Chairman - Board of Advanced Studies The Institute of Cost Accountants of India

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HEADQUARTERS

CMA Bhawan 12, Sudder Street, Kolkata - 700 016 Ph: +91-33-2252-1031/34/35/1602/1492/1619/7373/7143

DELHI OFFICE

CMA Bhawan 3, Institutional Area, Lodhi Road, New Delhi - 110003 Ph: + 91-11-24666100/24666124/24666129

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