

BRANDS ON ONCOLOGY

Project report submitted in partial fulfilment of requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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UNDER THE GUIDANCE OF

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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

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TABLE OF CONTENTS

CAPTION	PAGE NO.
DECLARATION	i.
ACKNOWLEDGEMENT	ii.
LIST OF ABBREVIATIONS	iii.
LIST OF FIGURES	iv.
ABSTRACT	v.
CHAPTER 1: INTRODUCTION	9
1.1.General Background	9
1.2.Problem statement	12
1.3.Objective	12
1.4.Scope of the project	13
CHAPTER 2: LITERATURE SURVEY	16
CHAPTER 3: ONBOARDING	18
3.1. Data Management 101	18
3.1.1. TPAs	18
3.1.2. AMAs	18
3.1.3. PDRPs	18
3.2. Pharma 101	18
3.3. Communication & Quality	20
3.3.1. Communication	20
3.1.1.1. SCQA	20
3.3.2. Quality	20
CHAPTER 4: FORECAST MODEL	21
4.1. Defination	21

4.1.1. Types of Forecasting models	21
4.1.1.1. The Base Model	22
4.1.1.2. Simple Elasticity Model	22
4.1.1.3. Simple Extrapolation	22
4.1.1.4. Simple Conjoint- type Models	22
4.1.1.5. Zipf’s Law	23
4.2. Forecasting 101: An Introduction to Forecasting	23
4.2.1. What is Forecasting?	23
4.2.2. Application of Forecasting in pharma	23
4.2.3. Credible Forecasts	27
4.2.4. Types of Projects	28
4.2.5. Forecasting Project Lifecycle	28
4.2.6. Forecasting Methodologies & Models	29
4.2.6.1. Patient – Based Forecasting	29
4.2.6.2. Patient – Flow Forecasting	29
4.2.6.3. Projection – Based Forecasting	29
4.3. Approach/Flow of Model	30
4.3.1. Diagnosis	30
4.3.2. Testing	30
4.3.3. Treatment	31
4.3.4. Revenue	32
CHAPTER 5: RESULTS AND DISCUSSION	33
REFERENCES	34

DECLARATION

I hereby declare that the work reported in the B.Tech Project Report entitled “**Brands on Oncology**” submitted at **Jaypee University of Information Technology, Wakknaghat, India** is an authentic record of our work carried out under the supervision of **Mrs. Nimisha Gupta**. I have not submitted this work elsewhere for any other degree or diploma.



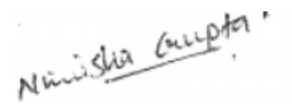
Ananya Sharma

171050

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Mrs. Nimisha Gupta

Date: May 21, 2021



Project Manager/Supervisor

ACKNOWLEDGEMENT

I would like to thank God for guiding us throughout our academic journey and to acknowledge our project supervisor, Mrs. Nimisha Gupta, for her undying support, priceless motivation and guidance throughout the project duration. Moreover, I extend my sincere gratitude to all my team members, inc. Associates, Associate Consultants, Consultants and Managers for their contribution towards the success of this work.

The role my friends played during the entire period cannot also go unmentioned. Thank you all for your moral support and encouragement. I am deeply honoured and indebted to you all.

To my family, I appreciate the support you have given me throughout my academic journey. This quest has not been easy but you have always solemnly stood by my side.

Thank you.

LIST OF ABBREVIATIONS

TPAAs	Third Party Access Agreements
AMAs	American Medical Association
PDRPs	Prescribing Data Restriction Assosication
Rx	Prescription
NRx	New Prescription
TRx	Total Prescription { combines NRx + Refills }
NTS	New Therapy Start
HCP	Health Care Practioners
NP	Nurse Practioners
CMOP	Consolidated Mail Outpatient Pharmacies
GPO	Group Purchasing Organisation
LTCP	Long Term Care Pharmacy
HPP	Health Plan Providers
MPS	Medical Products & Services

LIST OF FIGURES

Figure no.	page no.
Figure 1	9
Figure 2	10
Figure 3	10
Figure 4	11
Figure 5	12
Figure 6	14
Figure 7	15
Figure 8	19
Figure 9	19
Figure 10	20
Figure 11	21
Figure 12	24
Figure 13	28
Figure 14	28
Figure 15	29
Figure 16	30

ABSTRACT

This project deals with a Big Pharmaceutical Company {say, TAN , will use this acronym for the client in this whole project report} which have a requirement for different Forecasting Models and Analysis Tools for their brands on Oncology. This project covers all the aspects that the client needs for their brands and drug launch in the existing market.

It also covers the management of those models and tools till the very last and providing them to the client hand ready is the need of the hour of this project.

In this project, we tried to create a client ready environment to work on so that they can go hands on with the models and tools.

CHAPTER 1

INTRODUCTION

1.1. General Background

Let's Begin this with a general overview of Oncology. Oncology, It's the branch of medical science which deals with the study of cancer. It covers the diagnose, prevention and treatment of the devilish disease. As cancer is becoming more and more common now days the need is to study it and find something that helps in curing the disease. The person who to so is called an Oncologist. Down below are the types of Oncology/Oncologists:

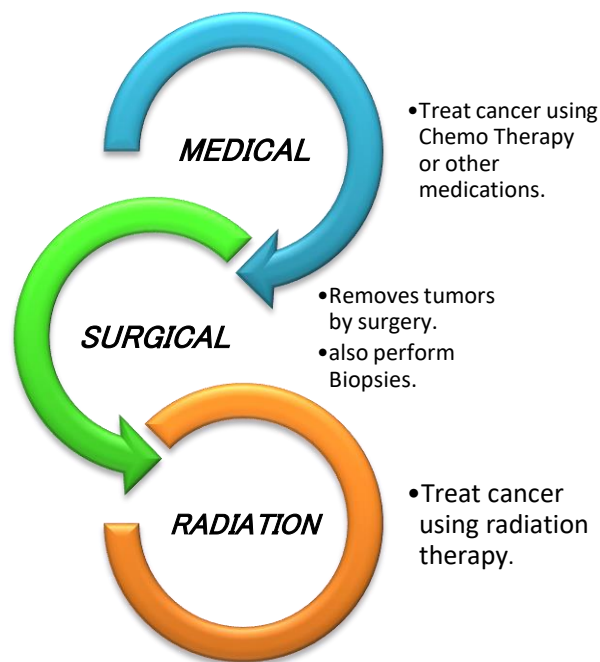


Figure 1:- Types of Oncology/Oncologists.

Cancer, a severe family of disease which involve the abnormal & indefinite growth of cells with a potential to attack and spread to further more parts of the body. It spreads and grows when the cells becomes older or get damaged, they die, in place of which new fresh cells grow. Not very often the process gets break down into abnormality and more damaged cells gets multiply and forms a tumor {lumps of tissues}. Tumors can be both benign {non cancerous} & cancerous. The one which spreads to other parts of the body is cancerous and can damage the body to a very serious extent.



Figure 2:- Risk Factors for Cancer

ESTIMATED PERCENTAGE OF NEW CASES OF FEMALE CANCER IN 2020, WORLDWIDE

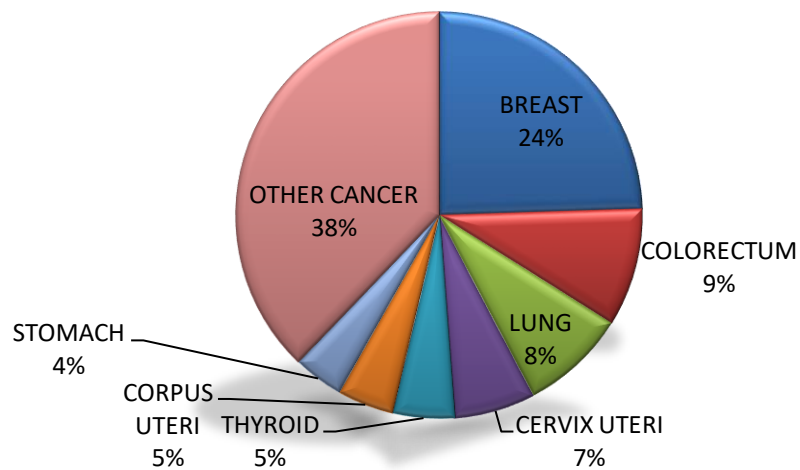


Figure 3:- Estimated percentage of new cases of female cancer in 2020, worldwide

ESTIMATED PERCENTAGE OF NEW CASES OF MALE CANCER IN 2020, WORLDWIDE

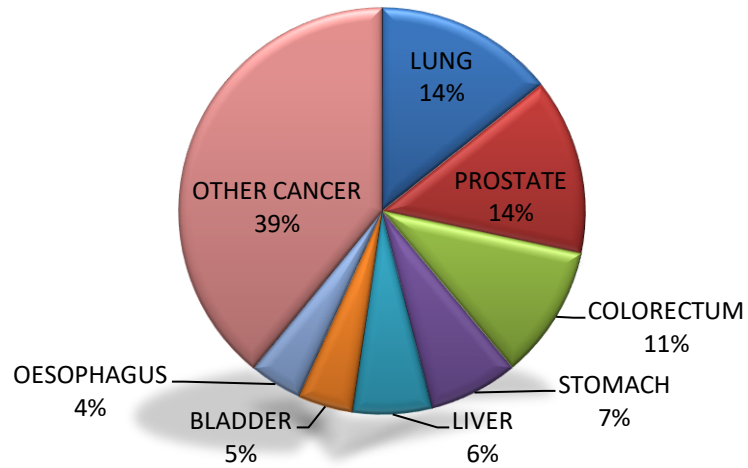


Figure 4:- Estimated percentage of new cases of male cancer in 2020, worldwide

There are certain cancer treatment options that helps in cure and remission of the same & those are as follows:-



Figure 5:- Cancer Treatment Options

1.2. Problem Statement

The requirement of the Big Pharmaceutical Company (TAN) is to build certain systems which will help in the forecasting of their new drug in the existing market or a new version of an existing drug in the existing market. The need to develop such a system is to be able to calculate different aspects on which the drug should get a launch.

For this, the system ought to be well enabled to detect and have a calculative strength to get along with the complex calculations without having any lagging issue.

The enacted tools which is being built for the fulfilling the clients requirements help to intercept every request so that one can get to final optimized output.

There is much need to have such system and this need makes us more ambitious to create such well-designed and well developed system for the client.

1.3. Objective

The main aim of this project is to focus on developing a forecasting model and an analysis tool that can get the client the net revenue and the share of patients in the market after that.

The total net revenue at the end of each cycle for each different country, region or area is been calculated on different aspects and those are the one used in the model to obtain the result.

Being able to get the correct output for the given inputs is the key point in any of the model here and that what makes it so efficient.

ZS focuses on quality assurance and quality checks that helps in delivering the right model and tool to the client.

1.4.Scope of the project

In today's world as we all know that medical science is being one of the crucial subject to study and get more and more knowledge related to it.

The use and requirement of different medicines is the need of the hour and each of which needs a certain amount of beforehand study and R&D. being on a same page the drug needs some forecasting as well to get along in the market and to survive in the pharmaceutical industry otherwise there is a risk of loss and fall of patients for that drug and even that pharma company.

The need for oncology esp., is increasing as the number of cases of cancer are on the rise as well. As seen in the 2020 data, above mentioned it is seen that one should get wider in this branch of medical science.

On a global front almost every big pharma is working in this field and they definitely need some model to have their shares before launching the medicine.

The scope of the project is so much that its growing at a very rapid pace.

The following data obtained will show the same:-



Figure 6:- Top 7 sectors which needs forecasting models.

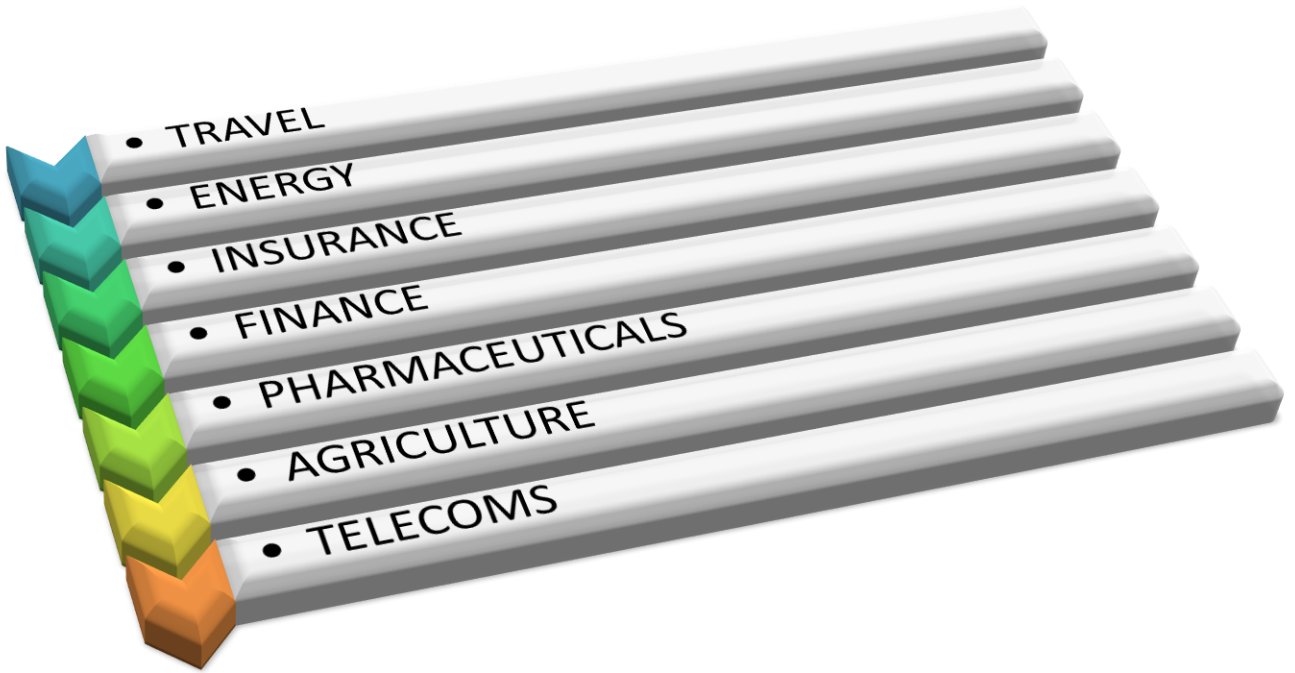


Figure 7:- Top 7 sectors which needs Analysis Tools.

CHAPTER 2

LITERATURE SURVEY

Oncology could be a multidisciplinary specialty, which occurs throughout the curriculum. Hence, teaching is also fragmented, with an overlap within the fields of surgery, pathology, communication skills, and palliative care. A high proportion of patients with cancer are being managed as outpatients, making it harder for medical students to look at them. A 1993 survey of oncology departments found that 78% of medical oncology and 53% of clinical oncology departments had regular commitments. Despite significant progress in tumour diagnosis and treatment over the previous few years, cancer remains a serious reason for death worldwide. Cancer prevention through diet and lifestyle changes is gaining importance, as our understanding of the potential of dietary patterns and single foods to avoid carcinogenesis is growing. This review discusses available evidence for links between nutrition and cancer and summarizes a number of the recent findings from observational and interventional studies on the potential of diet and specific nutritional components to cut back cancer risk.

The first known written record of the disease was an outline of carcinoma within the Egyptian ‘Edwin Smith’ papyrus from 3000 BC. The cut surface of a solid malignant tumour with veins stretched on all sides is sort of a crab with its feet on all sides of the body, hence the name ‘cancer’ which comes from the Greek word *carcinos*, meaning crab.¹ The vocabulary we use for cancer is loaded with metaphors, mostly taken from living quarters. We are ‘at war’ with and ‘fight’ cancer, which reflects its devastating effects and urgent need of treatment. The military metaphors also help to rationalize the novel treatments required.

Cancer encompasses many diseases and features a reputation for being a fancy and deadly disease although about one-third of cases are non-melanoma skin cancers, which are easily treated and frequently cured, although they're excluded from cancer statistics precisely for this reason. In her article ‘The war on cancer’ (p. 8) Jo Whelan, a medical journalist, summarizes current thinking on what makes cancer cancer, the question first posed by Hanahan and Weinberg in 2000. She explains how the hallmarks of cancer that they outlined then, and added to during a 2011 update, have had an incredible influence on scientific opinion and research although they need not been without their critics.

The pharmaceutical market is experiencing significantly amplified research and development costs, in addition as increasing price and other competitive pressures. this text presents a much-needed systematic review of the literature relevant to pharmaceutical marketing. The authors find that the order-of-entry effect is critical within the sector, but that both early- and late-entry strategies is effective when including the suitable marketing strategies. Within this context, the current study reveals that promotion policy is that the most relevant, followed by price policy, with product design policy surprisingly only third in importance. Distribution (place) is that the least relevant within the pharmaceutical context. These findings are accustomed drive an agenda for future research in pharmaceutical marketing.

CHAPTER 3

ONBOARDING

3.1. Data Management 101

3.1.1. TPAA's

A TPAA is a contract with a particular data provider that permits the user to access, use & process the provider's data.

The TPAA specifies:-

- The client for which the data will be used.
- The particular data set that may be used.
- The specific uses of these data sets that are permitted.

There are several other third party agreements which are required to keep data safe and secure from the outer world. For e.g., MDAA.

3.1.2. AMA

American Medical Association is the most crucial and important source of data in pharma. This owns and maintains the database for prescriber level data, related to physicians and medical students.

3.1.3. PDRP

This provides HCP an option to secure their info., even providing some basic details for the benefit of health of public.

3.2. Pharma 101

In the pharma industry, even for the stakeholders it is important to know about some basic terminology of pharma which comes under Pharma 101.

There are some factors down below which needs to be understood before any approach and those should be in focus.

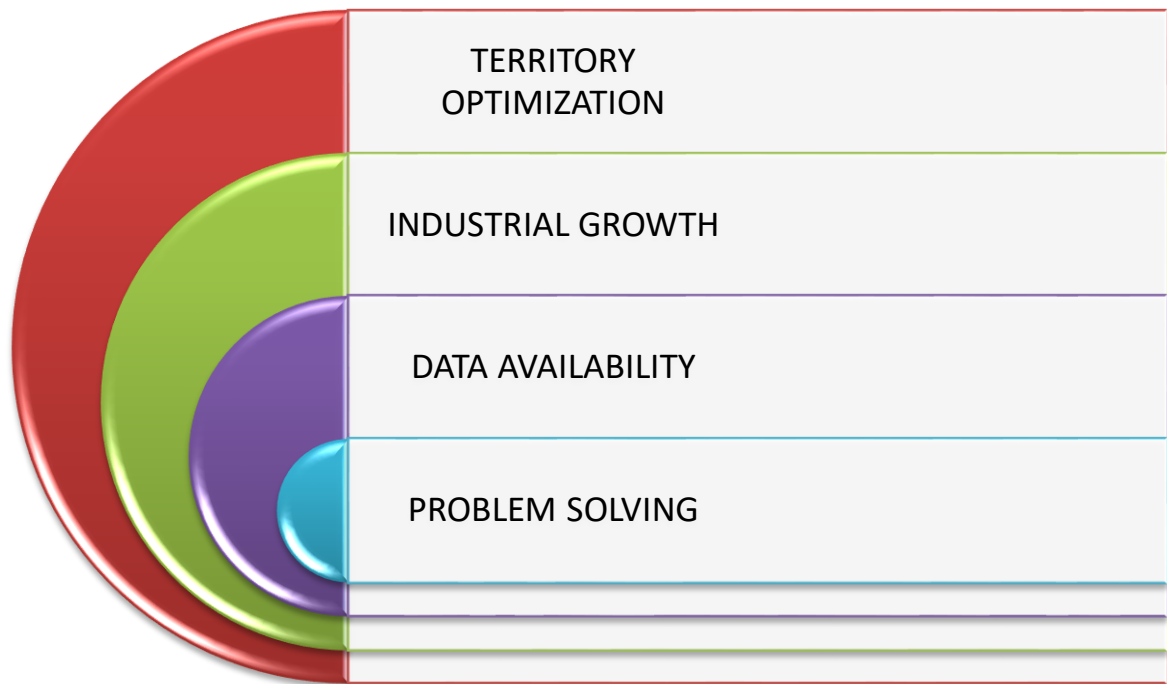


Figure 8:- Factors to focus on in pharma

Rx	Prescription
NRx	New Prescription
TRx	Total Prescription {combines NRx + Refills }
NTS	New Therapy Start
HCP	Health Care Practitioners
NP	Nurse Practitioners
CMOP	Consolidated Mail Outpatient Pharmacies
GPO	Group Purchasing Organisation
LTCP	Long Term Care Pharmacy
HPP	Health Plan Providers
MPS	Medical Products & Services

Figure 9:- Some basic terms to know

3.3. Communication & Quality

3.3.1. Communication

3.1.1.1. SCQA

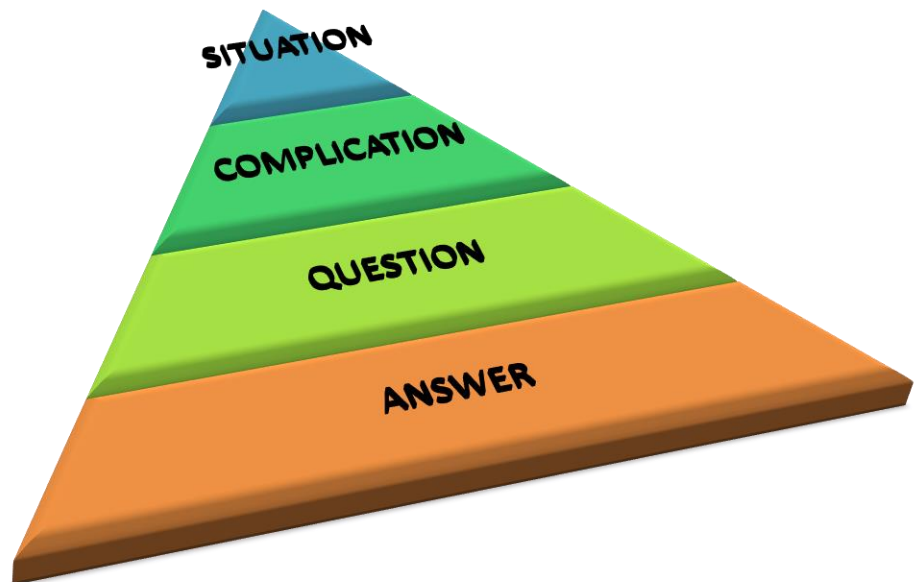


Figure 10:- SCQA

- Convey the situation & elaborate.
- What complication happened & How its going to impact?
- If you have any questions or any other question is there then ask them.
- How do you get out of the situation & answer the situation or any possible one you have?

3.3.2. Quality

There is one important thing that needs to be done in ZS and that is focus on quality.

- No compromise with the quality.
- Understand the expectations.
- Improvise things as needed.
- Understand customer's perception.
- Do the right thing, first time, every time.
- Quality is a reflection of me.

CHAPTER 4

FORECAST MODEL

4.1. Defination

If we talk about Forecasting, in simple words, it is the prediction of future on the data we have of the past. It is very usual to have a understanding about the data present esp., in numerical form and need to know that some of the patterns in the data present would remain almost similar as of this time also and will continue to do in the future.

Forecast model is one of the crucial and necessary need in today's world. It is one of the many tool that business uses nowadays to have a prediction about their business sales, shares in the market, revenue generated, outcomes regarding demand and supplies and consumer behaviour.

These models are very much useful in sales and marketing.

4.1.1. Types of Forecasting models:-

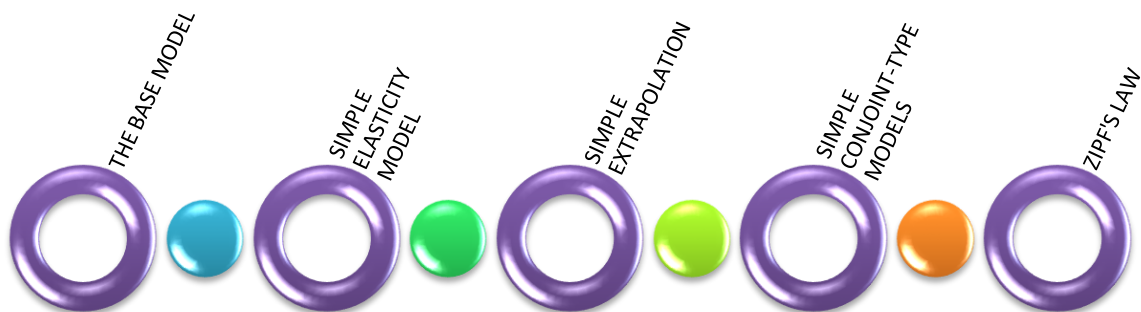


Figure 11: Types of Forecasting Models

4.1.1.1. The Base Model:-

This is the best method to get the prediction of speed uptake for a Brand/Therapy Class. This is the most studied & most famous marketing forecast model of all time.

In this, it is seen that when there is a new product in the market people tends to get a little nervous about that and follows what other people are thinking or doing unlike to when they are confident/desperate. This model needs only 3 numbers to predict the whole sales of a latest product.

- This model is certainly very similar to a simple epidemiology model which was used to get the prediction for spread of Swine Flu.

4.1.1.2. Simple Elasticity Model:-

This is the best way to extend a linking b/w market spending and market share.

In this you can get the elasticity number of you market spending which the market share obtain by changing the market spending. This simple number is used to get the linking b/w the both.

- Marketing weight for a brand is more impact on its sales than that for therapy class sales.

4.1.1.3. Simple Extrapolation:-

The best model to forecast stable trends in market.

One needs to project the current trend for the future for an accurate forecast when one have a stable item in a stable market with zero competitors and zero major clinical trials.

Simple Extrapolation are better than the complex ones if they are useful in large forecasting as complex make it more hard and time taking to get to the result.

- In 1940s, a simplest and best form of exploration was invented by a US navy analyst who used it for tracking & firing submarines and the technique was named as Exponential Smoothing.

4.1.1.4. Simple Conjoint- type Models:-

Best method for linking the strength of item's profile to market share.

This model works on the principle of how much attractive a item is to its competitors in the basic area of product performance.

Research suggested that a simple conjoint model is very simple as it produces a DIY version of it on MS-Excel & it is on the same page of accuracy as the most expensive & the complex ones.

- The most popular form of perceptual mapping was invented by the inventers of conjoint models.

4.1.1.5. Zipf's Law:-

Best method for linking entry order to market share.

This law was being invented in the late 1940s by a Harvard linguist who made it predict many unrelated disparate things. For eg., the popularity of pages on the internet, pharma brand market shares, sizes of cities in a country, etc.

On an average, the brands get into the market later are the ones getting less market shares than the ones which gets earlier in the market.

The best predicted simple modification of Zipf's Law is the relationship b/w pharma brand market shares & entry order.

- Murray Gell-Mann is the discoverer of quark subatomic particle & also the creator of modified form of Zipf's Law.

4.2. Forecasting 101: An Introduction to Forecasting

4.2.1. What is Forecasting?

It helps us plan & make effective decisions about using our time & resources.

It helps us look into the future, affects every stakeholder, understand the market, informs a broad range of business decision.

4.2.2. Application of Forecasting in pharma

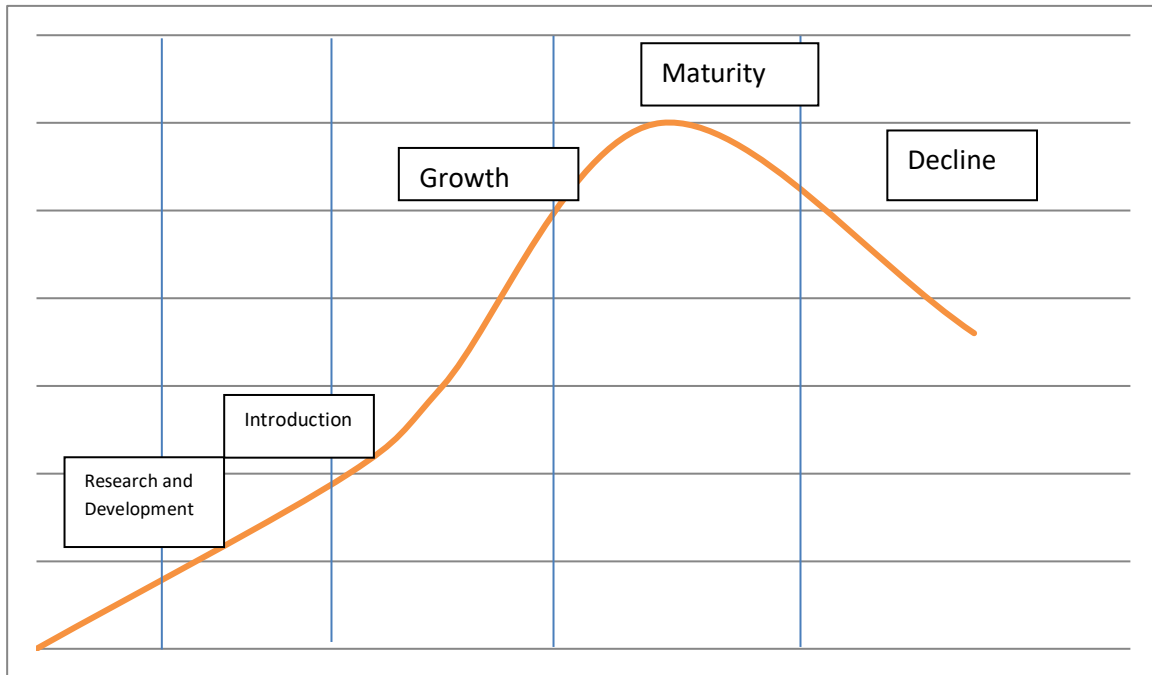


Figure 12:- Curve Cycle of a product

- **Early Development or R&D:-**

This is the first stage in any of the forecasting methodologies done in a pharma based company.

In this there are certain aspects which comes here and those are:-

- **Pre-clinical:-**

The pre-clinical trials is a phase where the research and development is carried out & here it is decided whether a drug is ready to go for further clinical phase or not. It covers extensive preclinical studies & R&D studies to yield the best outcome of any drug. This contains the laboratory studies for a drug which contains cell studies and animal studies.

- **IND application:-**

Before going for a further approach or entering the clinical trials the research must get an approval on that drug and that is filed by an IND application with FDA.

- **Phase 0:-**

Here, in the phase 0, it is checked if the drug is feasible enough to roll on or not. It is the exploration related to if & how the will work in the future.

Although in this phase the drug is tested on humans but its more of a process which is done for further drug approval processes. In this it is found that the drug is working upto the mark or not as studied by the reasearchers. This generally helps in saving time and money which would have been spent on future trials.

- **Phase 1:-**

In this phase of trials it is ought to be found that the drug is really safe or not. It is done to find the treatment process, the amount doses that must be given for the treatment and all.

It also checks for the side-effects of the drug on humans even though it is been tested in labs & on animals.

Here safety is the main concern so the doses used here are of very less amount and use to track the reaction of human body towards this dose.

Here a number of people are taken into account for the testing.

- **Phase 2:-**

This phase is used to find the clinical efficacy of the drug that how much the drug work on the treatment and will it be able to get along the course of time. It is used to find out if the drug is able to work on certain types of cancer or not and how much it works on them if it does so.

Here, the number of people taken into account are more than those taken in the first phase trials, here it is around 100 in number having the same type of cancer. They are treated with the most appropriate & safest approach to deal with the disease found in the first phase.

Here, usually everyone gets the same amount of doses and these are performed at major cancer treatment centres or hospitals.

- **Phase 3:-**

In this phase it is find that whether the new drug is better enough to beat the already existing one in the market and is able to solve the problem with a good outcome.

Before getting the approval for the launch a drug must walk through this trial as well. This phase compares the effectiveness of the drug on the patients as the doctors also don't know till now is the this method of treatment better than the previous one.

- **Submission for FDA approval:-**

A NDA is needed before the launch of any new drug in the market (esp., for USA) and that needs to be approved by FDA. FDA allows the drug for the launch in the market and reviews the results which are there from the clinical phase trials & even other info.

- **Launch**

This is the point where the drug gets into the market. It is also known as the introduction phase of any new drug or a newer version of any existing drug.

It is phase in the point of time where the curve increases slowly and steadily as for any new drug it is very difficult to attract the patient share present in the market.

This launch or introduction phase is the most critical phase for any drug as it is the one where a drug can get a boom growth start or can fail to do so.

Here the drug needs to be very efficient in its treatment solving field so as more and more people gets attracted towards the drug and to get the trust of the people is the most important.

For a successful launch, companies must focus on meeting the quality standards, regulatory compliance and all the other benchmarks. The drug must reach the market with clear value proposition. One must have a good market coverage to get a successful launch.

Having a stable market for a new drug is another important factor that needs to be considered while launching a drug.

- **Growth**

This is the phase where the drug gets a rapid growth of market shares in the market & it gets headed towards the maturity phase. Here is a steep growth in the curve & the best phase for any drug as here it generates most of the revenue for the company.

In this phase people gets to trust the drug and are more interested in having the brand for their treatment. More and more people gets attracted towards the brand after seeing many people having a stable health after having that drug.

- **Maturity**

This is the phase where the drug hits its maximum point of revenue generation and declines afterwards.

The maturity phase is the one where most of the companies are believed to have a certain amount of growth and hit the peak of market share. This is the phase where most of the people gets to use the drug and the treatment from the drug becomes more common in the market.

- **Loss of Exclusivity or decline**

It is the phase where the patent of any drug is lost by the company and a generic version comes in the market. The formula of the drug can be easily accessible by other companies as well and they start making their own drug

When the drug reach the loss of exclusivity the revenue it generates starts decreasing as more similar drugs with same formula or molecule are available in the market and even a cheaper version of the same drug is present out there which can be used in the treatments.

At this point of time the drug gets to a normal place in the market and have less and less revenue as the time increases but stops at a certain point where the share of patients on the generics version of the same version becomes almost constant.

4.2.3. Credible Forecasts

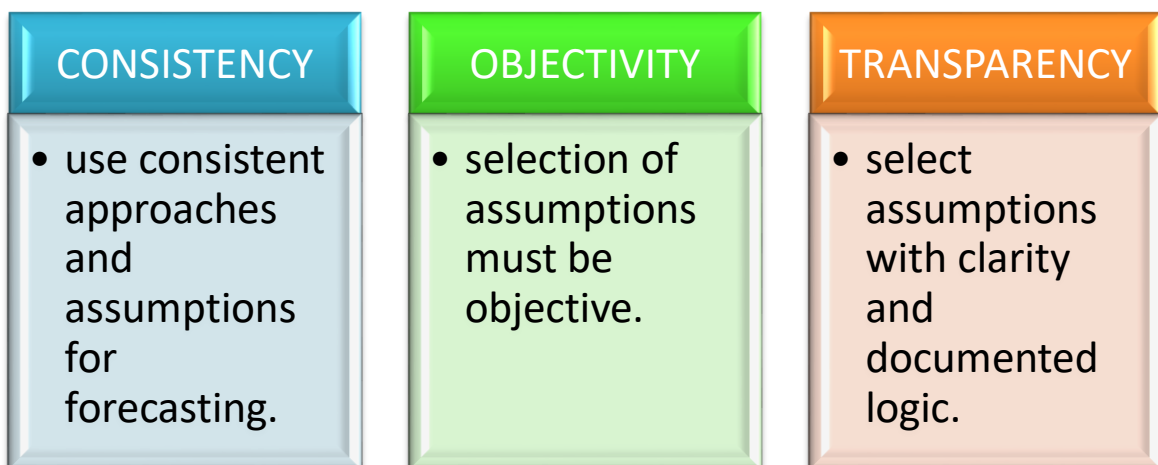


Figure 13:- Credible Forecasts

4.2.4. Types of Projects

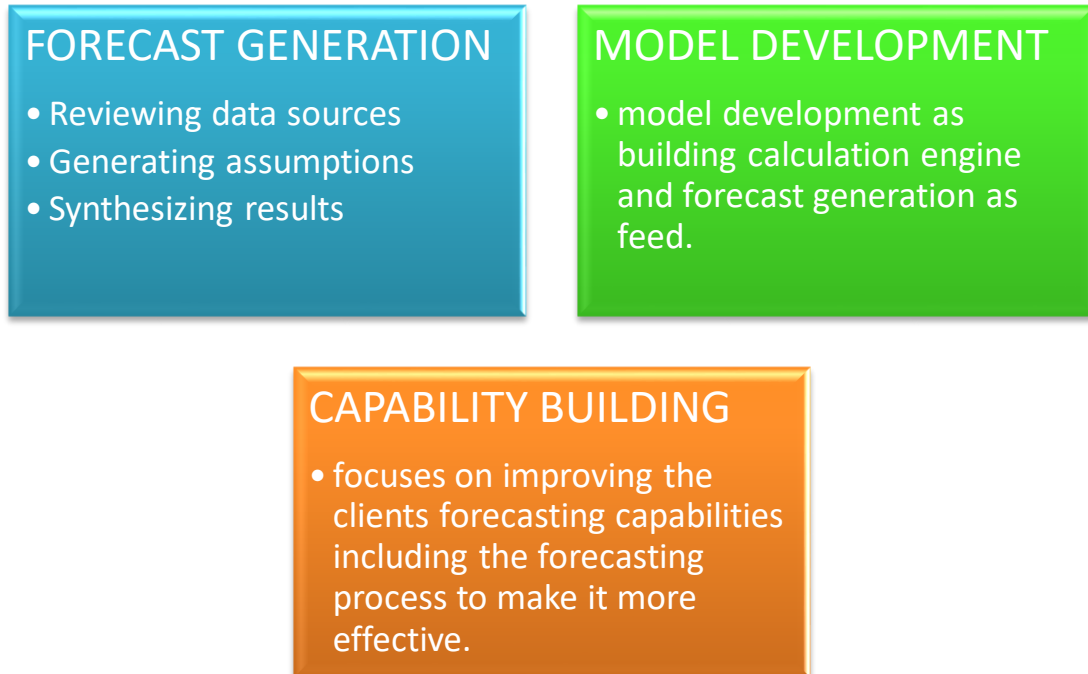


Figure 14:- Types of Projects

4.2.5. Forecasting Project Lifecycle

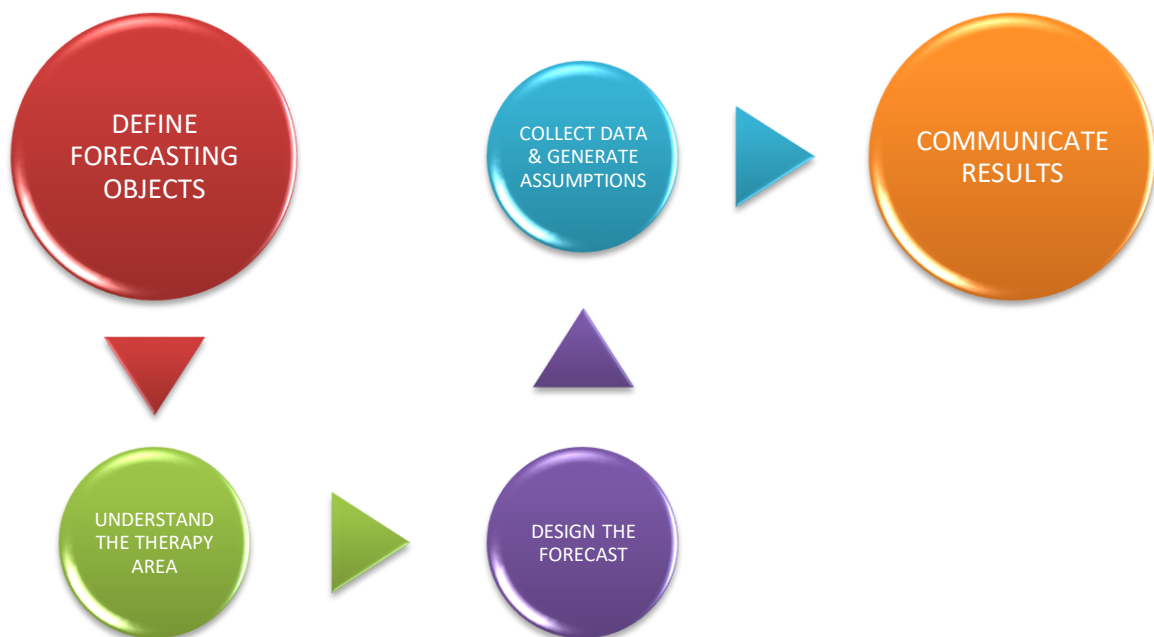


Figure 15:- Forecast Project lifecycle

4.2.6. Forecasting Methodologies & Models

4.2.6.1. Patient – Based Forecasting

In this not much of the historical data is needed.

Based on:-

- Market sizing and Epidemiology
- Product share generation
- Volume & Revenue conversion

4.2.6.2. Patient – Flow Forecasting

- This involves tracking disease & treatment history for a group of patients
- It provides insights into market dynamics that are often not apparent in the aggregated market view

4.2.6.3. Projection – Based Forecasting

This requires historical data.

- This leverages market based trends
- Integrate market events
- Generate final forecast i.e., reconciliation & conversions

4.3. Approach/Flow of Model

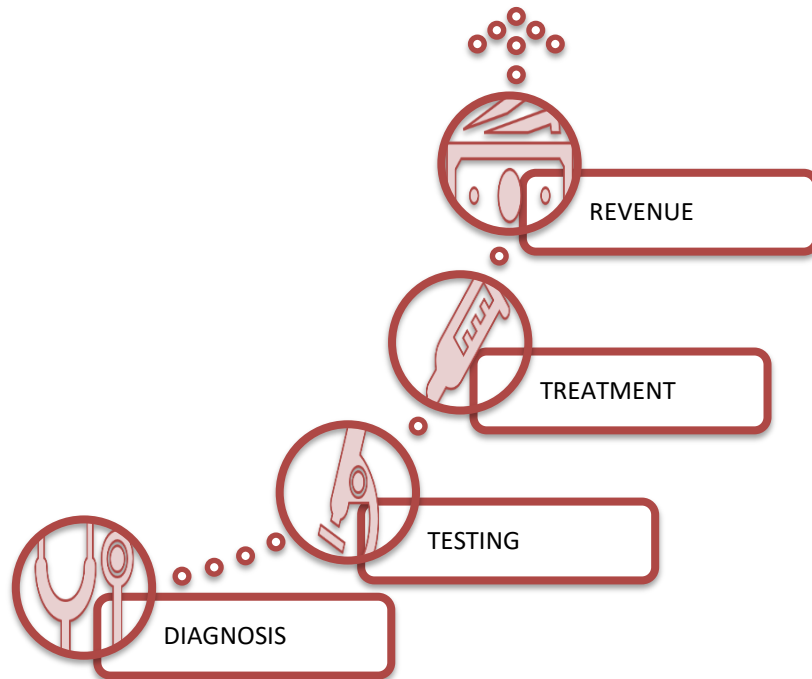


Figure 16:- Approach used in Forecasting Model

4.3.1. Diagnosis

Firstly, the patients are diagnosed by the physician/HCPs and the disease gets diagnosed for e.g., blood cancer. These patients comes under the share of diagnosed patients for blood cancer and the pharmaceutical company (TAN) is making drugs for curing blood cancer patients.

Then those patients are taken for therapies and testing. From here basically we gets the number of diagnosed patients for a particular drug.

4.3.2. Testing

Now, these patients are tested and got divided on the therapies or classes from where the treatment begins. These tests contain further diagnosis of patient on the basis of severity of the disease.

From here, we get the number of those diagnosed who actually going for the therapies and are getting divided further.

This further gets divided into different sections as follows:-

- **Cure / Remission**

Here is the share of patients taken out from the whole slot of patient shares as some of those patients get remission which can be either partial or full. Some research says that if any remission covers a period of 5 yrs or more than it is said to have your cancer cured. But still some cells having cancer remains in the body even after so many. So some patients are taken out of the pool.

- **Treatment Rate**

Here is the pool of patients considered to be alive or healthy even after been diagnosed with a disease for quite some time.

- **Bulk up factor**

This contains certain increase in the share of patients due to the success of drug or increase in diagnosed patients on cancer.

4.3.3. Treatment

Here, the treatment gets started and the patients have their line of therapy started for cure of the disease. In Oncology, particularly, its never sure that one will get cured. So in this part it is taken into account all the desired factors.

Here we get the therapy patients active for different lines of therapy for the drug. Here, we applying every factor needed to get our revenue right. For e.g., PFS/OS, Adherence rate, therapy shares, etc.

- **PFS**

This is known as the Progression-Free Survival, and is the time period until the worsening of the disease starts. This contains the pool of patients who survives until the cancer starts to spread.

- **OS**

This is known as Overall Survival, and is the time period till someone lives after the treatment starts.

- **Therapy Share**

Here comes the therapy shares and the pool gets divided into different line of therapies & further gets divided into the different brands and therapies. So here is the pool of patients and shares get divided on the root level as well.

- **Persistence**

Here is the calculation which is calculated as the no. of days on hand on drug divided by the no., of days in the specified time interval.

- **Adherence Rate**

This is calculated as the time period the patient covers on the drug divided by the time period the patient is eligible to take the drug on hand.

4.3.4. Revenue

Here, we get the desired o/p and that is the revenue generated by calculating every factor and applying every market event onto them. This is the most crucial part of the forecasting as one needs to get the best possible outcome of revenue at the final stage even in the worst-case scenario.

Many factors and market events are taken into account for revenue calculations like market event, market access, promotional coverage, discount, gross price, etc.

- **Market Access**

It is considered as the giving the patients the exact treatment one needs at the correct time and at a right price.

- **Market Event**

This means any occurrence that happens in the market that impacts the market and the market shares.

- **Gross Price**

This is the total definite cost that is acquired by an item/product.

- **Discount**

This is the amount that is been deducted from the overall price to get the desired eligible amount for the drug.

CHAPTER 5

RESULT AND DISCUSSION

In this project, there is the creation of a forecast model for the big pharmaceutical company (TAN) for their different brands on Oncology which helps them to find the overall share they are having for the brands and the net revenue of each of those brands.

This shows the impact of different aspects of market which are to be considered for an optimized result. The forecasting model helps the client to get know each of the area of the market which can have an impact of branding of the product. They get an option to review the market shares and revenue beforehand only. This helps them to capture the market more easily and efficiently have their brand acquire it.

They also have an option to neglect any of the above discussed aspect to get the revenue. It's basically a dynamic model which helps the client to have a vast area of options to consider for their brand launch in the market.

REFERENCES

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