



DEMAND FORECASTING FOR PERISHABLE SHORT SHELF-LIFE HOMEMADE FOOD AT iD FRESH FOOD

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“We are only professional assistants to the homemaker. Our products will always be ready to cook, not ready to eat. So, they don’t reach the dining table; they first go into the kitchen. If the Idli is good, the homemaker get the credit; if the Idli turns out bad, iD takes credit”

- PC Mustafa, CEO, iD Fresh Foods

Sujeeth Ravindran had recently taken over as the Head of Information Technology at iD Fresh Food, after helping to expand the company’s business in Mumbai and Pune. As a childhood friend of PC Mustafa, founder and CEO of iD fresh foods, Sujeeth went on to sell software after graduation for several years before joining iD to help expand the company’s operations in Mumbai and Pune. Three months prior to our meeting in 2015, he had taken up the responsibility of establishing strong IT systems and processes at iD. Predicting demand for products was one of the challenges faced by iD Fresh, since the products sold by them had short shelf life of about 7 days.

Sujeeth started the meeting with the following statement:

Right now, what we do within iD is to run the entire production to distribution ourselves. We pretty much run the entire operations ourselves. Our production-to-distribution to store fronts time window is about 24 hours. We are trying to see how we could get into a more predictive organization. Unlike the challenges that other FMCG players may have, we believe we have lot more data points using which we can make our organization lot more predictive and responsive than what we are currently doing. Which is why, this exercise has become lot more interesting and focused for us now.¹

Fast moving consumer goods (FMCG) are products that are sold quickly in large number and at relatively low cost. They have a short shelf life, either because of high consumer demand or because the product deteriorates rapidly. FMCG is a classic case of low margin and high-volume business that can result in high cumulative profit. From a consumer perspective, the main characteristics of FMCG include frequent purchase, low involvement (i.e., little or no effort by customer to choose the item), relatively low price, short shelf life, and rapid consumption². Sujeeth said:

This project has become strategically important to us and we are very focused on the outcome. The basic question to be resolved is to ensure an optimum production quantity such that we can serve our retail stores daily and increase our SKU velocity. This way, we would be in a situation where sales force would be guided on how much to place on the store shelves daily, ensure daily store visits and reduce stock-outs.

¹ Interview with Sujeeth Ravindran, Head of Information Technology, iD Fresh Food.

² https://en.wikipedia.org/wiki/Fast-moving_consumer_goods

iD FRESH FOOD – ORIGINS

iD Fresh Food, a private limited company, was founded in 2005 by PC Mustafa and his four cousins – Abdul Nazer, Shamsudeen TK, Jafar TK, and Noushad TA. Mustafa, a school dropout to an Indian Institute of Management, Bangalore graduate adopted Nazer's idea for homemade batter to start his entrepreneurial journey which was in 2017, a Rs.100 crore (approximately 15 million USD in 2017) turnover ready-to-cook packaged food company. The company, which made 10 packets of one kilogram batter a day in 2005, manufactured 50,000 packets a day in 2017 and developed into a team of 1,300 employees who worked at their units in Bengaluru, Chennai, Pune, Mumbai, Delhi, Hyderabad, and Dubai. In 2013, they started operations in Dubai. In 2014, the company raised Rs.35 crores in the first round of funding from Helion Venture Partners. The funds were used to add more products and scale-up the business³.

iD Fresh products were 100% natural without any preservatives or additives. Their products were available in air-tight packets with a shelf life of about 7 days. Besides Idly-Dosa batter, their ready to heat and serve Parotas were also quite popular in the market. They introduced natural curd and paneer too⁴. The company in 2017 handled about 15 stock-keeping units (SKUs) in their operating markets. However, there were about 6 or 7 main SKUs and belonged to four broad categories; Batter, Parotas, Chapatis and a B2B packaging of the three. Fifty per cent of iD's business was derived from Idly-Dosa batter, 35 per cent from Parotas, and the rest from Chapatis, curd and paneer. iD Fresh products were sold in 16,000 stores across seven cities. Their main unit in Bengaluru operated in a 15,000 square feet space. The company was also coming up with a world class manufacturing plant on a sprawling 75,000 square feet space near Hoskote in a year's time⁵. iD planned to enter other overseas markets such as the United States, Singapore, Malaysia, and the United Kingdom. Mustafa explained in a media interview:

We have transitioned from a family-run business to a professionally-run organization. iD Fresh Food runs on IT; the operations are totally automated and is technologically-driven.⁶

FMCG INDUSTRY OUTLOOK IN INDIA

India's FMCG industry was expected to grow by 12%, reaching sales figures of US \$49 billion.⁷ The FMCG sector had grown at an annual average of about 11% over the last decade. According to India Brand Equity Foundation (IBEF), the overall FMCG market was expected to increase at cumulative annual growth rate (CAGR) of 14.7% to touch US\$ 110.4 billion during 2012-2020. The rural FMCG market was anticipated to increase at a CAGR of 17.7% to reach US\$ 100 billion during 2012-2025⁸.

³ Source: Usha Prasad, "He got batter and batter daily and today helms a Rs 100 crore turnover company", *The Weekend Leader*, 12 November 2016, available at <http://www.theweekendleader.com/Success/2555/getting-batter-daily.html>

⁴ Ibid

⁵ Source: <http://www.idfreshfood.com/media/>

⁶ Source: <http://www.theweekendleader.com/Success/2555/getting-batter-daily.html>

⁷ Source: <https://www.ibef.org/industry/fmcc-presentation>

⁸ Source: <https://www.ibef.org/industry/consumer-durables-presentation>

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Food products formed the leading segment, accounting for 43% of the overall market. Personal care (22%) and fabric care (12%) were next in terms of market share.

Growing consumer awareness, market penetration, and changing lifestyles have been the primary growth drivers for the consumer market in India. The Government of India's new policies such as approval of 51% foreign direct investment (FDI) in multi-brand and 100% in single-brand retail were some of the major growth drivers for the consumer market in India⁹.

MANUFACTURING PROCESS AT iD FRESH FOOD

iD Fresh Food did not use preservatives or chemicals. For all their products, the company sourced very high quality raw materials. Considering a product such as Idli-Dosa batter, the batter was freshly ground and packed every single day. Only the finest quality rice, urad dal, and fenugreek seeds with RO-purified water were used. For the batter, a small pinch of low sodium salt was added. The company left the final desired taste in the hands of the home maker. From the time the batter was manufactured, there was 12 to 16 hours cold fermentation period. Manufacturing process was started the previous day followed by grinding and mixing; the batter was kept in a cold room for 12 to 16 hours and from the time it could be used, it was distributed to retail stores (or in most instances to in-store refrigeration units). Batter was made, seal packed, and loaded into chiller vans by as early as 5:00am. The operations were totally automated and technologically driven. iD also invested heavily in packaging of their products. In 2017, iD Fresh Food considered patenting the unique packaging for its “crispy vada” which would bear a unique spout to squeeze out the vada batter in a perfect round shape.

DISTRIBUTION MODEL

In 2017, iD had production facilities in 6 cities including Dubai. Pune was serviced from Mumbai. The company operated 200+ vehicles across its operations. In each of its operating markets such as Mumbai, Bangalore etc., the market was further divided into areas and each area was further divided into a *FMCG beat or route*. There were 70 such beats in Bangalore and about 200+ across its operations. Each beat was serviced by one salesman and a driver in most cases. So, a combination of a vehicle, a salesman, and a driver constituted a team. Every day, the salesman visited every single store in his beat.

This has been the company's operating model since its inception. This model suited their humble beginnings and culture. While other typical FMCG distributors may have a weekly beat model; iD operated a daily beat culture. Sujeeth said:

Since we are a very niche product, not every one of the typical FMCG distributor was a potential distributor for us. The only players who could play ball was either a milk distributor, a bread distributor or a dairy distributor like Nestle or Britannia. Our competing products have a once-in-three or once-in-four days beat culture but we wanted

⁹ Source: <https://www.ibef.org/industry/consumer-durables-presentation>

to have a daily beat culture. Our entire production and P&L (profit and loss) processes get written on this model.

An iD vehicle distributed only iD products. This means, as the business developed, the company kept adding vehicles to its fleet rather than make vehicles cover multiple beats. As each vehicle supplied a mix of iD products (i.e., chilled and ambient products), the chilled products were kept in a cooling box while ambient products were kept in ambient temperature.

Sujeeth added further:

Our basic business model is such that every salesman should visit every single retailer in his beat. We do come across situations where some salesmen may slip away after servicing three-fourths of the route or they may run out of stock for the last few retailers in their beat. These are operational challenges and we want to eliminate them. Third-party distributors will typically play it safe; only supply the products to select stores and therefore reach becomes a big challenge for us. So we decided not to use third-party distributors for our products.

SALES MODEL

iD's primary sales model was centered on the vehicle visiting a retailer every day. The salesman would fill an optimum number of products of each type on the shelf or fridge. For a new retailer, they typically started with 3 or 5 pieces of an iD product on the shelf/fridge. On the second day of the visit, if 2 were sold off, shelf levels were replenished to 5 and if this was continuous, the salesman was motivated to keep additional pieces. In 2017, average supply volume to a store ranged from 3 to 20 pieces. About 90% of the stores took 3 to 20 pieces of a SKU. Any store taking in less than 3 was considered as difficult to service. In 2017, some retailers had 50 or even 100+ SKUs on a given day. This situation also means that much decision making on what should be on the shelf rested with the store keeper and the salesman. So, at the moment of sale, only these two (store keeper and salesman) were involved in influencing how much should be kept on the shelf.

Sujeeth said:

We have a van-sales model. Our pitch to the retailers is that; you don't have to call for an iD vehicle. We will keep an optimum number of units on the shelf. On the second day, if a few have been sold, we replenish to bring back the level. While some of our sales force is exceptionally good, many of our salesmen either come back with a under supply or over-supply situation. This is the reason why we want to eliminate the non-rational method and increase our SKU store velocity in a more predictable and optimal manner.

In essence, iD was a mass producer of fresh foods and its customers were the retailers and grocery stores, both big and small. iD did not sell its products directly to the end customers. Some of the stores may be

part of a chain or a larger super store. Demand at these stores did not follow a steady pattern and were subject to fluctuations. There would be fluctuations across SKUs. Typical reasons for demand fluctuations may be weather conditions, festivals, days of the week, and holidays. There were also interaction (substitution) effects between some of the SKUs (such as Batter vs. Parottas or Chapatis).

PROBLEM ON HAND

The main problem that iD would ideally like to solve: How much quantity of each SKUs was to be loaded onto a vehicle for each store each day? A day before the salesman walked into a store, he was given an indication of how much stock should be taken the next day. This in turn would help understand how the requirement for a month and consequently assist in production planning.

This sales and distribution model meant that the company would be walking on a tight rope every day. If more units than the store's selling capability were kept on the shelf; then, those items may return after attaining their shelf life. If understocked, then potential sale would be lost, leading to customer dissatisfaction. For some SKUs such as batter, the company faced a different set of challenges. In some markets, the product category did not exist. In markets such as Pune and Mumbai, there were stores which prepared the batter and sold them in-store (private label or house brand). A consequence of this was that iD's batter may not attract attention and visibility from such retailers as it could be competing against the retailer's own product. In a market such as Mumbai, customers liked street-food and preferred to buy batter prepared right in front of their eyes than picking up something from the shelf.

Unlike other FMCG players who adopted a "push" model backed by aggressive marketing programs to generate the "pull", iD was constrained by not following such a model. For iD, the "push" model would increase the "returns" rate. It would result in higher returns which would lower the morale of the sales team and the enthusiasm of the store keepers to offer space for iD products. *Returns were picked up every day.* iD would have to replace a fresh unit of SKU for every return. Further, stock-out information was not captured and only inferred. If a store was consistently selling whatever quantity was kept on the shelf and never returning, then it was an indication that there was a stock-out in that store. Similarly, key information about returns was not captured, that is, information such as returns owing to damage and expiry. While the sales force was equipped with instruments, the returns were not actually captured accurately. One could assume that about 90% of the items that returned on a given day could be considered as expired on that day although it could not be generalized across iD's operations.

The company realized that the existing practice was highly non-rational. The success of the current model has been largely dependent on the salesman's gut. Their average salesman returned to iD Fresh with either excess items left in the van or failed to service the last 10% or 15% of the stores in that beat. Retailers were not incentivized for managing returns but their salesmen were incentivized for managing returns. Sujeeth observed:

Our criteria for success would be to increase the frequency of supply, eliminate stock-out situations and reduce our returns percentages without choking the supply. An easy way

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to reduce returns is to choke the supply. During that time, we learnt that the SKU sales does not grow. We want to continue growing the SKU sales but without suffering an excess return. In markets such as Pune, for every 100 units, our returns are as high as 30%.

So, a more predictable and scientific way of forecasting demand for its SKUs at the level of granularity that would help minimize returns and yet keep the frequency of supply increasing is what the company was looking for.

As we concluded our interview, Sujeeth's final comments were as follows:

The goal of our analytical model is to create a segmentation of one. I would like the proposed analytical model to go down to the store level and say that for a given day, in a given store, X number of items should be placed on the shelf based on the history. Right now, it would be the salesman who would be able to act on this information while I realize that it would help us from a larger monthly production planning process.

IT applications at iD have been modernized in the last few years. Their applications and databases captured data about daily sales and returns to a good degree of accuracy. However, not all regions and their operating markets were in a consistent state of maturity. Even within a mature city such as Mumbai, the daily sales data had quality issues in the initial days when a new outlet was set up. There were also instances when the sales quantity values would not be captured. Daily returns were not captured accurately. They were partially constrained by operational reasons as the salesman would not capture the daily sales and returns at the point of sale in each outlet owing to parking limitations near some outlets and the need to complete a visit to an outlet as quickly as possible. Instead, the data may be captured subsequently and an average salesman may not necessarily attribute the correct sale to the right outlet.

Data dictionary for daily sales and returns is provided in **Exhibit 1**. The sample dataset represents a sample of all daily sales and returns during July to November 2015 for the Mumbai market. **Exhibit 2** provides a graphical representation of major SKUs. Packet information of various SKUs is provided in **Exhibit 3**. **Exhibit 4** provides a view of beats and **Exhibit 5** shows graphical representation of a beat. **Exhibit 6** provides information about vehicles.

Exhibit 1

Data Dictionary for Daily Sales

Variable Name	Description
Store Seq. No.	<No description...transaction identifier>
Date	Date of sale in date format
Invoice Id	Invoice identifier
Invoice	Invoice Number
PO	<No description>
GRN	<No description>
Quantity	Quantity sold (in units)
Gross Amount	Total gross amount
Total VAT	VAT amount
Net VAT	Net of VAT (Gross Amount – Total VAT)
Time	Date-Time of sale in date time format
Discount Category	Type of discount applied
Zone Id	Zone identifier
Zone	Zone Name (e.g., Mumbai)
Warehouse Id	Warehouse identifier
Warehouse	Warehouse name (production warehouse)
Area Id	Area identifier
Area	Name of the area within the market (e.g., MUM-West)
Outlet	Outlet identifier
Outlet Id	Name of the outlet / store
Outlet Address	Address of the outlet / store
User Id	User identifier
User	Name of the user booking the sale (salesman)
Beat Id	Beat identifier
Beat	Name of the beat (e.g., Juhu, Vashi, etc.)
Mode	Payment mode (e.g., cash)
SKU Id	SKU identifier
SKU	SKU name / Product Name (e.g., Chapati, Wheat Parota)
Approval Status	<No description>
Outlet Lat	Latitude of the outlet
Outlet Long	Longitude of the outlet
Visit Lat	Latitude of the iD vehicle parked near the outlet
Visit Long	Longitude of the iD vehicle parked near the outlet
Variance in Meters	Distance between actual outlet and parked iD vehicle

Source: iD Fresh Foods (the data is supplied in a spreadsheet)

Exhibit 1 (Continued)

Variable Name	Description
SRid	<No description...transaction identifier)
Date	Date of return
Quantity	Quantity returned
Amount	Amount equivalent for returns
Time	Date-Time of Returns in date time format
Zone	Zone name (i.e., Market)
Warehouse	Warehouse name
Area	Area name (e.g., MUM-West)
Outlet	Outlet / Store name
Outlet Id	Outlet identifier
User	User booking the return (salesman)
Reason	Reason description for return (e.g., Damaged)
SKU Id	SKU identifier
SKU	SKU name (e.g., Chapati)
Beat Id	Beat identifier
Beat	Beat name (e.g., Juhu)
Status	Status of the return (e.g., Returned)
Outlet Latitude	Latitude of the outlet
Outlet Longitude	Longitude of the outlet
Visit Latitude	Latitude of the parked vehicle near the outlet
Visit Longitude	Longitude of the vehicle parked near the outlet
Variance in Meters	Distance between actual outlet and parked vehicle

Source: iD Fresh Foods, provided in a separate spreadsheet

Exhibit 2

Major iD SKUs



Source: iD Fresh Foods website

Exhibit 3

Major SKUs, Description, Shelf Life, Weight, and Dimensions of a packet

SKU	Shelf Life (in Days)	Price of each packet (in Rs.)	Weight of each packet (in grams)	Length (in cm)	Width (in cm)	Height (in cm)
ID-1kg	7	70	1000	20	28	5
KP	4	70	350	25	24	2
WP	7	70	350	25	24	2
ID-2kg	7	130	2000	27	25	3
B2B-ID	7					
B2B-KP	4					
Chapati	7	60	200	27	20	2
B2B-WP	7					
Meals Parota	4	30	150	22	18	2
Mini Parota B2B	4					
Jr-WP	7	30	150	22	18	2

Source: iD Fresh Foods

Exhibit 4

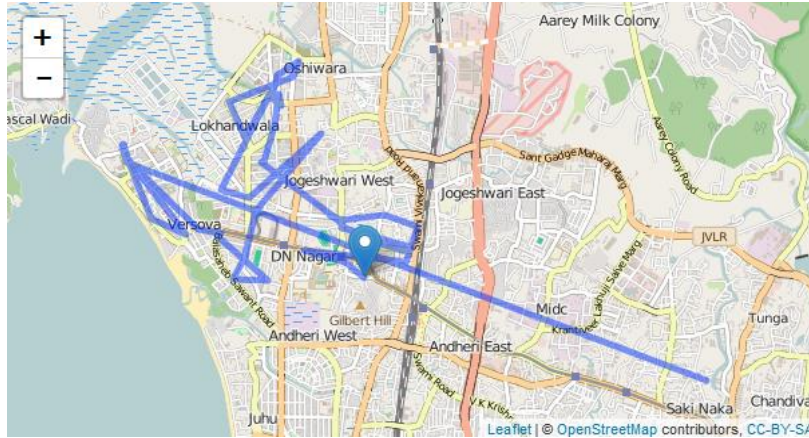
Sample iD's Beats in Mumbai and Graphical View of a Beat (Beat 74: Juhu)

Beat Id	Beat
73	Bandra
74	Juhu
76	Marol
77	Borivili
98	Matunga
101	Bhandup
123	Mulund
228	Worli

Source: Daily Sales dataset; unique beat identifiers and names

Exhibit 5

Graphical/Map representation of a typical beat



Source: Synthesized using Latitude and Longitude variables for the set of stores in a given beat and using mapping software

Exhibit 6

iD Vehicle details

Gross Weight = 1550 kg
Kerb Weight = 945 kg
Payload Capacity = 600 kg
Dimension = 2140 * 1430 * 1650 (units = centimeters)

Source: iD Fresh Foods