BUSINESS MODELLING

ON

CUSTOMER DEMAND FORECASTING

IN

RESTAURANT INSUDTRY

VERSION 2.0

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Submission by:
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(TASK-3)

This file is a continuation of version one, in which the code implementation ideas, applicable patents, external searches, and other information about the project were shown.

Code Implementation on Small Scale:

Submitted in Version 1.0

CODE: [Customer Demand Forecasting Restaurant Industry]

Data: To begin the offered code, we will begin with three given datasets, which do not exactly portray the conclusion we want to obtain.
As we have taken into account everything in these datasets, as well as the human unpredictability element, weather, and so on. However, because this is the only dataset we discovered, we will work on it.

1. **Weekly Demand data (train.csv):** Contains the historical demand data for all centers, test.csv contains all the following features except the target v

Variable	Definition
id	Unique ID
week	Week No
center_id	Unique ID for fulfillment center
meal_id	Unique ID for Meal
checkout_price	Final price including discount, taxes & delivery charges
base_price	Base price of the meal
emailer_for_promotion	Emailer sent for promotion of meal
homepage_featured	Meal featured at homepage
num_orders	(Target) Orders Count

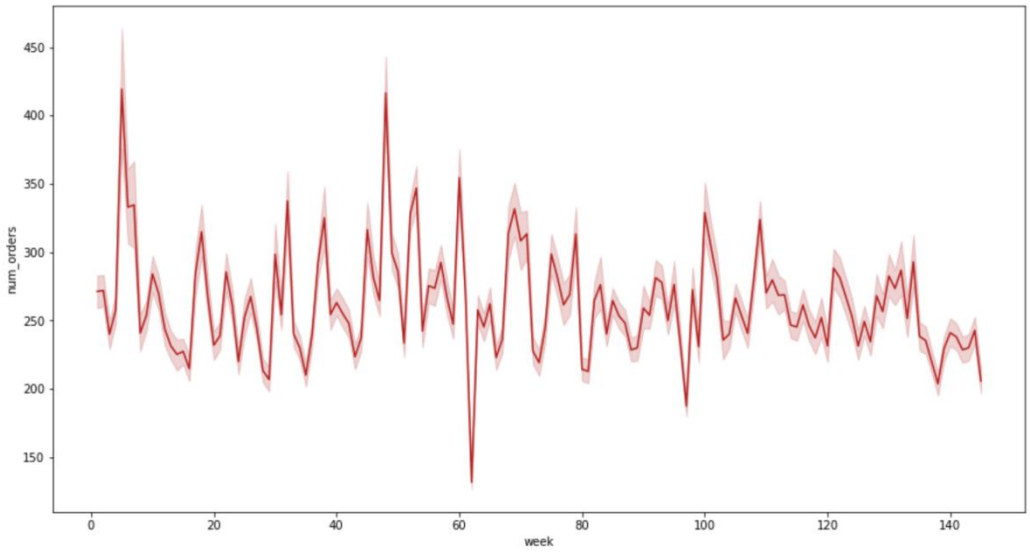
2. **fulfilment_center_info.csv:** Contains information for each fulfilment center

Variable	Definition
center_id	Unique ID for fulfillment center
city_code	Unique code for city
region_code	Unique code for region
center_type	Anonymized center type
op_area	Area of operation (in km^2)

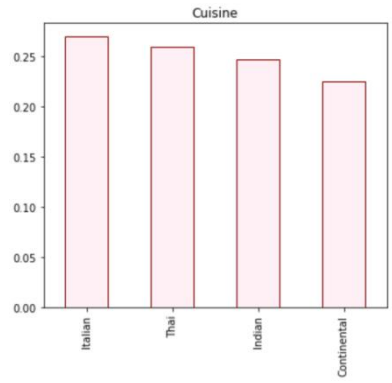
3. **meal_info.csv:** Contains information for each meal being served

Variable	Definition
meal_id	Unique ID for the meal
category	Type of meal (beverages/snacks/soups....)
cuisine	Meal cuisine (Indian/Italian/...)

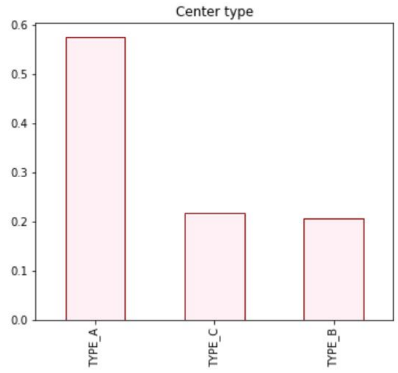
DATA UNDERSTANDING:



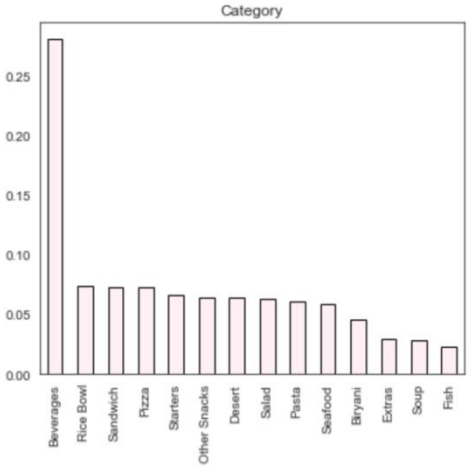
Peak sales occurred in the fifth and fifty-first weeks. The 62nd week saw a significant drop in sales.



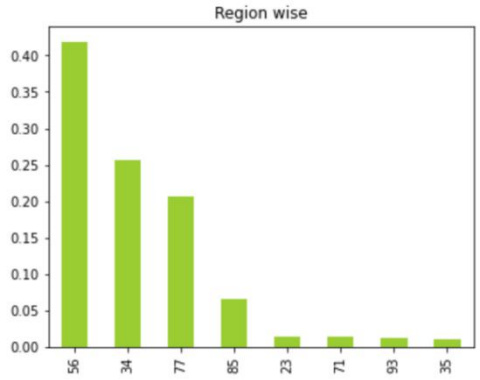
Italian cuisine outsells Indian cuisine in terms of sales.



Center type A is in high demand and sells well. Surprisingly, Center Type C outperforms Center Type B.

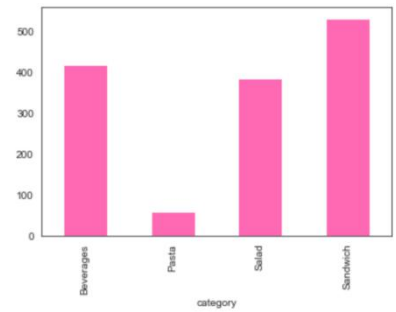


Bevareges is a popular item



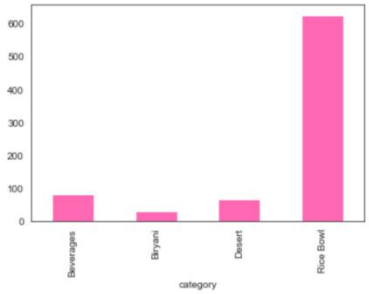
To get Italian cuisine and understand the distribution Data distribution of Italian cuisine

-Data Preprocessing
-Creation of unique_id for Center(55) and Meal_id(1033)
-Use Timeseries models (ARIMA, SARIMA, SARIMAX) to forecast
-Decompose the dataset
-Ploting ACF, PACF plots
-Use Neural Networks – LSTM
-Build LSTM model for full dataset
-Build LSTM model for single Center+meal_id combination.



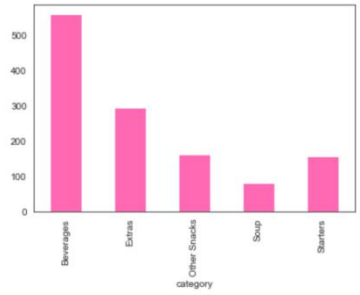
Surprisingly, Italian cusine has more sales of Sandwitch than Pasta Pasta is not demanding item. Salad has good demand.

To get Indian cuisine and understand the distribution Data distribution of Indian cuisine



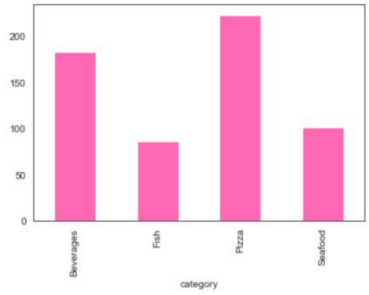
Rice Bowl is obvious option. Biryani is not preferred option from client business.

To get Thai cuisine and understand the distribution Data distribution of Thai cuisine



Beverages is preferred food in Thai cuisine. Other snacks is major contributor in overall sales.

To get Continental cuisine and understand the distribution Data distribution of Continental cuisine



Pizza is highly demanding food in Continental cuisine. Beverages and seafood also has good demand.

Business Opportunity:

Because the aforementioned technique has previously only been utilised by large firms, it may now be used to small businesses, like restaurants and takeout, as well as other prospective sectors. As a consequence, there's a significant chance that this service will be financially successful. This service is available to any small business that relies on sales to guarantee that they are always aware of what their customers want. As a result, every new small business provides a substantial commercial opportunity for the services we provide.

Revisiting Product Details:

What is the mechanism at work here? It's an interactive user system; if you click on forecast right now, it'll predict the order details in terms of day, time, weather, and so on, and display the result on screen in layman's terms so that employees can understand it on a daily basis.

What is the information's origin? They'll have to contact other restaurants that have used this system for real-time information, or they'll have to develop their own in the coming years by recording all of the data on a data sheet.

To mention a few, there are algorithms, frameworks, and software. Needed? This product makes use of machine learning techniques. The Python programming language is required for its implementation. Visualizations may be made with NumPy, pandas, matplotlib, seaborn, plotly, and other packages. The Flask framework will be used to create the integrating API. Visual Studio Code and Google Colab are the editors. Django is used for the main interactive web page.

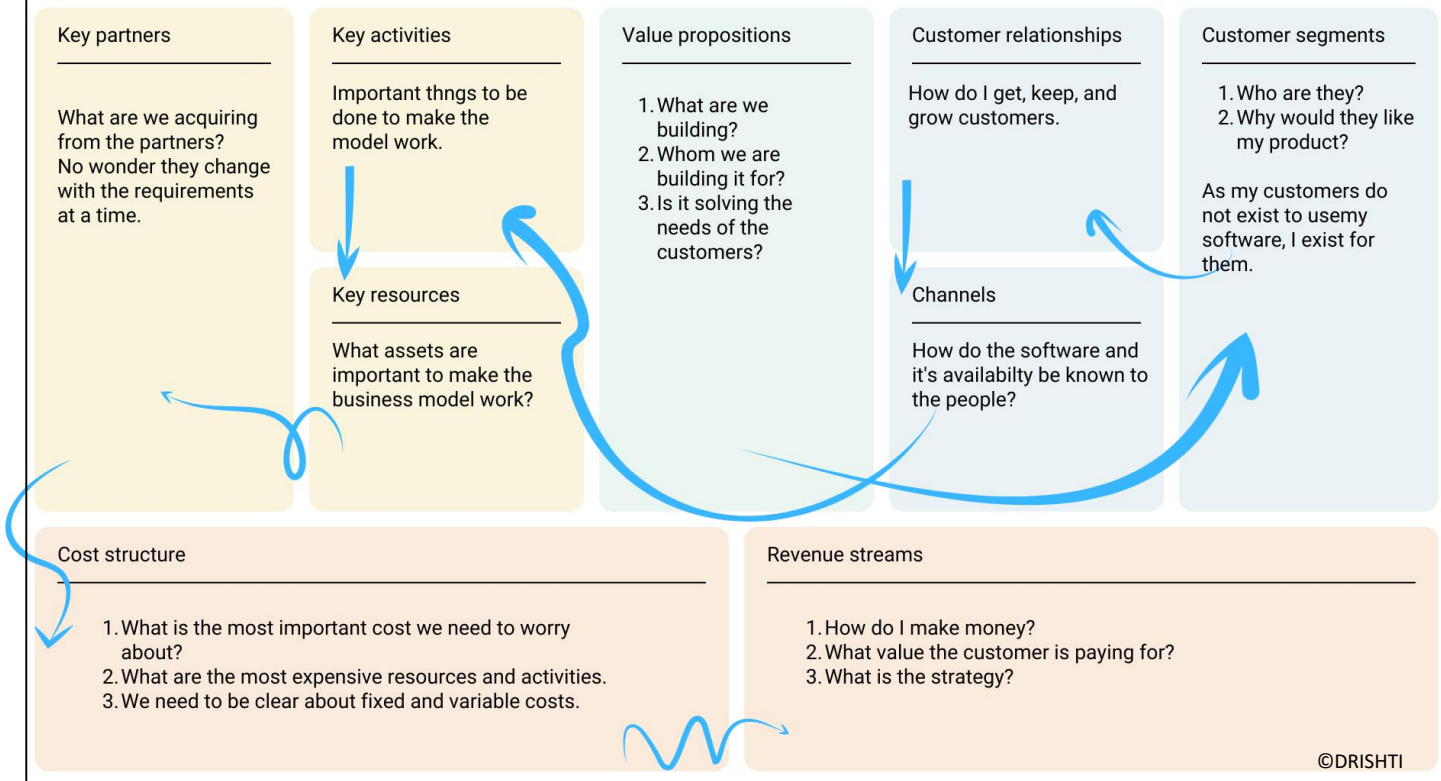
Is it necessary to have a development team? This would involve the hire of a project manager, a resource manager, a team leader, as well as team members

such as programmers, data analysts, testers, stakeholders, project sponsors, and business assistants.

How much does it cost you at least? You can calculate the total cost of labour, materials, equipment, services, software, hardware, facilities, contingency costs, and so on by organizing each step.

Business Model Canvas:

In order to create a successful business strategy, I came up with the following challenges that I need to answer.



Value propositions

- We are developing a software that can predict the items that will be required in the restaurant inventory in advance, ensuring that there will be no excess or shortage of goods that will aid in the processing of product. We will do this by creating a model and analyzing datasets, changing the model every day, every hour, and personalizing it according to the individual's needs. We analyse which orders are pleased on a specific day in a specific weather, whether there is a traffic jam on the street, whether it is a festival, how many people arrive, what are the orders, and we follow the trend and keep changing the model so that in the future we can predict orders and fill inventory accordingly. We can anticipate it, customize it, and be prepared the next time.

- We're making this for restaurant owners who frequently lose money or lose people's interest in their establishments due to a variety of factors. We'd like to assist small vendors and restaurant owners who struggle with inventory and with what needs to be prepared today in order to be appealing and cost-effective.
- If we speak about restaurant owners, sure, it will be able to meet the wants of their customers, with my customer being a restaurant owner, since it will enable them to tailor their customers' needs, allowing them to earn more and become more popular as a result of their customizing software.

Customer segments

- The people who will be using our product will mostly be small business owners or restaurant owners. It will be a smart move for them to employ and deploy the customer demand forecasting business model because they will be able to stay ahead of all the big other restaurants who have been in this market for a longer time. No doubt they will not be as experienced as the other big restaurants, but they will be able to have an exponential growth in profit in this field after deploying this software.
- The aforementioned is primarily why they would like my product because it will assist them in growing their small business venture larger than other restaurant industry elements. Big restaurant chains will not be interested in this because they already have a base and will be gearing up everything on a daily basis because they have a large base and high popularity, but new businesses must focus on a specific customer segment and the options available to them.

Customer relationships

- Getting customers is all on promoting the software's features. We need to devise a marketing strategy that will allow us to do a SWOT analysis of the programme. To keep our customers, we keep changing the model to a more cost-effective and time-effective model, so that it will be our original model but a better one every time we do an update, so that we can keep our customers by being loyal to them and they being loyal to us, and we can produce a better version of ourselves every time we compete in the market.
- To expand our client base, we may team up with the restaurants where we're installed, as well as other businesses in the same sector, to ensure that our company's name is mentioned every time the software is utilised. Every time a restaurant has a booming sale, we can show off on a website that yes, they used that's why they've grown so much, and that's how we can keep the companies in the loop.

Key activities

To ensure the success of this software, a number of critical operations must be completed. We'll be working in the production industry. With the aid of our team, we'll design a programme that can be downloaded from a website that we'll establish, or we can upload it to the device already and sell it as an individual forecasting device in which the feedback can be added and the model can crunch it to generate a better result in the end. So there are two ways this may work, and a platform will be necessary to deploy everything, a network will be required to update and reset, and problem solving will be required to construct a model in the first place, and the production is required to manage and and produce the product in a diligent and planned way.

Key resources

The usage of Key Resources is a need of any business plan. Your resources allow your business to create and offer a Value Proposition, expand into new areas, retain relationships with current clients, and earn revenue. Physical, intellectual, human, and financial resources are all resources.

- We have **tangible assets** such as manufacturing plants, buildings, trucks, machinery, point-of-sale systems, and distribution networks, and we will be connected to various restaurant markets and merchants.
- **Intellectual property**, such as trademarks, patents, and copyrights, as well as partnerships and customer databases, are becoming more vital components of a solid business strategy. Intellectual property resources are tough to generate, but once done so, they may be extremely valuable.
- We'll have a project manager, a resource manager, a team leader, and team members such as programmers, data analysts, testers, stakeholders, project sponsors, front end designers, sales people, and business assistants; every business requires **human resources**, but people are particularly prominent in certain business models.
- We will have **financial resources** such as cash, line of credit and a stock option pool to hire essential staff, among other things.

Key partners

Small restaurant enterprises, as well as other firms in the industry, will be key partners, as will neighbouring eateries where we will be using this technology in order to obtain historical data. If we are not self-sufficient, which we will discover in the later stages, we may partner with a software development company that can provide us with a few engineers on a pay-per-day basis, or we may partner with a large restaurant that can provide us with a base from which to start, or even in the physical asset, we can partner with big business companies like reliance, Tata for financial resources.

COST STRUCTURE

We'll be having approximately 8 types of employees as the company will just start. So we can estimate the starting salary (pay-per-day) of each one of them on the basis of the level of importance of their job following the **AGILE model**.

1. **Project manager: ₹ 1,500 per-day + 30%. . . . . Three months**
   This person's task is to oversee the project from the first day to the last month of production; he'll apply the model and ensure that the work is completed on time; otherwise, the software will cost extra. He'll be in charge of all product functionality and quality.

2. **Resource manager: ₹ 970 per-day + 30%. . . . . Two weeks**
   He/she will provide the researched and correct data set whenever it's needed, from any source possible; she/he'll ensure that the sources are trustworthy, and will double-check all the facts in the first two weeks of the project.

3. **Developer 01: ₹ 770 per-day + 30%. . . . . .Three months**
4. **Developer 02: ₹ 770 per-day + 30%. . . . . .Three months**
   This individual will be in charge of creating the project down to the last detail. They will work hard for the first two months and then assist the data analyst for the last month. He or she will ensure that the product is fail-safe and that it meets all of the SAAS and PAAS requirements; if hardware is available, he will ensure that the product is compatible with the software.

5. **Data Analyst: ₹ 1,150 per-day + 30% . . . . . .Three months**
   This person will be in charge of ensuring that the model created is forecasting accurately, with the help of junior software developers. . Because our software is solely based on forecasting, he or she will be given three months to process all of the needs, wants, and characteristics, create a prototype, and then implement it on real data once the developers have completed their part..

6. **Testers: ₹ 970 per-day + 30%. . . . . Two weeks**
7. **Full stack developer: ₹ 770 per-day + 30%. . . . . .Two months**
8. **Sales person: ₹ 570 per-day + 30%. . . . . Four weeks**
   This person will ensure that our product is sold with a healthy profit margin, as well as that the hardware we purchase and the people we hire are lucrative.
9. **Business analyst: ₹ 570 per-day + 30%. . . . . Two weeks**

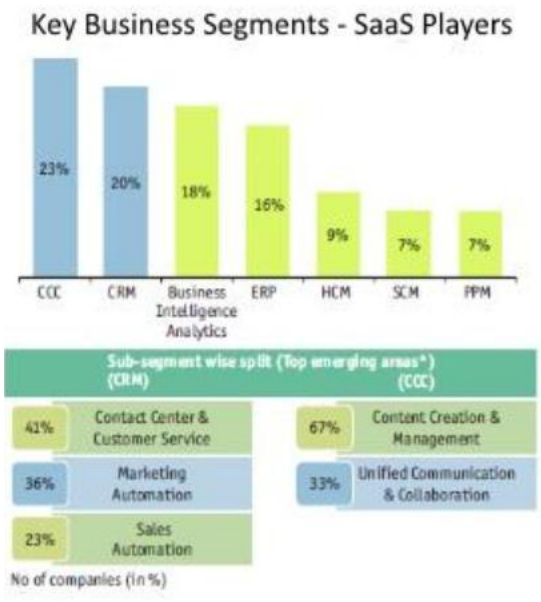
We added 30% extra to manage the total profit after the completion of the project or during it.
Well we try to sell the software in the market we go through a common practice called as negotiation and so in the total cost we will be adding more 20%.
So the total cost approximately will be, if we assume that the project will run for **three** months? **₹ 6,33,000/- (only software production)- Fixed cost**
The locality for three months may cost around ₹ 3000/-.
Hardware resource cost included as ₹ 2,10,000/-

Revenue streams
One hardware piece may cost ₹ 8000/- (touchscreen black screen).
If we assume that we are going to have opening 100 customer around in a locality then we can assume that per customer has to pay approximately **₹15,000/-** including 30% profit margin.
NB: This all directly or indirectly depends upon how many opening customer we will have or attract in small duration of time to ensure success.

Market Trend:

Customer demand forecasting in restaurant industry is a perfect example of supply chain (SaaS) and production industry.

India is a desirable location for manufacturing investments from throughout the world. Several mobile phone, luxury, and automobile brands, among others, have established or are considering doing so in the country. India's manufacturing sector has the potential to exceed $1 trillion in revenue by 2025. With a GDP of US$ 2.5 trillion and a population of 1.32 billion people, the adoption of the Goods and Services Tax (GST) will turn India into a common market, attracting investors. According to the Indian Cellular and Electronics Association (ICEA), legislative interventions might help India increase its total laptop and tablet production capacity to US$ 100 billion by 2025. The government is focusing on establishing industrial corridors and smart cities in order to secure the country's overall growth. The corridors will also help in integrating, monitoring, and building a favourable environment for industrial development, as well as promoting advanced



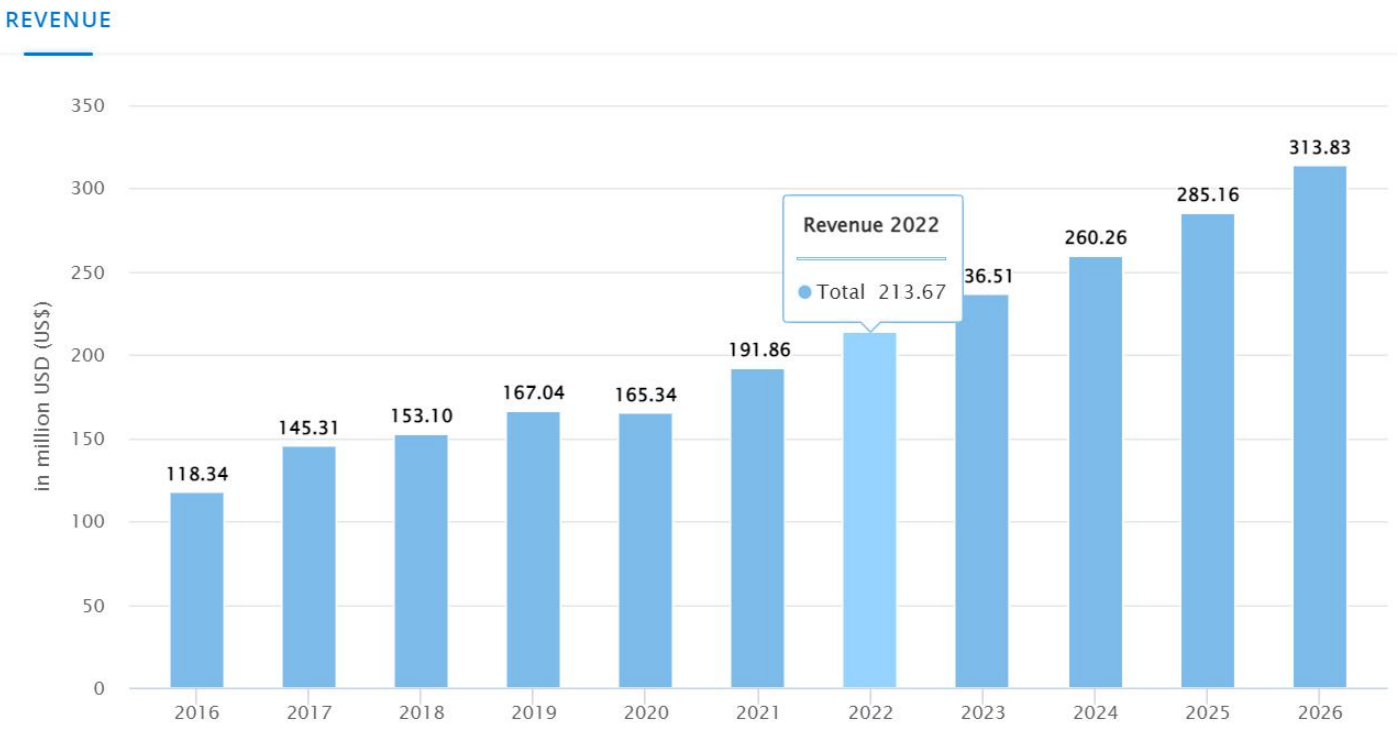
manufacturing methods. We call it a service production industry because we'll be producing software on a large scale and distributing it, whether in the form of this software, cumulative software, or hardware. The growth in this sector is enormous as more and more requirements are placed on the table every day to make things easier and accessible for those who can't do it for themselves.

The Supply Chain Management Software segment is expected to generate US$213.67 million in revenue by 2022.

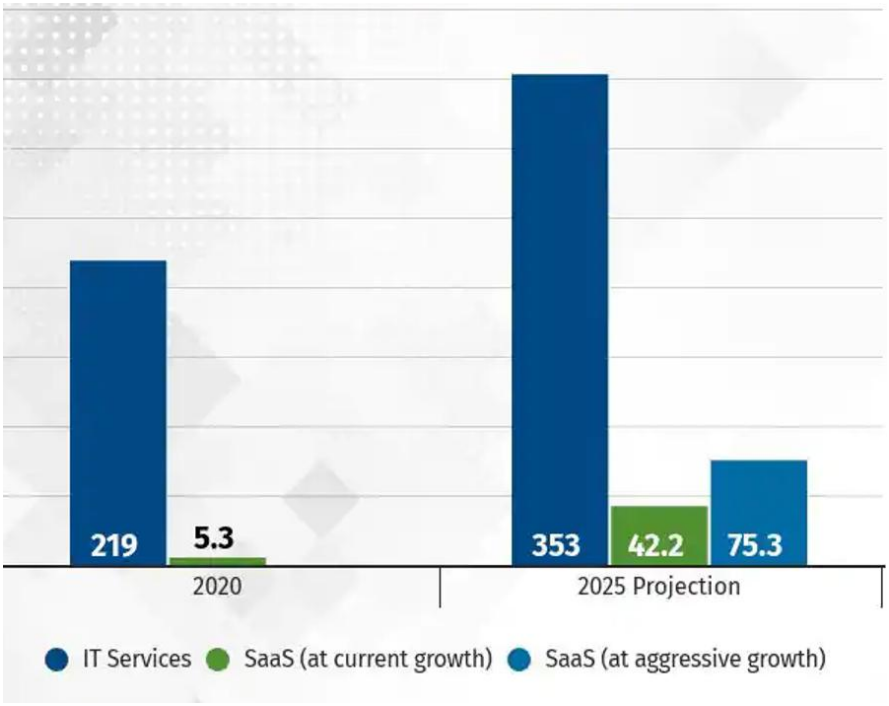
Revenue is predicted to rise at a 10.09 percent annual rate (CAGR 2022-2026), resulting in a market volume of US$313.83 million by 2026.

In 2022, the average Spend per Employee for Supply Chain Management Software is expected to be US$0.42.

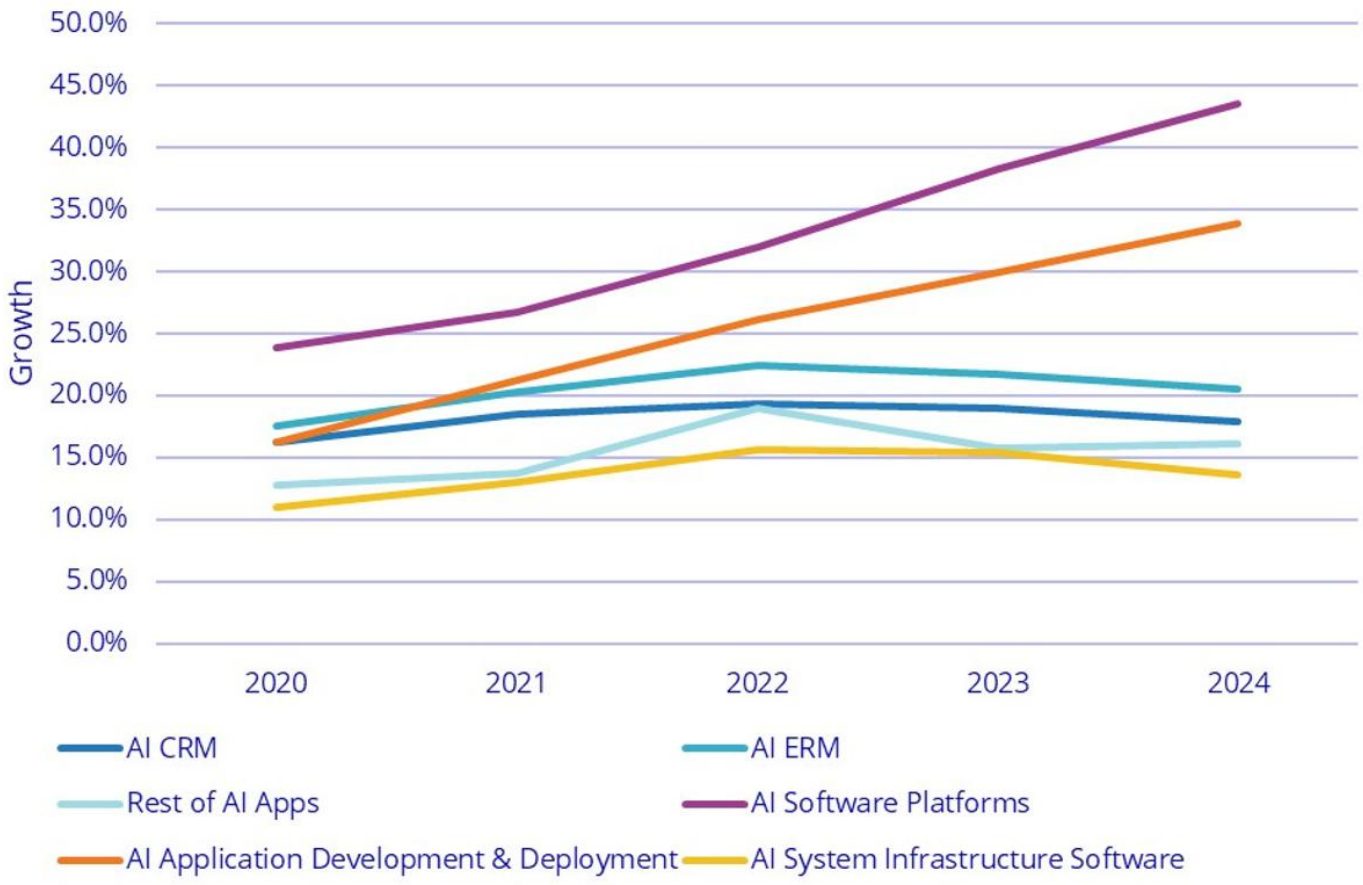
In terms of global revenue, the United States will generate the most ($9,293 million in 2022).



I explained that this is in the supply chain business because big data will be used to create and deliver products, and the more successful it is, the more the chain's production line will expand. Global IT investment on corporate software is estimated to reach $672 billion in 2022, up 11% from the previous year. The enterprise software market, like nearly other sub-segments of the IT services industry, has seen rapid expansion in recent years, with market sales more than doubling between 2010 and 2020. The global pandemic of COVID-19 had little effect on software sector growth, as had been predicted. Please see our dedicated Facts and Figures page for more information on the COVID-19 pandemic.



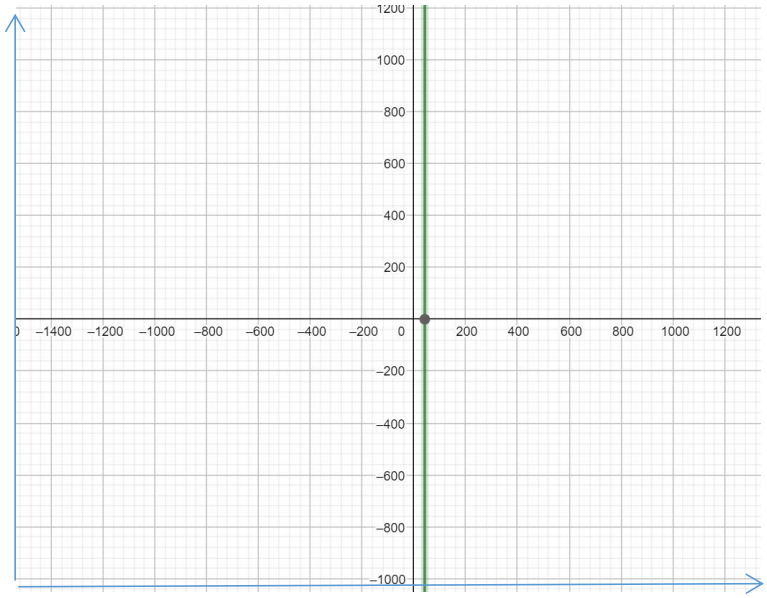
Software for businesses The enterprise software market is the fastest growing section in the overall IT industry, with annual growth rates sometimes exceeding 10%. Enterprise software attempts to meet the demands of businesses, with a focus on improving the efficiency of their essential business activities. Many enterprise software sub-segments have evolved into enormous markets in their own right, such as business process management (BPM) software, enterprise resource planning (ERP) software, and customer relationship management (CRM) software. CRM software analyses and improves corporate interactions with current and potential customers, and sales are predicted to reach over 47 billion dollars in 2022. ERP software is expected to generate an additional 95 billion dollars in revenue by focusing more closely on corporate data collection and analysis.



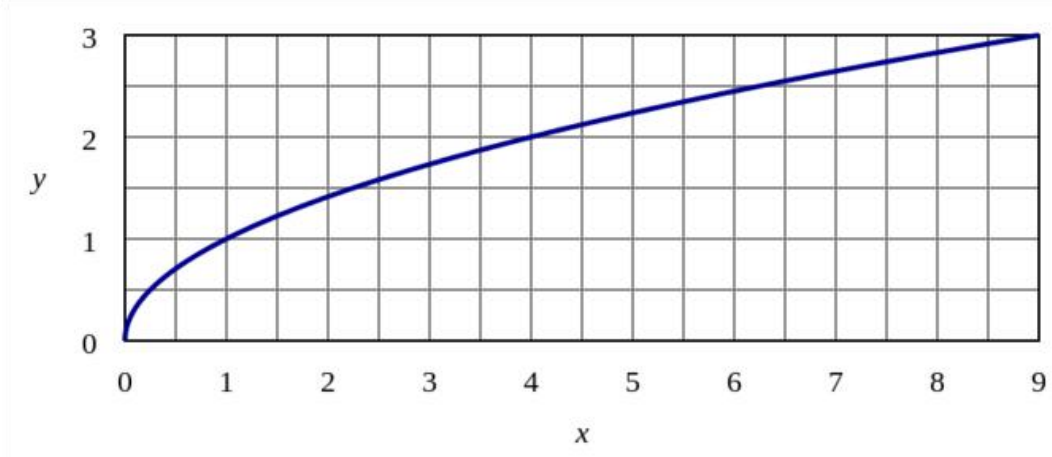
Financial Equation:

Price of my product being: Rs 15,000/-
Total sale as a function of time: x(t) to be plotted.
Total production and maintenance cost: Rs 6,33,000/-

Y = mx(t)-c
Graph: y - axis and x- axis



And if the possibility of acquiring a customer in a three-month period is 100, the total sale might be Rs 15,00,000/-.
Showing off gradual logarithmic market growth.



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