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# Subscription business model

## Background

The world of internet is progressing towards making individuals’ life easier to live. It does it by means of various appliances, gadgets and online services by which an individual can either take his products to the world or get benefitted by the ones provided online by others. In the shopping world too, the benefits are realized by society, where not only customers are happy buying their needs online at competitive prices but merchants also are able to reach to very large volume of customers and hence able to register large profits through big volume turnover.

The current thesis is scoped around online purchase/shopping aspect of internet world. Online trading is typically categorized into two types, B2C business and B2B business.

Consumer needs of are fulfilled through B2C (business to consumer) business. Few examples of B2C business can be online shopping portals such as alibaba.com, amazon.com etc. where consumers can buy electronic gadgets, fashion apparels, footwear, even packaged food and grocery items., portals that sell medicines to customers (subject to fulfilment of doctor’s prescriptions) and deliver them to consumer’s doorsteps (farmacyonline.com,zigy.com etc.) .

Examples of B2B(business to business) business are any kind of industrial supply sites which sell the tools/spare parts required by different industries for their products/services.

This thesis analyses the benefits of applying subscription approach to different trading experiences and try to prove that the subscription model is not only adding great value to customer but also greatly enhances the gains by a merchant.

Though current thesis assumes online retail trading (B2C) business as a carrier to illustrate the business model approach, the model itself is not limited to retail or B2B or B2C business but can be applied to any online trading business where there is some periodicity in the buying pattern.

## The “Convenience” effect

Retail Shopping portals provide customers an ability to choose their products from among 100s of options available and buy them online with hassle free home deliveries as well as ability to return some goods if not found suitable to one’s choice. Retail giants are offering lucrative discounts and cash back options in order to be ahead of their competitors. Merchants can do that because they have reached to the remotest customer in the region who carries a smartphone, which makes them deal with huge volume of goods. So gaining even a smallest profit per unit of sale enables them to earn huge profit figures. Sharing some portion of their gains with customers helps increasing the customer base as well as customer affinity further and this cycle continues.

All the transactions are paid through some e-payment (credit card, e-wallet, net banking etc.) which is much cleaner option than conventional “by cash” approach as customers can track their expenses through single statement. Retailer too can easily track their transactions associated with each purchase made thereby managing their book keeping simpler and easier to maintain.

Along with these “e” initiatives there are parallel initiatives such as “curbside” are also picking up well. A person can place an order to the third party agency through their mobile app/website, mentioning the name of the retail outlet/mall(s) of choice and, can receive his/her package on the way home by roadside “curbside” outlet. He saves significant time in finding closer parking for his car, spending few hours together in the mall as well as in the billing line every day/week/month and still have control on what is he buying and from where he wishes to buy.

The most important benefit of both these initiatives is, “lot of valuable time” that a person can save which he can spend on “better things”.

Growth of such initiatives clearly indicates that customer’s convenience is playing major role in growth of e initiative as well as hybrid initiative. The notion of “Time is money” for a customer is really playing very well for the merchants. Any innovations which will add value to the customer convenience are going to be the key to the profound success in retail business.

## Can I get more?

Customers are getting added value by receiving their needs at their doorsteps at discounted prices. Merchants are getting benefitted as they are able to reach out to vast volume of customer base thereby scaling their business exponentially.

It is giving rise to tougher competitions. Though competitions are posing bigger challenges in front of merchants, they are benefitting the customers as they are getting more options to choose from. They can carefully compare the prices being offered and choosing their supplier based on the lowest price offers.

Merchants are making all efforts, to get their existing customers remain associated with them for any of their shopping needs. But due to price wars and competitive quality of service customers may not be in a position to appreciate the affinity with a single merchant.

So are there any concrete solutions to the following challenges?

1. Are merchants successful in their mission to retain + enhance their customer base?
2. Even if they have growing customer base, is it yielding into sustainable profits? OR are they burning their fingers by indulging into price war with their competitors?
3. Is customer willing to remain associated with same merchant? On what basis the preferred merchant is decided by customers?
4. What will attract/motivate customers to remain associated with same merchant, thereby ensuring best benefits for themselves as well as ensure predictable growth for the merchants?

In order get answers to these question we need to probe into the expectations of the stakeholders.

## Shopping and selling patterns

Let’s start this discussion by analysing the selling patterns that merchants can opt in case of online shopping/trading.

Shopping portals are primarily of two kinds: the ones which are launched by merchants themselves and responsible for attracting and retaining customer base in order to remain in the market. In this case the extent to which benefits can be provided are based on how that merchant is financially doing and what is his appetite to face the brutal price competition.

The second category of portals is the ones which are launched by some third party IT organization and providing online platform for merchants across the globe to promote the sale of their goods using it. In this case the benefits to customers are provided by the merchants who are hosting their products on the online platform and the owner of hosting platform earn their money by charging some commission from merchants for enabling their business on the hosted platform.

The self-hosted portals, incur considerable additional expenses as they have to manage the IT services behind the online portal, in addition to their actual business. But they have a better opportunity to create their brand proposition, as they are known by their portal name. Also they are free to apply/change their shopping/pricing/discounting rules.

Third party portals on the other hand enable even smaller merchants to take their products to the masses and thus help upcoming businesses/product/services to grow faster using their infrastructure. They, on the other hand are restricted on the pricing/discounting rules. Also their own brand name may get shadowed by the brand name of the third party portal on which they are running the business. They can run only those shopping schemes which are provided by hosting platform.

We will see later how these selling patterns impact business growth for merchants.

Now let’s look at shopping patterns exercised by customers.

Few products are required by the customers on need basis and they will buy these products only when need arises. Example: Customer buying a new headphone, mobile or furniture from online site.

Few products are required by customers on periodic basis but their periodicity may or may not be defined. Example: few customers buy new cloths/fashion apparels every quarter, whereas few of them buy cloths when they need them or when they get bored of wearing the existing ones. Here the shopping frequency may be more than buying electronic items/ furniture but may or may not be fixed.

Range of few products is repeatedly required by most customers and their usage frequency is predictable. Example: toothpaste is required every month (numbers depending on family size),milk is required daily, washing and body soaps are required in some quantity every month, medicines are required at a prescribed time periods.

Depending upon shopping and selling patterns customers and merchants will have different set of expectations associated with them.

## Shopping Pattern based expectations

Let’s term the need based shopping pattern as “Instantaneous buying” whereas for repetitive buying needs I would term the pattern as “Periodic buying”.

In case of instantaneous buying, customer gets associated with a (online) merchant only at the instance of buying, compare price of a desired product against those offered by competitors and finally buy it form one of the merchants. Materialization of a customer to a merchant is the result of

* merchant’s continuous efforts of attracting customers by offering competitive prices,
* lot of advertisements/promotional campaigns/collaboration with payment instruments( credit card providers, PayPal, apple pay etc.) to provide attractive payment options and
* Assured quality of product/service
* customers’ earlier buying experience with the same merchant.

Among the above mentioned contributors of successful business, the last contributor is a result of all earlier contributors.; i.e. Unless customer gets good quality service from a ‘well known’ merchant ,at a discounted price he may not be fully satisfied with the merchant.

In order to get a customer into habit of buying products always form same merchant, gathering of his multiple experiences with same merchant is the key to the success. Merchants are spending hell lot of money just for this purpose.

Now let’s look at periodic buying. Here the ‘merchant affinity’ challenge may appear relatively simpler. Customer is keen to buy the same set of products with defined periodicity. As compared to instantaneous shopping pattern the opportunity of building number of good experiences with same merchant is much bigger.

A concrete step towards building multiple good experiences with a merchant is to sell good quality products/services so as to enable customer consider same merchant when same products/services are needed. Consider a portal selling vegetables and fruits (bigbasket.com). If customer gets good quality fresh vegetables and fruits from a merchant he would surely go back to same merchant next time. This is how long term affiliation can be built between merchant and his customers.

But selling good quality products alone may not ensure customers’ long term association as

* Multiple merchants may be selling good quality products.
* Branded products have established quality standards. So customer may not see any advantage of buying them from a specific merchant instead of other.

The document is trying to explore the avenues for a merchant to establish a long term association with most of their customers, in case of “periodic buying needs”.

## Challenges in front of merchants in “instantaneous” sales business

From the story so far it is evident that selling ‘periodic needs’ through subscription approach is ensuring long term relationship between customers and merchants. It may demand additional benefits for customers as described above, but may still yield better returns for merchants. In order to understand how it enhances gains for merchants lets first understand challenges being faced by merchants operating in “instantaneous” markets.

## Forecasting and resource management

The first and foremost challenge in front of any merchant is to increase the bottom line and make all efforts, first to retain current customer base and then to grow it so that business can be more predictable. A merchant is considered to be doing bad if a customer who has purchased some products from him in past does not turn up again to the same merchant. So even if merchant’s business is growing due to engagement with new customers, its stability will always be a question mark if retention of existing customers is not ensured.

Merely making efforts to gain new customers does not enable merchant build precise business forecasts, because probable new customers are in thin air and it is impossible to predict if they will really materialize. There may be even tougher challenges associated with demand due to varying customer density as well as varying needs from new coming customers for each product across geographies, periods and demography.

For example customer base in cities prefer different product brands than those in small towns. Moreover due to difference in usage patterns the consumption is different.

Unpredictable demands adversely impact procurement of goods, inventory management, operating expenses and may lead to either customer dissatisfaction due to “out of stock” kind of situations or lot of wastage due to expiries of batches. Ultimately they result into vast underperforming of business on revenue and profit fronts.

Different merchants try different options to circumvent around this problem of variable/unpredictable demand. Some may prefer to manage their own stock of inventory using some statistical analysis of historical demand information. Some try out “Just In Time” strategy where they collaborate with regional/local retailers and fulfil local orders through them. In turn the local retailers pay them commission for awarding business.

In first approach per item net profit is inefficient due to inability to control wastages, operating expenses and product pricing.

In second approach merchants rely on the inventories being managed by local retailers as well as services provided by them. They in turn gain much less gain as compared to first approach because they themselves are not dealing with suppliers in wholesale but rather selling items which are purchased by their regional counterparts in much higher purchase prices. Benefit of this approach is saving of inventory cost as well as transportation as well as zero accountability of wastages.

These challenges are much bigger due to their wider reach. They use sophisticated analytics tools to predict the consumption based on historical trends. But predications are predictions.

The ideal business which will succeed as well as grow exponentially when

* 1. Merchants almost precisely know their annual customer base as well as sale distribution throughout year.
  2. Merchants have stable and retained customer base where somehow customer is engaged for longer duration for his periodic purchases needs.
  3. Due to above two, merchants can be effective in dealing with their suppliers and possibly make annual deals with them by giving them precise demand and its periodic distribution for every products. It will give them edge in dictating the purchase price of every item. Suppliers can happily offer them competitive prices as they are getting assured high volume business for the full year.
  4. Merchants directly or indirectly manage their own inventory so that they can afford bulk purchases for which they are expected to get incentivised from suppliers. It may increase their operating cost marginally but should get compensated with improved customer satisfaction due to avoidance of “excess stock” or “out of stock” situations.

## Price determination

Online retail concept is primarily centred on turnover of huge volume of goods. So even if a single penny is earned on a unit as profit, it yields millions at the end of a day. The same is inversely true if single penny per unit is lost.

Most of the online merchants sell various products at discounted price (price lesser than its printed MRP) in order to attract customers. But determination of right price to be offered is a complex task, because wrong prices can spoil sale.

Price of any product is mainly driven by its demand (against all its substitutes) as well as many other factors such as

* Cost incurred (in addition to purchase price of a product) to sell product in market (fixed + variable cost)
* Price of competitor products
* Price offered by competitor merchants.
* Geographic +demographic aspect determining purchasing power and perceptions of buyer population

Demand is the primary factor driving base price to be offered. Consider the following problem for illustration.

If product X has breakeven price(purchase price +costs per unit) of 50 Rs. and MRP as 110 Rs., in order to get profit of 100,000 Rs. On sale of X, at what price it should be sold?

In order to solve one should know the demand forecast for product X. If expected demand is 2000 units, then offered price should be 100 Rs. so that.

2000\*100 – 2000\*50 = 2000\*50 = 100000 Rs.

Whereas if expected demand is 4000 then price should be reduced to 75 Rs.

4000\*75 – 4000\*50=4000\*25=100000 Rs.

It also illustrates that if merchant can afford to set the price lower then there is more likelihood of getting more customers than expected.

Merchants typically compete with each other by offering lucrative discounts on product prices. But how much to offer on a product/brand is determined by demand vs supply ratio for that product. The “Hot Favourite” brands usually offer fewer margins to the seller and hence may yield negligible discounts for the customer, whereas new arrivals offer heavy discounts and offers due the element of unpredictability in them being successful in the market.

If the market is very volatile, and merchants are unable to predict demand, they face real challenges in determining prices. The price per unit that they have offered(with some discounts) , anticipating certain sales growth in coming months may turn loss making as the predicated growth did not happen but the cost being constant.

In case of shopping malls they offer the prices based on the geography where they are located. In areas having majority of wealthy people, charging too low price may negatively impact sale as buyers can start suspecting on the quality of products, which are sold at cheaper prices. On the contrary if prices with heavy discounts are not offered in the areas where less wealthy people are living, it may negatively impact the sale.

Online shopping sites do not have this luxury of charging different prices in different geographies because the same site is accessible from all locations.

When a competitor merchant drops price of a product, others have to introspect offer price of the same product, else there is a likelihood of lowest price offering merchant will pull away customers from all.

When cost of substitutes (competitor products) goes up it may negatively impact their demand resulting into increasing demand for the products. Thus substitute price also plays a major role in price determination.

All the factors discussed above contribute to determination of price being offered to customers. As and when these factors keep changing the offered price keep moving between breakeven price and MRP.

In reality it is extremely difficult to predict customer behaviour in volatile market situation. His buying decisions are impacted by inflation, change of taste, offers by competitors, performance of substitute products etc. In instantaneous world it is extremely difficult to keep offering prices which can keep customers bound to the same merchants.

Merchants try to rotate offers on different products so that discounts on few products may get compensated by yields on other products and ultimately earn desired profits. So on any day, at any moment if you buy few items from a mall/online store you get discounts/offers on few of them whereas pay MRP for the remaining ones. Buyer is viewing MRP as a reference price for every product. Even getting discount on few items may also make him happy.

## Ensure sustainable growth

Sustainable customer base is the only key to success of sustainable business. In instantaneous sale, where customer approaches, buys his needs and leaves, it is difficult to ensure if the same customer will come back to same merchant/portal for his future needs. Since customer has so many options to buy his needs from, if he does not have any specific incentive to buy from the same merchant he may not turn up again, and demand calculations at merchants may end up being some probability function hoping for same/new customers to turn up.

A systematic engagement with every customer for a long duration where customer not only benefits of buying one time buts get more benefitted for by again and again and more and more ensures sustainable customer base. This in turn achieves all the above mentioned benefits for the merchant.

## Expectations from long term merchant-customer association for periodic buying pattern

Now let’s imagine the kind of benefits that customers will be seeking if they wish to remain associated with same merchant.

## Quality

Needless to say quality of purchased goods has always been and will always be the first criteria for any customer. In case of branded products this is not needed to be handled by merchants as customers are already associated with some brans or the other. This may be an issue for non-branded products such as fruits and vegetables.

## Convenience

Lot of convenience, by buying things online has been one of the main motivation factors for customers.

* Customers will be happy buying their periodic needs online through a self-intuitive user interface, so that they will save lot of their time going to market for shopping of these items, standing in long billing queues etc.
* Customers will want to get the purchased goods to be delivered at their doorsteps, mostly on precise time. These are periodic needs; so they may not wait for the goods to be delivered later than the day when they need these products.
* If customers are buying multiple products form a merchant, they may not need all of them at the same interval as each of their consumption rate may be different. Example: customer may want two toothpastes per month but need toothbrushes to be delivered every four months.

So they will need different items to be delivered to them, closer to their need time.

## Price Benefits

* For periodical needs such as grocery items or medicines, customers will prefer to buy online if these are offered at some discounted prices, even if the actual shipment will take some time to reach to them.
* Customer happiness may ruin away if merchants start charging considerable shipping charges on the delivery packages. In case the shipping charge grows proportional to package size/weight it may further add to customer dissatisfaction. What is the benefit of buying more items from an online merchant if the shipping charges are proportionally growing? They may find it more appropriate to buy these items from a nearby mall (although it is less convenient).
* If majority of the items those customers are buying are branded products, why should they be bought from the same merchant for long term? Is the long term association with same merchant benefitting the customers?

## Value added benefits

* Package level benefits: Some segment of customer base perceives different products at lesser prices than their offered (discounted) prices. Such price sensitive customers may compare offered prices of different branded products at different shopping malls/portals and selectively buy their needs from different shopping malls/portals so as to maximize their overall benefit. Also their choice of merchants keep on changing based on who is providing maximum benefits for their needed product at every time.

If customers are provided ‘package’ level benefit as an alternative to/in addition to product level benefits, they will be tempted to add more items in their package(because more the package amount more is the benefit),thereby buying all their needs from same merchant. Also the more time they keep buying from the same merchant more will be their savings.

* More for More: When a customer buys a goods worth ‘X’ amount and other customer buys worth 2X amount, the later should be appraised by passing on some value added benefits, as he/she is contributing more to merchant’s overall revenue and profit. This is how second customer will get a feeling of added gain and it will add to his satisfaction level.

## Rewards for loyalty

If a customer is periodically buying his needs from the same merchant, is he being rewarded for his long term affiliation with that merchant?

Looking little deeper in this kind of relationship, a customer is getting into long term agreement with the merchant where he promises to buy certain (perhaps same) set of products periodically for the agreement duration.

Customer’s loyalty with a merchant should be rewarded in some form or the other. It can be in the form of additional discounts or cash back schemes or loyalty/reward points etc. Thus this loyalty makes customer win more benefits on top of product level and volume based benefits.

Merchant is automatically wining a long term relationship with a customer so he can focus more on winning new customers. Also the business forecasts are more accurate and resources can be planned more precisely as compared to the instantaneous business. It also increases merchant’s ability to negotiate better with suppliers based on this assured future business.

There should be strategies in place which will compute the loyalty units for every customer based on duration of their agreement as well as number of renewals of agreements. They should then be converted in the form of benefits such as redemption points, added discounts, gifts etc.

## Determinants of Demand

As we have mentioned earlier demand for a product depends on various factors (price is just one of them).There are five determinants of demand for a good.

qD = *f* (price, income, prices of related goods, tastes, expectations)

1. **Price of goods**- The [law of demand](http://useconomy.about.com/od/demand/a/Law-Of-Demand.htm) states that when prices rise, the quantity demanded falls. This also means that, when prices drop, demand will rise. People base their purchasing decisions on price, if all other things are equal. The exact quantity bought for each price level is described in the [Demand Schedule](http://useconomy.about.com/od/demand/fl/Demand-Schedule.htm). It's then plotted graphically to show the [Demand Curve](http://useconomy.about.com/od/demand/a/Demand-Curve.htm).

If the quantity demanded responds a lot to price, then it's known as [elastic demand](http://useconomy.about.com/od/glossary/g/Elastic-Demand.htm). If the quantity doesn't change much, regardless of price, that's [inelastic demand](http://useconomy.about.com/od/glossary/g/inelastic_demand.htm).

1. **Income** - When income of people in the region rises, so will the quantity demanded. When income falls, so will demand. However, even if your income doubles, you won't necessarily buy twice as much of a particular good or service. Since this is not which the platform can influence this attribute is considered to be **out of scope**.
2. **Prices of related goods or services** - Demand for a product may decrease when price of its complementary product increases.

The opposite reaction occurs when the price of a substitute rises. Demand for a product may increase when price of its substitutes increases.

1. **Tastes** - This is the desire, emotion, or preference for a good or service. When tastes rise, so does the quantity demanded. Likewise, when tastes fall, it will depress the quantity demanded. This is what brand advertising is all about. Again this is not something which the platform can influence, though it can show the trend if the taste is getting shifted from product A to product B.
2. **Expectations** - When people expect that the value of something will rise, then they demand more of it. Even from merchant’s point of view this attribute may hold considerable value.
3. **Number of buyers in the market**- The number of buyers affects overall, or aggregate, demand. As more buyers enter the market rises, so does the quantity demanded -- even if prices don't change.

## Notion of Subscription

The “Subscription” concept tries to bind the expectations of customers to obtain their needs with maximum benefits, with merchants who wish to retain existing customer base in order to ensure sustainable business.

Concept of subscription is not new. It has been popular in publications business since long time. In IT world it has been practiced for SAAS (Software as a Service) business too. There are good evaluation metrics developed for SAAS to measure the effectiveness of the SAAS model. In telecom business, too different tariff plans are based on subscription model.

In simple understanding a ‘subscriber’ subscribes (registers for periodic receipts) for some goods (articles and/or magazines in case of publications) or services (software licenses in case of SAAS or mobile plans in case of telecom business) by getting into long term agreement with supplier and keep on receiving these products/services periodically at a predefined interval. Periodic deliveries of desired goods/services save subscriber’s efforts of procuring them newly, every time.

In publications as well as SAAS business models the market and cost vulnerabilities are limited and predictable as compared to retail business, mainly the one which is related to everyone’s daily needs.

Subscription to products in retail business is not so popular/ practiced in current retail market. It may be because in volatile market situations and due to instability of product prices there is no business model available which can ensure sustainable business along with assured(and growing) profits for both stakeholders.

Since this thesis elaborates application of subscription model to retail business it is inevitable to compare the conventional ‘instantaneous’ business model with subscription model. It is necessary to now, what are the challenges associated with instantaneous business for both merchant and stakeholders which will be taken care of in subscription business. We have already listed challenges for merchants for instantaneous business as well as expectations from customers in order to establish a long term association with merchants. Outcome of such comparison is going to contribute to the overall success or failure of subscription thinking.

## Long term association

The basis and intent of subscription concept is to establish a long term association of customer with a merchant, where he/she agrees to receive a fixed set of selected products repeatedly at desired intervals.

In default case an intangible advantage of ‘subscribing’ is ‘saving of lot of time and energy on buying his periodic repeatable needs’ becomes his primary source of motivation for subscribing.

An order needs to be placed by customer just once, mentioning the number and periodicity of every item being subscribed. Packages with appropriate goods are delivered to his doorsteps on completion of every period. No periodic visits to malls, no standing in long billing queues, not even periodic ordering online; Order once and you are done for subscription period.

How will a customer turns into a subscriber? It is simple. In case of online shopping

* Subscriber will register itself with merchant /online portal.
* He/she will provide list of products of specific brands by choosing among the options provided by merchant/on the portal. Against each product he will provide the quantity and periodicity at which he wishes to receive that item.
* He/she will provide information on the total duration of his association with merchant.
* He/she will make partial/full advanced payment towards the fulfilment of agreement with merchant.
* He/she will start receiving the package containing items to be delivered on agreed periodicity.

## Multiple dimensions of Subscription Business Model

Conventional retail business metrics are single dimensional in nature. It considers customer as the epic around which to measure revenue growth, profit making, losses, operating cost etc. This is because nature of business is instantaneous where association of a customer with merchant and with a purchased product (and its price) is true for an instance and finishes when the product is purchased by that customer. Next time even if the same customer is buying (probably the same) product again from same merchant it will be a fresh association and it does not carry any memories of earlier association. So new price is offered to his and he makes a fresh purchase and so on.

If subscription business needs to fulfil multiple expectations of customers for long term its business model should be multidimensional.

## First dimension: Subscriber

As in conventional (instantaneous) business where customer volume is the centre of all forecasting, budgeting and performance tracking, the same dimension is applicable to subscription business. But here the metrics are slightly tuned to subscription type of business. Business is measured in terms of incoming (new) customers, churned customers, their purchase volumes (basket sizes), duration of association (subscription) and thereby overall revenue, gross and net profit.

Since average customer in subscription business typically subscribes for more than one product as well as for more than one time, it is appropriate to forecast and measure the business in terms of subscriptions instead of customers. This is because

* Customer may subscribe to more than one product and for definite periodicity and duration.
* For the same customer subscription repeatedly adds to revenue for the given subscription period.
* Customer may remain associated with merchant but can change his total subscriptions one or more times during subscription period resulting into different revenue for his subscriptions.

Here the tracking is required not only on how much increase in customer base, but also on how long an average subscriber remains associated with merchant. This is because sustainability of business is key the key to success for subscription business. If large volume of new subscribers are getting added to merchant’s portfolio, but large volume of subscribers are getting churned out in between their subscription period, then something is going wrong in the business and merchant needs to introspect and correct wherever required.

Also if subscribers are changing their product subscriptions multiple times (replacing products, removing products from baskets) during subscription period, it may negatively impact forecasting and management of resources.

## Second dimension: Subscriptions (Association with products)

When a subscriber subscribes for set of products for some subscription period, he is intending to establish long term association with each of these products, expecting their steady in-flow at a constant price. But the products themselves have number of attributes such as their purchase price, MRP, offered price, which may vary multiple times during subscription period.

* If a product is consistently growing in demand for the stated price, its offered price may need to be increased in order to rip more profits from it. If it does not do well, its offered price may have to be lowered down so as to promote its sale. But if a subscriber has subscribed to that product with a specific offer price, these demand centric price fluctuations should not impact him during his current subscription period, as they may make losing his trust in the merchant.
* Alternatively, its purchase price (thereby MRP) may get changed due to exponential increase in market demand or stock shortage. Hence, its offered price should be recalculated with reference to new purchase price and offered to new subscribers. Again existing active subscribers should not be impacted by this price change.

In case of price committed products, in either of the above scenarios the product still needs to be served with earlier committed prices to existing subscribers (registered before offered price change). The new price will be applied to new subscribers subscribing after the price change.

Thus every product may carry multiple active offered prices (Let’s call them price buckets) at any given instance. Different number of subscribers is associated with each price bucket depending on when they have joined the subscription journey. How to track such price dynamics happening differently at each product level at different times?

Due to the price dynamics when a different price is offered for a product almost every day, it will apply to new subscribers joining since new price is offered.

In case increased price is offered than its earlier offered prices, all existing subscribers are now yielding lesser profits or even incur losses as compared to new subscribers, as they are being served with lesser prices.

In case new price is lower than earlier price then new joining subscribers start lowering profits or even losses, as they will be served with lower prices than earlier ones.

Moreover if the purchase price and MRP of a product increases, thereby increasing its offered price, all existing subscribers are now getting served by incurring losses as they may have been offered prices lesser than new breakeven price.

Such change may happen even daily depending upon volatility in its demand. The same rule applies to all products regardless of if they are price committed, percentage discount committed to none committed.

The profit and loss dynamics resulting from the price dynamics can be limited by

* Anticipating for future price changes in every price being offered for a product and compensating for forecasted losses in current offered price in a piecemeal way AND/OR
* Limiting the total subscription period max limit (to say one year), so as to limit the losses. At renewal of subscription period subscriber will be offered freshly calculated price.

It should also track the added expenses incurred at product level as some of them are strongly related to its demand and its delivery frequency. For example: Sales and marketing expenses may be more for some products as they are relatively new as against those which are well established brands. Also in periodic subscriptions, some items are needed more frequently/in more quantity than other products (example: toothpaste is needed every month but toothbrush may be need only once in 4-6 months.).

So the subscription model proposes the product to be the self-managed entity in subscription business where it should

* Forecast for dynamics in its demand, price, revenue and profit.
* Track/measure the actual progress against the forecast
* Propose price changes depending upon increase or decrease it demand
* Track subscribers being registered with each offered price
* Track actuals now with revised offered price
* Create foundation of future forecast based on current actuals.

## Why a Merchant should think of subscription business

## Sustainable customer base

In case merchant attracts customers to get into such long term association it will be a complete business transformation for him.

His/her relentless efforts and investments to obtain new customers as well as retain existing customers will be greatly saved as customers are turning into ‘subscribers’ with the intent of not just buying once but buy periodically and hence remain associated with him for a longer duration.

If merchant takes appropriate measures to ensure longer term association of existing subscribers by proportionately rewarding them for their loyalty/relationship, it helps create affinity for him among subscribers. Such a relationship is much more precious than just a momentary commercial association for the purpose of trading.

Moreover such relationship also enables him to know his customers better, by knowing their choices/preferences, their usage patterns, their periodic volume needs, cost vs. brand preferences etc. This data is extremely valuable asset for analysing and categorizing customer base, so as to offer them better value proposition based on their personas. This too will help affinity towards him.

## Precise Predictions

Merchant is more equipped to make considerably precise predictions related to business forecast. 60-70% of his future business will be the actual on-going subscriptions, which are going to continue in near future. Remaining 30-40% will be predictions about new subscriptions based on current trend.

This has never been the case for instantaneous business as there is no guarantee of recent customer coming back to same merchant. So all the forecasts will be pure predictions, and mere predictions cannot be precisely closer to reality.

Such precise predictions will make him better prepared to manage goods as well as resources well. As he almost exactly knows how many subscribers to serve, at what periodicity, with what quantity, he can precisely order goods for current/future period.

Moreover he knows how many baskets are to be delivered, at what periodicity; with what weight (per basket) he can precisely budget for transportation/delivery cost. Such information not only helps him manage budget for theses expense but also help him negotiate better with logistics vendors, if any and ensure better rates from them.

Due to predictable demands and logistics, merchant is in a better position to optimize on personnel cost of infrastructure etc. etc.

As the inflow and outflow of goods is assured, he can negotiate better with suppliers (may be getting into long term supply agreement with them). It will help him reduce wastage cost to minimum. In turn he can launch his products at competitive prices which will be difficult for his competitors to beat.

## Cost Optimization

Imagine that a shopping portal is trading in instantaneous mode. Customers purchase products and those are shipped to them. Assume that it is dealing with approximately 10,000 customers per month. Some customers make purchase of multiple items per instance, but many of them purchase single item at an instance. So merchant is making approximately 7000 to 10000 deliveries per month. In this it is shipping 10000 to 20000 items (i.e. approximately 1.5 to 2 items per delivery). If average shipping cost per delivery is 40 Rs. then shipping cost per item is approximately 20 Rs.

In all the cases, it may not be possible to absorb the shipping cost by merchant as the price of the content in a delivery is not bringing enough gains for the merchant so as to absorb such a high shipping cost. So in case of shopping of less expensive items, the shipping cost is separately charged to the buyer.

Now assume that same portal is dealing in subscription mode and with same number (10,000) of subscribers. So it will be making 10,000 deliveries. But as subscription is providing better benefits if more content is subscribed to, a shipment may contain 10-20 items. So in same number of deliveries, around 100,000 to 2, 00,000 items are getting delivered. Even if average shipping cost per delivery is 60 Rs. (as weight of delivery increased due to more items in it), cost per item is 3 to 6 Rs.

Due to repetitive nature of ensured business, and cost being less as compared to price of item, it will be more possible absorb this cost thereby boosting customer satisfaction.

In case future deliveries to be made are already known in advance, logistics costs (storage, shipping, routing etc.) can be better optimized. Such optimizations can add huge gains into merchant’s wallet.

As a summary, when any business reaches at its saturation level, merchants can increase their profits by optimizing their costs per item sold. As we have seen above, a merchant has better avenues for the cost optimizations than those available in instantaneous business.

## Value based benefits instead of competitive benefits

In instantaneous worlds, different merchants compete with each other to attract more customers as well as get customers into habit of using them as de-facto shopping channel.

It gives rise to price wars. Many times merchants are ready to bear huge losses, by offering products at dirt cheap prices. Because they think that, cheapest prices visible on their shopping sites, will get their customers into a habit of buying anything from them. Game theory based pricing determination models are being used for this purpose.

In subscription approach typically product price can a function of following

1. Breakeven price of the product, and margin available( between MRP and breakeven price)
2. Current demand of the product
3. Time of subscription(every day different price may be available for a product)
4. Total basket (delivery per period) size ,value
5. Duration of subscription.
6. Subscriber’s loyalty with merchant (total duration of all subscriptions with same merchant, number of subscription renewals etc.)

So same product will be offered to subscribers differently based on all above criterion.

Thus it is not possible to compare price of a product on different sites and determine the cheapest option, because price is not only calculated on product characteristics but also on the subscriber’s characteristics.

Instead of giving haphazard discounts on individual products, benefits for a subscriber can be better organized based on volume of purchase, duration of their association, loyalty, brand loyalty etc. Such a multi layered benefit model not only attracts more subscription but also tempts subscribers to buy more goods as well as extend association for longer term.

Let’s understand how the multi layered benefit model can be laid out so that it will bring enough motivation for customers to get into long term agreement with any merchant.

## Layered Benefits Model for subscribers

When a customer wants to buy set of products, he may choose products based on two criterions.

* Brand preference: Out of various brands available which brand he/she would like to buy.
* Quantity required for the desired time period.

In case of grocery goods, if a subscriber is buying 10 different products, he may be firm about his brand choice for 7 of them, but may be flexible about the brands for remaining 3. These numbers are just for illustration purpose and may vary from subscriber to subscriber. But this behaviour is mostly common across all type of subscribers. Example: As a customer I would not like to use any toothpaste other than Colgate Total, but in case of biscuits I may be flexible. Rather I may wish to try some new brand of biscuits.

Cost sensitive customers are more flexible on brand preference as they may tend to choose the products which provide them more cost saving or some added benefits. The choices (and quantity) are also influenced by the ‘added’ tangible/intangible benefits being offered by merchants. The duration and quantity of subscription gets positively impacted by these added offerings.

The above description may not be applicable to buying of medicines, as they will be mostly bought based on doctor’s prescription (though there too, is a flexibility to buy reputed brands or generic medicines)

Now when the customer wishes to turn into a ‘subscriber’, he will obviously expect some added benefits for getting into long term relationship with merchant.

So what are the benefits that he can expect vs. merchant can offer?

We have already seen that subscription greatly enhances the convenience factor of subscribers, as they are getting desired goods at desired intervals at their doorsteps throughout subscription period. But this may not be enough reason for a customer getting turned into a subscriber. Let’s see what are those few “toppings” (on top of this basic advantage), those can be offered so as motivate customers turn into subscribers.

## Topping 1: Cost saving through stable prices/discounts

First and foremost intangible benefit that can be offered is commitment of price or discounts on every product throughout subscription period.

A subscriber wishes to subscribe for number of products because he sees that competitive/discounted prices are being offered on many of them. But price for every product may be calculated & corrected frequently based on the performance of the product against forecast. Also the base (purchase price and MRP) price of price may change frequently due to high inflation in the region. So a product cannot hold on to the same price which was offered during subscription by a subscriber. Different subscribers subscribe on different days throughout the year. So they will subscribe to the price of a product which was offered on the day of their subscription (based on current purchase price/MRP/discount offered etc.). So different subscribers may subscribe to different prices of the same product, depending upon when they have subscribed for it.

What will happen if a subscriber who subscribed for X price will have to pay for X+2 price in next delivery because price of subscribed product has been increased by 2 rupees? What will happen if subscriber experiences same price change at different times during subscription period, for all 15 different products that he/she has subscribed to?

This scenario is specific to subscription business model. In instantaneous business a customer visits merchant site, chooses product(s) of his choice based on the prices being offered, buy them and moves away. Since there is no long term association with merchant, customer does not feel the impact of ever changing prices of different products. But in case of subscription contract, merchant chooses set of products to be delivered ‘repeatedly’, based on the prices being offered on the ‘subscription day’.

A subscriber would not like to see these prices changing at every delivery. It may create a feeling of being fooled by the merchant, where initially competitive prices are displayed but after few deliveries they are increased.

Instead if he is ‘committed’ a price on every subscribed product which is applicable throughout his subscription period, he is assured of not only reliable deal but also assured of ‘inflation proof’ prices for a longer duration regardless of ups and down in the actual market prices of these items. Isn’t it a great advantage for him to consider subscription business model for procuring his needs? In countries having high inflation rates where prices of daily needs are expected to frequently grow up, price commitment can be a sure measure of ensuring sustainable customer growth.

Well said than done!! Is it really possible to commit price of each product at subscription time? The daily needs such as food items/grains/edible oil/milk etc. are most vulnerable to inflation and shortage due to natural calamities and it may not be possible for a merchant to commit prices for each (throughout subscription period) to subscribers. Inflation rate is different in different countries and hence applies to different products differently.

In such case merchant needs to analyse that instead of ‘price commitment’ can ‘discount commitment’ be offered for some them. Merchants, based on their experience as well as historical data of prices of different products/brands can think of offering ‘percentage discount commitment’ on latest MRPs. In case MRP changes frequently during ones subscription period he/she may have to pay different price for the same product, but will pay with a fixed percentage discount on latest MRP.

There are some products for which neither of these options can be feasible. In such case merchants may not want to get into any commitment but can strive to offer best prices to subscribers with every delivery.

If this idea is innovative, Subscription business mode should also discuss how it is feasible to a merchant to offer committed prices/discounts and still does cause the loss making proposition for them. We will see that in ‘Benefits’ section.

## Topping 2: Cost saving through product level discounts

Offer each product at ‘discounted’ price to subscribers so that they can get to buy things at lesser prices than MRP. The fundamental of online subscription based retail business is to sell things to large volume of people. Even a very small gain per unit being sold can bring huge profits to the merchant. In retail domain typical profit margins for large volume of sale is from 30-50% to a retailer. If merchant is flexible enough to share gains with subscribers than he can win more subscribers, which in turn increase his bottom line, thereby increasing his net gain.

In turn if a customer is gaining a small discount on each unit bought, his/her total cost saving will be considerable as he/she has been buying multiple units per period as well as for number of periods. He/she may be tempted to subscribe for more products, more quantity per product, for more subscription duration in order to maximize savings.

How much profit to offer on each product being sold? How will merchant arrive at appropriate prices by which his cost of goods sold will get covered as well as minimum expected profit margin is ensured?

It will be the responsibility of sophisticated subscription platform based on predefined market parameters/metrics. We will learn about this model in next sections.

## Topping 3: Content size and subscription period based benefits

Next ‘added’ topping that will further motivate subscriber to get into long term agreement with merchant, can be in the form of added benefits(in form of discounts/ reward points etc.) for buying more goods per period (bigger baskets).The more goods he/she will buy per subscription period ,more will be his/her ’Basket Level Benefit’.

Similarly added benefits can be provided for subscriber loyalty. The longer association/renewals of association with merchant more will be the loyalty benefits.

If merchant manages to

* Make budget provisions for benefits to be offered, based on profit margins and keep on correcting them according to ups and downs in margins.
* Distribute total benefit to be offered to a subscriber among committed prices/percentage discounts, product level discount, basket level benefits, loyalty benefits etc. based on demand density of products in baskets, total subscription/basket amount, total subscription period etc.
* Provide these benefits in layered fashion based on subscriber/subscription composition.

Then winning more customers, offering them competitive prices and retaining them for longer period will be the obvious consequence.

But how does a merchant manages to provide all these benefits and still manage to retain some gain for him? Next sections describe the basic factors for planning, managing and executing subscription based business in order to get answer to this question.

## Success Factors for subscription model

Like any other business model subscription model too depends on identifying the market trends and flexibility to adapt to them in order to be ahead of competitors. The success will depend on following factors

1. How precisely the overall business budget & forecast is defined, tracked and corrected based on actual trend.
2. How well are the metrics defined to precisely measure the performance of the business/investments made on sales and marketing/customer retention index/per customer revenue growth etc. How well they are used to make intelligent changes to orient business around customer satisfaction.
3. How well analysis of the historical performance is used to repurpose overall gains into
   1. Capital required for investing into growing business based on current trend
   2. Provision for different fixed and variable recurring expenses
   3. Provision for different benefits (product level discount, basket level benefits, loyalty benefits etc.)
   4. Provision for recovering from current/future losses
4. How early predications can be made about products that are not doing so well and adding to overheads?
5. How can the business model supports well performing products help moderate/low performing products to recover?
6. To what extent historical indicator improve individual product sale, through targeted schemes for struggling products
7. To what extent historical indicators optimize on operating expenses so that cost per product gets reduced.
8. How well the business model learns and recovers from its mistakes so as to adapt to changing market conditions?

## Assumptions regarding proposed subscription platform

Now let’s go deeper in the actual subscription business model. The model has been proposed as a business model expressed in terms of associated domains, business entities in each domain and interaction among the domains so as to fulfil desired business activity. The approach used to describe business domain is to elicit a platform on which any subscription business can be set up, executed and measured. The reason for describing business domain as a platform architecture is, that the same can be used to develop a software platform to serve all listed responsibilities of subscription business.

Here the business architecture assumes that subscription based business is served by an existing instantaneous business. Hence following assumptions are made.

1. In case of software enabled shopping system, the shopping site which serves to the actual customers/subscribers is already in place where they can register themselves, select products, add to cart, make payments and receive their desired items. The system is expected to be enhanced so as to operate in subscription mode.
2. The logistical aspects such as inventory management, shipping, accounting are expected to be already existing embedded in the current software system or integrated from external vendors. So the subscription business model does not need to manage the good or to make delivery provisions for them.
3. Subscription business platform is expected to get integrated with the main shopping platform where there will be integration points to exchange required information between subscription platform and main platform.

## Product centric subscription business model

The overall business can be looked at as an atomic entity and all the predictions, calculations; decisions are done at business level. Business tells its overall forecasts, its procurement needs for different products, it overall revenue, profits/losses and performance is measured at a business level. Business centric metrics such as percentage revenue growth/loss per period, percentage profit growth per period, percentage subscription churn per period, average monthly recognized revenue at business level, percentage MRR churn, Average revenue per subscriber etc. can be tracked at business level.

Demands vary from product to product so that some products are doing great and some are struggling to compete. When a subscriber wishes to buy number of products to be added to the basket, it may be combination of preferred brands for primary needs and cost effective brands for secondary needs. So it would be strongly advisable to measure success or failure of a subscription business in terms of dynamics associated with each product, instead of measuring it at business level.

Product centric subscription business model looks at overall business as composition of businesses of multiple individual products and their impacts on each other.

Each product has its own story to tell. It may be doing very well because it is among the top brands, or it may just have appeared in the market and trying to establish its identity. A product may be providing great margins per unit to the merchant but its overall sale is moderate, resulting into limited overall gain. Alternatively, a product may be providing very narrow margin per unit but its sale volume is very high, resulting into considerable gains for the merchant. Some products bring great profits whereas others bring great revenue. A product may be very price elastic. It means a small variation in its price may result into huge variation in its demand. Similarly some product may be price inelastic, resulting into no significant change in demand for a moderate change in its price.

A product does not operate independently in the market. It has various forms of correlations with other products. These relationships aid in determining the price and performance of a product.

Some products are more essential than other. Clever marketing can make a less essential product more essential by making people habituated to it. Some products are required more frequently than others.

## Rules for product centric subscription model

The business model proposed in this thesis is product centric business model. Following rules for a product will provide its characteristics as well as responsibilities in order to operate in subscription business

1. Forecast will be made for every product individually, depending upon DNA of the product. It will include how many subscriptions it may win during the period and how much churning in its subscription may take place. The actual performance for a product will compete with forecast and periodically ‘corrects’ the forecast based on the actual trends. Thus forecast keep on getting more précises and tougher for the actual product performance to follow/overcome it. Overall business forecast will be an aggregation of forecasts of individual products being traded.
2. Every product will maintain its own profit/loss account. Any new sale of a product registers appropriate profit in its own account, whereas any churn registers loss.
3. A product knows about all its substitutes and complements. It can decide its price by taking into consideration price of its substitutes as well as complements.
4. A Product’s account maintains list of its own price buckets. Price bucket is any offered price of a product (for the given purchase price and MRP) to which one or more subscribers have been subscribed. When a price is offered newly, number of subscribers subscribes for the product for this price. Until these is a single active subscription association with price, price bucket will remain active. When all subscriptions associated with a price get exhausted, the price bucket expires.

Since product prices are calculated periodically and may be changing very frequently, at any given point a product may have multiple active price buckets. Total subscription to the product should be the aggregation of subscriptions associated with all active price buckets.

1. A Product can be a good revenue generating contributor, whereas some other product may be a good profit generating contributor. Appropriate contribution targets will be used to trigger price changes. Revenue generating products will change their price when their actual revenues grow/fall by x% than current forecasts. Similarly profit generating products will receive price change trigger when their profits grow/fall by x% than forecast.
2. Every product bears its own share of different cost/expenses incurred for running the business. Depending on special maintenance needs, some of these expenses may vary from product to product. Example: Milk needs refrigeration whereas body soap does not have any such special needs. Hence milk may have to carry additional share of electricity expenses.
3. Every product reports its own performance metrics by which its performance can be analysed.
4. Every product decides next sale targets for itself based on forecasting using his historical actual performance data. Also it decides the trigger event (decision point) to change its offer price, based on how much variation from the forecasted targets should trigger the price change.
5. In case a product is doing better than expected, then it contributes some of its additional gains to a central repository. The product which is not doing well it can borrow some money from this repository so as to recover from losses.

Thus performance of an overall business can be granularly tracked as aggregation of performance of every individual product offered for subscription.

Since we have given so much weightage to product portfolio, it is essential to understand different types of products so as to understand how to make any decisions about them while deciding their targets, budget provisions etc.. Following categories describe all such distinctions.

## Product Categories.

## Essential vs. Optional products

Depending on region of sale, few products can be categorized as essential (mandatorily needed) products whereas few others may be considered as optional (occasionally/optionally needed) products. This categorization cannot be universal and needs to be fine-tuned as per geographic needs.

Example: In India Tea can be considered as an essential product, as drinking tea is an inevitable part of Indian culture in most areas. But the same is not true in case of European countries. Here Corn Flakes may fall into essential category.

## High/Low demand products:

Among the range of products being sold, some of them are well established brands, whereas others are relatively less popular and trying to establish themselves.

The high demand products ensure a sustainable sale as well as steady state growth. Their sale volume is also relatively higher than their low demand counterparts.

The popular brands usually offer lesser profit margins for the merchants (due to their monopoly) as compared to their less popular competitors.

So a merchant needs to balance the sales targets as well as sale prices for both types of brands, so as to ensure repeatable and consistent profit margins on the reliable brands whereas putting extra efforts on enhancing the sale of less popular brands, thereby making more money on them. For enhancing the sale of medium/low demand brands typical ways to maximize sale is by offering them at discounted prices or provide some offers/schemes (example: one free on the other) on them etc.

Example: Colgate is a more popular brand than Pepsodent, Nescafe is a higher demand product brand than its competitor Bru, Dove is getting more popular than Rexona etc.

## High/Low velocity /frequency products:

Some products are needed in daily life and hence their consumption is faster. It results into more frequent demands for them.

Example: Toothpaste, washing powder, deodorants and corn flakes are more needed than cosmetics, biscuits, tooth brushes.

High frequency products are those which are ordered at low periodicity (2 per month or 4 per quarter) than the low frequency products (tooth brushes (once per half year per person), lipstick (one per quarter) etc.

Even if some of the high frequency items are getting consumed with low demands (than their competitors) they may yield better revenues due to higher frequency nature.

## Generation influencing products

Some product brands influence specific generations. Example: Pampers and Huggies are inevitable brands for children in the range of 0 – 24 months, Axe/Old Spice/Fogg deodorants attract young generation, whereas kiwi shoe polish is more used among middle aged members.

Companies promote their brands through various innovative ways of sales promotion due to which even if a product is not an essential commodity item, but still attracts handsome demand among people under specific age/income classes.

## Seasonal products

Some products do business in specific seasons.

Example: Fruit squashes and Sharabats are sold mainly during summer season. Demand for Food mixes (Git sweet mixes), chocolates increases mainly in festive seasons (Diwali, Christmas).

In some cases some brands are capable of recovering their dues in merely few months, which is their peak season. Setting targets for them is not as uniform per month as the other categories, but higher targets are set for their peak seasons and negligible targets are set for other months.

## Substitutes and Complements

Some products invite sale of their peers, and this behaviour can be understood by analysing historical data.

Example: Does a customer ordering schezwan sauce always order noodles? Does a customer ordering condensed milk mostly orders dry fruits? Does a customer always order sugar when he/she orders coffee?

Based on the territory the sale is intended, historical data analysis can reveal such facts. In which the product which creates need for a peer product can be considered as a sale promoter for the peer product and should deserve a due credit while setting the price for it. These are the Complements.

On the contrary, some products are competitors of each other. Think of apple juice and orange juice. If a customer has ordered apple juice there is a less likelihood that he will order orange juice. These are called substitutes.

If demand for a product decreases, there is a more likelihood that demand of few of its substitutes may increase. Thus it may not just impact the price decisions for that product itself but also impacts price decisions of its substitutes.

## Regional products

Some products are sold more in some region than the others. Example: Sambar Masala may be less popular/regular in southern states(because people prefer to use homemade masala) but will sale more in metro cities as well as in northern regions, Condensed milk is more sought in Northern states due to more frequent sweets making.

For an online portal it is very challenging to offer regional prices at an item level but this categorization may help us in determining basket level offers based on number of regional products contained in it.

## Product Business domain

Product business domain represents every product as a live entity which has its own characteristics and it is responsible for collaborating with other domains so as to serve number of responsibilities, to be served by every product in the business context.

## Product Categorization

As explained earlier when a subscriber wishes to subscribe for a product for longer term, he will need some level of assurance from the merchant on its price. Merchant has to make provision in such a way that he/she will succeed in providing some sort of price commitment at least for some product, if not all. A merchant marks products for different types of price commitments or no commitments, based on experience so that subscribers subscribing to those products are charged accordingly.

Subscription model assumes three types of products which will be offered to subscribers based how these products react to the changing business demands.

1. Price committed products: many branded products such as tooth pastes or shampoos do not fluctuate greatly on price fronts. Their price gradually increases as response to inflation or increasing demands but the overall rise in a year is within acceptable limits. They are termed as “Price Inelastic” products. So it is safer to commit prices of such products to a subscriber for his/her entire subscription period.

In case of price committed products, price of a product committed to a subscriber should remain same until end of his current subscription period (contract period with merchant). This should hold true even if the product/merchant has started incurring losses on that product (after committing price) OR cost of that product gets changed one/many times during subscription period (after committing one price).

1. Percentage discount committed products: Some products may fluctuate more frequently and considerably but they provide relatively constant margin. These are “Price Elastic” products. Committing absolute price for entire subscription period may be risky but instead it is relatively safer to commit percentage discount on their latest price.

In case of percentage discount committed product the subscriber should get a constant committed percentage discount on the latest price at the time of every delivery. In this case the actual price to be paid by subscriber will vary as the percentage discount is calculated on latest price at the time of every delivery.

1. No commitment products: Many products mostly categorized under primary needs such as food grains, edible oil, sugar vary so unpredictably on price front that it is impossible to either commit price or percentage discount for them for entire subscription period. They are highly “Price Elastic” and gains on them are also not ensured.

In case of no commitment products the subscriber has to pay latest offered price on the product at every delivery. Some time it can be much lesser than the one shown at the time of subscription and sometimes it may be considerably more.

The same product may be categorized differently in different countries in either of the above three categories, depending upon goods producing percentage and demand pattern. So merchant need to mark them accordingly, depending upon country in which products are getting sold.

## Product Level Metrics

## Input Parameters

Following list provides input parameters of a product which are defined by merchant. They are prediction values based on merchant experience.

1. Its purchase price from the manufacturer/supplier(Cost of goods sold-COGS)
2. Its MRP( manufacturer suggested sale price)
3. Demand Density of the product
4. Expected number of new subscriptions each month: New subscriptions always get affiliated to the latest offered price of the product
5. Expected number of churned subscriptions each month: When churning of subscriptions happen, these subscriptions may have been associated with different prices at time of subscription, as they may have been subscribed at different times in a year.
   1. Churned subscriptions affiliated to price at start of the years
   2. Churned subscriptions affiliated to the changed sale price1
   3. Churned subscriptions affiliated to the changed price2 and so on.
6. Merchant’s expectation of profit for self (%)
7. From & To date of the forecast

Example input parameters table will look like this

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Month1** | **Month2** | **Month3** | **Month4** | **Month5** | **Month6** | **Month7** | **Month8** | **Month9** | **Month10** | **Month11** | **Month12** |
| Purchase Price | 45 | 45 | 45 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| MRP | 75 | 75 | 75 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Average Offered price | 65 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| New subscriptions | 3000 | 2300 | 2400 | 2540 | 2600 | 3200 | 2800 | 3500 | 3200 | 3300 | 3100 | 2800 |
| Churned subscriptions | 300 | 200 | 120 | 160 | 150 | 210 | 160 | 140 | 120 | 100 | 130 | 170 |
| Merchant’s expected profit (%) | 10 | 10 | 10 | 10 | 12 | 12 | 12 | 14 | 14 | 15 | 15 | 15 |

## Calculated metrics

Based on these parameters following parameter values are calculated and stored against the product

1. Monthly operational expenses to be borne per product. This should be calculated based on per product operating expenses contribution calculated as given in next section.
2. Monthly sales and marketing expenses calculated per product based on monthly sales and marketing expenses forecasted by merchant (total expenses to be distributed across all the products..)
3. Breakeven price: The amount of money for which a product or service must be sold to cover the costs of manufacturing or providing it.

Breakeven price = Fixed cost for a product per unit + variable cost for a product per unit.

**Breakeven price = product’s purchase price + operating expenses per unit + sales expenses per unit**.

1. Offered price: If this price changes due to demand dynamics or due to change in purchase price, then the changed price should be marked from that month onwards. In forecasting it is not possible to predict how much and how many time an offered price undergoes changes. So forecast will assume single average offered price per month. In this case there are twelve (12) offered prices per year (one average offered price per month) to which subscriptions are affiliated. So All churning with respect to all 12 prices should be forecasted.
2. Net new subscriptions and Total subscriptions per month(to indicate demand)
3. % subscriptions churn per month(- #number of churned customers current month/total # customers at last month)
4. Monthly recurring revenue due to new subscriptions in a month( MRR New)
5. Monthly Churned MRR among subscriptions affiliated to offered price. and total churned MRR( approximate indication of impact of changed price on subscriptions churn),percentage net MRR churn( churned MRR/starting MRR)
6. Ratio of Its expected quantity demanded per month against total quantity demanded of all products in the same category( product and all its substitutes)
7. Monthly Average revenue per new subscriptions (ARPS (New) = New MRR/# New Customers \*1000) and Average revenue per total subscriptions (ARPS= Ending MRR/# total subscriptions\*1000).
8. Total monthly revenue
9. Total Cost of goods sold (COGS= Total subscriptions\* latest purchase price): Though subscriptions are committed the instantaneous sale price at the time of registration, they are periodically dispatched these products which are purchased at the latest purchase price (at the dispatch time). This is an important indicator of impact of change in product price on the revenue and margin.
10. Operating profit/loss(gross margin – operational expenses) and Operating profit/loss percentage( operating profit or Loss/COGS)
11. Subscription Lifetime Value(SLV): ARPS(New)\*Gross margin%/%MRR churn
12. Subscription lifetime period = 1/%customer churn
13. Cost of Acquiring a subscriptions (CAC=(sales& marketing expense/# new subscription) \*1000) : Isn’t giving discount per item included in cost of acquiring a customer?
14. SLV to CAC ratio: SLV/CAC. This indicates how much a subscription will yield by investing specific cost of acquiring a customer as a subscription. For a healthy product this ratio should be more than 4.It means if a merchant invests x rupees in acquiring a subscription, the subscription should at-least yield 4x rupees of business with the merchant.
15. Months to recover CAC= CAC/(ARPS(New)\*Gross Margin%) . This indicates how many months (minimum) an average subscription should be retained in order to at least recover cost of acquiring it.

## Lifecycle of a product

Being a live business agent in the whole subscription ecosystem product has a defined lifecycle, which every product being sold through subscription adheres to.

1. Product gets registered with Subscription ecosystem in order to be identified as a “subscriptionable” product, product to which subscribers can choose to buy.
2. Registration is followed by configuration. Every product as a profit and revenue contributing agent may represent different behaviour, depending upon its nature and accordingly it should be configured. It configuration should dictate how and how much it can contribute in the subscription business.
3. Forecasting of a product is a prerequisite for determining its price for time to time. In absence of any history, forecasting starts with manual target setting based on experts judgements and experience. As the actual performance is getting captured, the forecasting will keep on periodically getting corrected so as to match the forecast with current trend.
4. Product pricing is an important recurring lifecycle activity which keeps tracking a product’s performance against its set targets and accordingly keeps recommending prices to be offered to new subscribers. Changing offer price of a product can sometimes be a rejuvenating lifecycle moment for that product as new price is based on its performance and balances out any trailing performance by offering lucrative price so as to boost its business.
5. A product periodically receives operating expenses attributed to itself, which are used in determining the breakeven price of the product. Every product may need different operating expenses depending upon any special needs associated with its storage, delivery etc.
6. A product daily checks with parent application registered purchase price, MRP and current stock of itself. These values are used to determine its offer price as well as used for calculating product performance metrics.
7. Register subscriptions for a product as well as subscription cancellations, is an on-going lifecycle activity which determines product life. A product is expected to keep track of new subscriptions to itself, and the offer price for which a subscription is registered. Similarly it also need to track in case of subscription cancellation, and the offer price at which the cancelled subscription was affiliated. The subscription trend to a product determines its price as well as shelf life. If product is continuously experiencing more cancellations that new subscriptions, as well as its losses cannot be recovered despite of multiple efforts of lucrative offering, it may not be suitable for subscription business and may be take out from subscription ecosystem.
8. A Product may occasionally contribute a part of its gains to Subscription ecosystem so that the same can be used to recover non-performing products. When to contribute and how much to contribute is automatically determined by the ecosystem based on product’s configuration.
9. A product periodically keeps calculating its performance metrics which tell the story of product’s overall performance and its contribution to overall subscription business. . It is also used to compare performance of competitor products (substitutes). The performance itself and its comparison provide hints to a merchant if any efforts are needed to boost business of some products.

Now let’s get deeper into characteristics of a product and its responsibilities/lifecycle activities.

## Product Attributes

In order to take care of this aspect of an intelligent product, each product will be associated with following attributes which will describe a product in from of its metadata.

1. Unique product identifier and name to distinguish it from other products
2. Category/sub category of product describing the product belonging to which family and if there is any sub category where they are further classified into. Products in the same category/sub category may be substitutes or complements of that product.
3. Weight of the product which will help in precisely identifying a specific product subtype among all variants of the same product/brand as well as it will be used to calculate the delivery charges required to deliver product.
4. Unit of measurement (ml, gram, kg etc.)
5. List of its substitutes and complements; as price changes in them are impacting pricing of the product
6. Demand density of the product. It defines the percentage share of a product in its category against all its substitutes/competition. Here assumption is made that total demand in market for given type of product is 100.If product A is sold 20 out of 100 then its demand density is 20(%).Demand density indicates a product’s market share against all its competitors. It should be periodically recalculated so as to see if the product is getting stronger or weaker against its competitors.
7. Average demand per year per subscriber: It provides average number of units of a product ordered per year per subscriber. This can be used to offer basket level discount per product (added to basket). If a subscriber orders above the average demand then he should be entitled for more basket level benefits and inverse if orders lesser than the average.
8. Product account. It maintains forecasts for the product which it is associated with as well as tracks the actual transactions happening with product including its price change. We will see it in detail in next section.

## Product Account

Product account is responsible to maintain financial attributes and metrics associated with a product. In all of the following scenarios appropriate attributes of product account should be updated.

Product Pricing Category: Product account maintains pricing category of the product. Every product can be categorized either as “Price Committed”, “Percent Discount Committed” or “None committed” depending upon, with which type of commitment it is being offered to subscribers. Also this category determines of price buckets are maintaining various committed price or various committed discount percentages or product will have a single price bucket because it is being categorized as “None Committed”.

Tagged Price Versions: The list maintains versions of purchase price and MRP changes that have associated active subscriptions. When purchase price (and MRP) of the product undergoes change, it should get added in Tagged Price Versions list which maintains versions of purchase prices against which active subscriptions are present. It should also enable recalculation of appropriate metrics listed in performance tracker.

Fixed Expense Versions and Variable Expense Versions: Main portal reports monthly stake of fixed and variable operating expense attributed to subscription business. It should add a new version of fixed/variable operating expenses versions list maintained by Product account.

Current Stock Of Units: Main portal also periodically informs current stock of a specific product against which subscriptions can be received. When the stock information arrives, it should be updated in “current Stock in Units” attribute.

When a new subscription is made to a product, it is expected to update appropriate attributes of product account such as

* The total count of items for the subscription period should get added to the latest price bucket.
* Current stock in units may get subtracted with total count of items subscribed???

Similarly when subscription to a product cancelled, the same should as well be updated at following places.

* It should update appropriate price bucket by adding count of remaining cancelled subscribed items, to the churned subscription count.
* It should add to the Current Stock in units by adding cunt of remaining cancelled subscriptions.

List of active price buckets: All price buckets having active subscriptions associated with them are called as active price buckets. These are maintained within a product account. We will get more description about them under Price Buckets section.

Product Performance Tracker : Performance of a product need to be periodically calculated in terms of basic metrics and tracked so as to understand if product is doing good/average/bad business. Moreover some of the performance metrics such as profit or revenue are tracked against forecasted performance figures to determine if offer price of the products needs to be changed. We will get more details about them in pricing section. The periodicity of calculating performance metrics should be determined by the merchant.

Credit points: As described in product collaboration model, product donates its excess profit (profit earned above set target) to an intermediary “nodal” account. When it does that it earns some credit points for each unit of money donated. These credit points indicate credibility of a product as well as help it get financial help in crisis situation or during execution of expansion plans

## Price Bucket

In instantaneous business offered price for a product remains active only until a new offer price replaces it. So any customer who is buying the same product at different times may likely pay different prices. But since his/her nature of association with merchant (for the purpose of buying a specific product) is instantaneous, he/she may agree to pay different price for same product for different association instances.

But subscription approach intends to have long term association with every subscriber. So charging different prices for all subscribed products despite of periodic buying agreement may ruin the trust of the subscriber. So subscription approach should try to provide some level of price assurance wherever possible to the subscribers, in order to make the commitments bidirectional.

Subscription business may commit an offered price to new subscribers so that they will keep receiving the product with same offered price. Or it may offer committed discount percentage, where subscriber will always gain a committed percentage discount on latest MRP.

This results into multiple offer prices being active for every product until each of them has at least one active subscriber. Price bucket represents these prices and number of subscribers associated with each of them.

## Price Bucket for Price Committed products

When a product is launched its first price bucket is created for it, having offered sale price of that product. When a subscriber subscribes to that product on the same day his/her id is registered with this price bucket.

Offered (sale) price of a product may keep changing due to dynamics of its demand OR due to change in the base (purchase and MRP) prices. For every changed offered price, a new price bucket will get created where the subscribers subscribing on/after the price change day are registered with this latest bucket.

Following are the attributes of a price bucket.

1. Offered price per unit
2. Start and end date of the offered price
3. Number of new subscriptions getting associated with this offered price
4. Number of subscriptions churned out from the offered price
5. Total number of subscriptions associated at any point of time
6. List of Items delivered ,date of delivery, revenue associated with each, profit associated with each

Example: Consider that On 1st January 2016 purchase price of product X is 45 Rs., MRP is 90 Rs..On the same day platform generated a new offered sale price is 72 Rs.. A subscriber has subscribed to two units of toothpaste per month (for one year) on the same day. In this case a new price bucket has been created on 1st Jan 2016, in which it has offered sale price as 72 Rs and the subscriber’s total subscription count(2 units per month \* 12 months=24 units) gets add to “Number of New Subscriptions” attribute of this bucket. Also the price bucket ID gets registered in his/her subscription definition (so as to remember which offer price has been committed to him/her).Thus all the subscribers, who have subscribed to this toothpaste on the same day/time, will get registered with the same price bucket. Also until new price bucket gets created, all subscriptions to this toothpaste will continue getting registered with the same price bucket.

After a few days if the offered price has been changed from 72 Rs. to 69 Rs. a new price bucket gets created. Now onwards any new subscriptions will get registered with this new bucket.

In case of price committed products, though purchase price of the product has changed, offered price for the subscribers who have subscribed to the earlier price cannot be changed. But the same will get changed for any new subscribers subscribing to the toothpaste newly on 23rd Feb 2016 or later by creating a new price bucket.

## Price Bucket for Percentage discount committed products

In case of percentage discount committed products too, price buckets get created in the same way as described in above category. But instead of offer price attribute they will have percentage discount attribute associated with them.

Periodically based on performance of a product or based on the base price changes new price buckets keep getting created (as in price committed category).But each price bucket ill offer a different percentage discount on latest MRP instead of offered price. Subscribers associated with each of these buckets will enjoy the offered discount prescribed in that price bucket.

In case base price (purchase price and MRP) of the product undergoes change, it gets reflected to all the price buckets. From that day subscribers will be charged new price with fixed (committed) percentage discount but applied on new MRP.

Following are the attributes of a price bucket.

1. Offered discount percentage
2. Start and end date of the offered price
3. Number of new subscriptions getting associated with this offered price
4. Number of subscriptions churned out from the offered price
5. Total number of subscriptions associated at any point of time
6. List of Items delivered ,date of delivery, revenue associated with each, profit associated with each

Example: Consider the same (toothpaste) example given for price committed price bucket. But now assume that instead of committed price the product is offering per cent discount commitment.

So on 1st January 2016 platform has created a new price bucket where 7% discount (on latest MRP) has been committed; gets created and 24 units (2 units per month subscribed by a subscriber for 12 months) get added to “new subscription count” of this price bucket. All subscribers subscribing to the toothpaste on and after 1st Jan 2016 will be committed 7% discount on latest MRP. It means if MRP changes the offer price they have to pay will also change but the discount percentage will remain constant.

When platform changes the discount percentage from 7% to say 6%( due to some demand fall), a new price bucket will get created. Any new subscriptions after this time will get associated with this price bucket.

## Price Buckets with ‘None’ commitment

There is no need to form multiple price buckets in case of products configured with ‘None’ commitment. A single price bucket will be created with latest offered price. All subscribers to that product are associated with same price bucket (regardless of when they have subscribed for the product). As and when offered price changes due to demand dynamics or due to base price changes, the same offered price will be applicable to all its subscribers. Structure of this price bucket is same as the one for price committed products. Only difference is, in this case a single price bucket is created per product.

1. Offered price per unit
2. Start and end date of the offered price
3. Number of new subscriptions getting associated with this offered price
4. Number of subscriptions churned out from the offered price
5. Total number of subscriptions associated at any point of time
6. List of Items delivered ,date of delivery, revenue associated with each, profit associated with each

Example: In a country which imports Lentil, the lentil prices are very volatile due to supply vs demand dynamics and uncertainty of international lentil price. Lentil prices keep changing so frequently that it is impossible for a merchant to offer them using either of “price committed” or “percent discount committed” approach. So merchant has configured lentil as a “None Committed” price category.

A single price bucket gets created for Lentil product item with latest offer price say 100 Rs per Kg. If a subscriber A has subscribed to 1 Kg lentil per month for 12 months, a subscription count of 12 units gets added to “New subscription Count” attribute of this price bucket.

Very soon offer price of Lentil has risen to 120 Rs per Kg. In this case subscriber A( and all subscribers subscribed for Lentil) will have to pay 120 Rs per Kg from now onwards.

As subscribers have chosen this item for subscription despite of its published pricing category being “None Committed”, they are prepared for volatility in its offer price and hence should be ready to pay the price differences, if any.

## Product Performance Tracker

Product performance tracker keeps track of periodic performance metrics of a product. Multiple instance of product performance tracker (one per period) indicate product business trend. The overall performance metrics of a product should be actively calculated when any transaction associated with that product is made. For example, when a new subscription is made for a product it quantity per period should be updated in the latest performance tracker. When a delivery of product should be made its revenue and profit figures should be calculated with latest performance tracker etc.

## Responsibilities and collaboration

Following are the responsibilities of the product domain.

## Product Registration

All the products being served by the main business system may not be suitable for subscription business. For example nobody would like to buy electronics items periodically through subscription approach. Hence the products which are eligible for subscription business should be registered with subscription platform.

Product registration can happen in bulk manner where all the eligible products are fed to the platform as a flat/csv file having all essential attributes. Their candidature for subscription business is approved by the merchant.

Registration can also happen one per product where any new product appearing in market and is eligible for registration can be fed to platform through admin interface and gets registered.

Then onwards the subscription platform recognizes only the products registered for subscription business for managing their lifecycle.

Products registered are not immediately available for subscription by customers. This is because every product needs certain configuration as well as offer price in order to be available for subscription.

## Product Configuration

After registration a product needs to be configured so as to make it eligible to make its own pricing decisions intelligently.

Following configuration parameters are tuned so as to suite characteristic of a product.

1. Threshold Determinator: as we have discussed earlier some products are helping in growing revenue whereas others aid in growing profit. There should be criteria to trigger price change based on whether a product is doing better than its forecasted revenue/profit or lower than forecasted revenue/profit.

This trigger can be configured as “revenue”. When revenue grows above/falls below forecasted revenue per period by x%, it will trigger adjustment to offer price.

In some products this trigger may be “profit”. When profit grows above/falls below forecasted profit for a period by x%, it triggers price adjustment.

Based on experience merchant has to define appropriate threshold determinator for every product.

1. Change threshold (percentage): This should be a number (%) indicating that when value of defined threshold determinator (revenue or profit) deviates by this number(%),it should trigger offer price calculation.
2. Is cross price elasticity considered: offer price of a product can be calculated using demand function (we will see it in detail in price determination section). As we have seen in “determinants of demand” price of a product can also be impacted by change in price of its substitutes and complements. This configuration parameter asks if price variations of substitutes and complements should be considered for calculating price of a product.
3. Is advertising expenses to be considered: Similar to cross price impact, price of a product is also impacted by variations in different expenses (example: advertising expense) incurred on product. This configuration parameter lets merchant decide if he wishes to consider advertising expenses for determination of product price.

## Receive/Derive Forecast

Every product is expected to earn specific revenue and margin depending upon its popularity (measured as demand density in this context) and accordingly forecasted. The forecast is typically derived using historical performance of that product, which is then extrapolated to arrive at forecast for current year.

Forecasting can be done in following ways

1. Manual forecast: When a product in newly incepted as a subscriptionable product, there may not be any historical performance information associated with it. In this case merchant defines its forecast based on his experience and judgement on probable performance of the product. Being manual and without any past reference, this forecast may be error prone or far from reality and hence may not serve as the best basis for price computations. It just acts as a starting point for subscription business for product.
2. System corrected forecast: When actual subscriptions to a product start, its actual week on week/month on month performance is recorded by the platform. It clearly provides the trend and seasonality visible in the business associated with a particular product. This actual data is then “extrapolated” in future to generate forecast for the coming period for that product. This forecast then overrides the earlier forecast and makes it in line with current trends and seasonality.

Even if a forecast is manually made or it is made from extrapolation of earlier historical performance data, it may still not paint “precise” picture of today, unless it is capable for reflecting the recent picture of product business. Market trends keep changing and so do people preferences.

The forecast made from previous trends/past customer preferences/historical span of business/previous business maturity stage of the product etc. may have limited business value in the current period. The value decreases as the historical information keeps getting older and older.

Trends/preferences keep changing. Product may achieve new maturity level in the market as compared to past and hence may exhibit relatively different growth curve as compared to past. Also think of a situation where price of a product substitute has been increased, resulting into product demand on an increasing trend. Or think of situation where complement product’s price has been increased, resulting into decreasing demand trend for a product. Thus price variations of products in the same category (complements and substitutes) also contribute to changing trends.

So generating forecast for the product for far future as well as generating it only once in a long span of period (say once a year) will not be useful. Periodic corrections to the forecast figures are essential to reflect the most recent picture of product portfolio.

Subscription platform architecture supports periodic overriding of forecasts, based on latest historical figures. In case of long history, far historical information will also be used for forecasting but will be given lesser weights as compared to recent past figures.

Example: A merchant has manually entered forecast for **subscription count** of a product X as follows

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Product X | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct |
| Manual forecast | 400 | 600 | 800 | 1200 | 1600 | 2000 | 2400 | 2800 | 3200 | 4000 |
| Actual performance | 500 | 1000 | 1500 | 2000 |  |  |  |  |  |  |
| Corrected forecast |  |  |  |  | 2500 | 3000 |  |  |  |  |

When the actual performance over four months is accumulated, it is extrapolated to find out forecast for next couple of months.

In early stages when we have started with manual forecast and eventually collected minimal actual performance data for forecasting, there is limit to the precision of the forecast. This is because merely few historical records do not provide enough information about the trend and seasonality. So forecasts may merely be next number in the number series. But when adequate amount of data is available for forecasting, the trend and seasonality aspects of product performance start reflecting in history. This will then provide relatively closer forecasts, with reflections of recent trends and seasonality.

But also understand that when actual performance data for number of years gets collected, it may have multiple trends and seasonality reflections across the years. Theses can keep changing at different time for a specific product as new products arrive in market, people start wanting different attributes than those provided by the product etc. Thus although this historical information is very important for determining the forecast, lesser weight will be allocated to past data and weights keep increasing when data is representing recent past.

Platform provides different forecasting algorithms at different stages based on amount of historical data available and makes intelligent decisions at runtime on which forecasting technique to be used.

Let’s look at it from another angle. A Product introspects its current performance and based on it setting tougher targets for itself in future.

Forecasted profit

Forecasted profit

Actual profit

Actual profit

Consider the performance graph (profit (on y axis) vs time (on x axis)) for a product X. The first graph on left hand side shows profit forecast for X and actual profit against it. In the second graph on right side, the actual profit history has been extrapolated for future months and has become the new forecast. Now onwards product performance should be higher or lower than this “revised” forecast in order to trigger offer price change.

Attributes listed in ‘8.2.1 Input Parameters’ are forecasted/corrected from time to time.

## Forecasting with no historical data

When the subscription business is newly started, there is a possibility of no historical information available for each product being sold through subscription. In this case the only to predict the number of subscriptions per month is to use merchant’s experience based on the product’s reputation, span on business (If it is only targeting big cities or also targeting small towns; only in few states of the country or from all the states; Also how much contribution is expected from each region/state based on their respective online buying patterns). He can also collect the same information from interviewing experts or by conducting some level of market surveys. He/she can also refer to some data feeds being made available by various agencies for analysis purpose.

Initially merchant can decide to

1. Forecast number of subscriptions per month for each product, for a few months.
2. He/she should also forecast how much churning/cancellations of subscriptions can happen each month.
3. He/she should forecast probable offer price per month along with purchase price and MRP of the product.
4. He/she can open the product for subscription using an opening offer price for the current month. There are two strategies those can be adopted for opening offer price determination. Some merchants may want to open with a higher offer price(MRP or close to MRP) and later keep on reducing it as product is doing better business.

For example: For a product having 30 Rs. As purchase price,3 Rs. As operating expenses per product per unit and 55 Rs. as MRP, a merchant may want to open the product with an offer price of 52 Rs. Later the offer price can keep reducing as the product is doing better and better, from 52 Rs to 34 Rs( May not go below 54 Rs as 53 Rs is the breakeven price of the product).

Another strategy is to start with lowest possible offer price in order to win maximum subscriptions and then gradually increase it as product gets stabilized in subscription business.

So as in above example opening offer price may be 34 Rs and then eventually increasing up towards 54 Rs.

The strategy to be used highly depends on demand density of the product, market conduciveness for the product launch, season conduciveness for product launch and finally merchant’s calculations behind specific pricing decision.

Subscription platform’s pricing module should be capable of adopting any of the above strategies (low to high prices or high to low prices) and provide its price recommendations based on factors listed above. We will see in detail, how pricing recommendation engine fulfil these expectations.

The forecasted data in all above listed attributed will enable calculation of basic metrics such as revenue per month, profit per month etc. These metrics act as “targets” which the product actuals are expected to meet/exceed.

As the initial forecasts are merely based on opinions, it is less likely to be closer to actual performance of the product. But this does not cause any harm in short –term/mid-term as the forecasts are periodically being overridden by the extrapolated values for actual performance figures.

Although merchant is free to forecast for few months, minimum of 3 actual performance records are required for running any forecasting algorithm on it( so as to arrive at modified forecasts based on actual performance).

## Forecasting algorithms- with minimum historical data

Based on the superficial manual forecast (made based on experience, expert opinions), product has been launched for subscriptions. Subscribers start subscribing for that product for various durations and for various numbers of units per period.

Example: For a product having 30 Rs. As purchase price, 3 Rs. As operating expenses per product per unit and 55 Rs. as MRP, a merchant has decided opening price of product ’X’ with an offer price of 52 Rs. and predicated that its subscription for first month will be 750. But he realizes that 750 subscriptions have been crossed in first 15 days. So he/she corrected prediction for subscription count for current month to 1200. Also he decided to change the price, so as to further boost the subscriptions rate and offered a new offer price of 51 Rs. and predicated subscription of next month to be 2000 units. He witnessed that 2000 subscriptions are covered in first 5 weeks. So he /she again corrected subscription prediction for current month to 2400(from earlier 2000), changed the price to 50 Rs and predicted subscription count of 3200 for the third month.

Thus he makes few predictions manually as well as made manual offer pricing decisions. The actual subscriptions to product X for every month are stored in repository .After minimum three actual subscription counts and offer price records are found in “actuals” repository, it acts as the minimum data to be used for forecasting algorithm.

Since the actual data is less but adequate enough to use some forecasting technique, platform selects appropriate forecasting algorithm to forecast the next month’s subscription count as well as next month’s probable offer price. For this data set “**Simple Moving Average** (SMA)” forecasting algorithm is applied on the minimum dataset and next forecast for subscription count of 4th Month and next probable offer price for 4th month is provided by execution of SMA algorithm.

Extrapolated values of next month subscription count and offer price are stored in “Forecast” repository and they are used to calculate the “target” revenue and profit for next month.

Similarly forecasted subscription count for next month is fed to pricing engine. Pricing engine calculates new offer price to be recommended to merchant depending on forecasted demand of the product.

So the forecasting job runs after every ‘configured’ period (daily, weekly, monthly etc.) and forecasted values for subscription count and offer price for next period.

## Forecasting algorithms- moderate number of historical records

“Simple Moving Average” forecasting technique is useful for small set of actual data which does not have much influence of trend and seasonality. Though it provides reasonable forecast it is not very accurate.

After actual history grows to an adequate volume (say 15 records) so that it can provide indications on demand trend and seasonality, then “**Triple Exponential Moving Average(TEMA)”** algorithm is triggered to forecast next values of subscription count and offer prices. These forecasts are more precise as compared to SMA approach as they are executed on adequate amount of historical data, capable of showing impact of current trend and seasonality.

These forecasted values are then used by the pricing recommendation engine to calculate new offer price.

## Forecasting algorithms- Adequate historical data

As historical “actuals” data keeps on growing it is enabling possibilities more and more precise forecasting. For adequate number of (say 30) actual records, “**Box-Jenkins”** forecasting algorithm is getting triggered. Box-Jenkins is “**ARIMA (Auto Regressive Integrated Moving Average)”** based algorithms and capable of selecting forecasting model and coefficients based on the data. It is considered to be one of the most precise forecasting algorithms and hence takes the predictions closer to reality.

Additionally subscription platform is capable of plugging in any additional forecasting algorithms as and when needed as well as capability to invoke appropriate algorithm based on volume of actual data as well as types of products (recurring demand products/seasonal products/trendy products etc.)

## Receive and process new/added subscriptions

Subscription to different products by subscribers is the responsibility of Subscriber business domain. But subscriptions impacts product domain for each of the products, subscription is made to.

When a subscriber subscribers for one or more units of a product, per desired periodicity (weekly, monthly, quarterly etc.), the latest offer price/percentage discount of the product is offered to him. As we have seen in the ‘price buckets’ section, there is a price bucket associated for the latest offer price or discount percentage depending upon pricing category of the product.

The “subscription confirmation event” contains list of all the products a subscriber has subscribed to. So “new subscription count” of each of these products is increased by total number of subscribed units by the subscriber (for total subscription period) for that product.

If subscribed product has been categorized as “price committed” product, there is a price bucket associated with each ‘active’ offer price. Price bucket is also responsible for keeping track of number of subscribers subscribed to that product and associated with specific offer price, being published by that price bucket. When a new subscription is made it increases the “new subscription count” of respective price bucket by total number of units subscribed to, indicating that for the selected product, for the latest offered price one more subscription has been added.

If subscribed product has been categorized as “percentage discount committed” product, then too “new subscription count” of latest price bucket(offering latest discount percentage) is increased by total subscribed units for that product, indicating that one additional subscriber will be getting same percentage discount on the latest MRP as offered by latest price bucket.

If subscribed product has been categorized as ‘None committed’ product, then ‘new subscription count’ of single available price bucket is increased by total number of units subscribed.

## Receive and process subscription cancellations

Cancellation of subscription to a product by a subscriber is the responsibility of Subscriber business domain. But similar to new subscriptions, cancellations of subscriptions also has impact to Product domain.

When subscriber cancels subscription to one or more (may be all products, as a result of cancellation of total subscription) products the “subscription cancellation event” containing list of cancelled products is received by product domain.

For each product, depending upon committed price/percentage and date of subscription, its appropriate active price bucket is found out and its ‘churned subscription count’ is increased by the count of not yet delivered units of the product, indicating that those many items of the products are cancelled by the subscriber.

If the product is ‘None committed’ then ‘churned subscription’ count of single available price bucket is increased.

## Receive and process subscription deliveries

Delivering desired cunt of items per product to a subscriber is expected managed by the main shopping application. The trigger for delivery should be managed by Subscriber domain. But when few items are successfully delivered from the total items subscribed by a subscriber, it will impact total subscription count for that product in product domain.

## Process price bucket expiration

When all subscribed items of a product, by a subscriber gets successfully delivered to him/her, his/her subscription for that product is said to be completed.

Among the subscribers who have subscribed for a specific product either successfully receive all their deliveries or they cancel their remaining subscription. As we know new subscriptions of a product specific to an offer price are accounted in its price bucket under “New subscription count”. Similarly subscription churn is accounted under “Churned subscription count”, and deliveries are accounted under “items delivered count”.

Active subscribed items yet to be delivered = New Subscription count – churned subscription count –items delivered count

When the above arithmetic returns zero (active subscribed items yet to be delivered=0), it means that the price bucket is exhausted with all subscriptions associated with its offer price. This price bucket is then marked as expired in data repository as well as removed from list of active price buckets in respective product’s product account.

## Receive and process operating expense per product per unit

Operating expenses are managed by ‘Business Account’ business domain. Two types of operating expenses are handled by platform; fixed expenses and variable expenses.

Subscription platform receives both types of expenses attributed to (to be shared by) subscription business from main application. Expense distribution job distributes total fixed as well as variable expenses across all subscriptionable products so that each product should know and bear operating expenses per product per unit attributed to itself. The per unit expense is used in determining the breakeven price of a product which in turn is used for determining offered price of that product at any point of time.

‘Expense calculated event’ is fired by expense distribution job, one for each registered subscriptionable product. It is received by each product. Product maintains the recent history of changed operating expenses. Whenever operating expense undergoes change, it impacts profit being delivered by each price bucket and hence profit recalculation happens for all active buckets.

## Derive actual performance of a product

Each product maintains following attributes which demonstrate its performance in various aspects, per period. Their detailed description is already provided in ‘8.2.2 Calculated Metrics’ section.

1. Net new subscriptions per period(say month)
2. Total subscriptions per period
3. % subscriptions churn per month
4. Monthly recurring revenue due to new subscriptions in a month( MRR New)
5. Monthly Churned MRR among subscriptions affiliated to offered price.
6. Total churned MRR
7. Percentage net MRR churn
8. Ratio of Its expected quantity demanded per month against total quantity demanded of all products in the same category( product and all its substitutes)
9. Monthly Average revenue per new subscriptions (ARPS (New)
10. Total monthly revenue
11. Total Cost of goods sold
12. Operating profit/loss and Operating profit/loss percentage
13. Subscription Lifetime Value(SLV)
14. Subscription lifetime period
15. Cost of Acquiring a subscription(CAS)
16. SLV to CAS ratio
17. Months to recover CAS

A Metrics calculation periodic job will calculate performance metrics for each product. It runs at a periodicity as configured by merchant (weekly, monthly, and quarterly).

## Receive and process offer price/per cent discount changes

Calculating offer price of a product is a complex task and it is performed by a ‘Product Pricing Job’ outside of product business domain. Once a new price is calculated for the product, it is received by Product domain through ‘Offer price updated event’. It will cause creation of a new price bucket, with start date as date of new price receipt and offered price as newly calculated offer price. Now any subscriptions will be affiliated to this price, until next price change happens. This scenario is applicable to products having category ‘price committed’.

In case of ‘percentage discount committed’ products, a new discount percentage is received, resulting into creation of new price bucket.

## Receive and process daily price quotes from main application.

Subscription platform assumes that main application will first receive changes in purchase price/MRP of a product (as they are responsible for maintaining the inventory). It will then send the price changes to any of the subscriptionable products to the platform.

Product Account maintains list of purchase price/MRP changes versions. So upon receiving the “Tagged price changed event” from main application (through integration layer) a new version of tagged offer price (composed of purchase price, MRP and change Date) is added to the list.

When purchase price undergoes change, it has a winder impact on overall revenue and profit recognition.

Consider a scenario that for product X( it is price committed), there 3 active price buckets already existing prior to purchase price change, each having different number of subscriptions associated with each offer price. Assume that these 3 price buckets have offered prices based on earlier purchase price of 30 Rs and MRP as 55 Rs.. Also assume that standard total expense per unit for product X is 3 Rs. So the breakeven price will be 30+3=33 Rs. SO the 3 offered prices from these buckets are

Bucket 1 has offered 50 Rs with 2000 active subscriptions out which 300 items have been delivered so far.

Bucket 2 has offered 47 Rs. with 3300 active subscriptions out of which 450 have already been delivered.

Bucket 3 has offered 45 Rs. with 5200 active subscriptions out of which 670 have already been delivered.

Now purchase price has changed from 30 to 35 Rs. and MRP from 55 to 60 Rs.

After purchase price changes there are 400 items delivered from price bucket1, 600 from price bucket 2 and 750 from price bucket3.

For price bucket1 the recognized revenue = 400\*50 = 20000 Rs. and breakeven cost=400\*(35+3)=15200. Hence recognized profit =20000-15200=4800 Rs.

For price bucket2 the recognized revenue = 600\*47 = 28,200 Rs. and breakeven cost=600\*(35+3) =22800. Hence recognized profit =28200-22800=5400 Rs.

For price bucket3 the recognized revenue = 750\*45 = 33750 Rs. and breakeven cost=750\*(35+3) =28500. Hence recognized profit =33750-28500=5250 Rs.

As seen in the above example committed offer price could not be altered, but purchase price of the product undergoes change. So items delivered after purchase price increase report much lesser profit.

Also understand form the above example that profit and revenue calculations are not based on number of subscriptions of any product but they are based on number of actual items delivered to subscribers till date. This is because subscription for a product is just an advance intimation of the desire to buy that product in specific quantity per specific period. It can be changed by the subscribers any/multiple times during their subscription period. Revenue and profit get recognized only after actual items are successfully delivered to respective subscribers

## Calculate total profit of a product

In subscription business model the same product is offered to different subscribers at different times with different prices, and these subscriptions are active at any point of time. So profit calculation for a product at any time is aggregation of profit calculation of each of its active price buckets.

The examples described above in earlier section indicate how profit of each price bucket gets calculated separately for respective delivered items and then total profit is calculated by addition of all price bucket specific profits.

For illustration purpose if we have to calculate profit at a given date after purchase price change then it will come out to be

Total profit for product X at a given date = profit of price bucket1 at given date + profit of rice bucket2 at given date + profit of price bucket3 at given date.

So Profit(X) = 4800 + 5400 + 5250= 15450

Profit of individual price bucket gets calculated every time some units of product are delivered. At the same time aggregate profit is getting updated.

## Contribute to Nodal Account

Product collaboration model suggests that “excess” profit attributed due to “over” performance of some products can be provisioned for helping underperforming products to recover. When any product is underperforming typically following provisions are tried to boost its performance.

1. Offer additional discounts/benefits on them so that price sensitive customer segment can be attracted.
2. Increase advertisement expenses to promote that product and broadcast added benefits being offered on it.
3. Initiate clearance sale for some underperforming products at throw away prices so as to minimize losses due to wastage of inventory due to expiry of such products.

The “excess” profit amount is periodically added to a central account named as nodal account. In order to understand this better let’s define “excess” profit.

Price change of a product is triggered by configured “threshold determinator” and “change threshold” values. Threshold determinator can be revenue or profit. Change threshold will be the percentage change in the determinator value which will trigger offer price recalculation.

Consider that threshold determinator for product X is defined as “revenue” and “change threshold” value is set to 5%. It means when revenue of product X deviates (up or down) from its forecasted revenue figure by 5%, its price will be recalculated.

If product X earns 7% more revenue than forecasted figure, it will trigger price calculation. But the additional 2% will be considered as “excess” revenue and hence will be contributed to nodal account.

The same applies to products having “profit” as threshold determinator. In this case if 10% is the “change threshold” and of product earns 13% more profit than forecasted profit figure then the amount equivalent to “excess” 3% profit will be contributed to nodal account.

When deliveries are made, revenue and profit get calculated and at the same time excess gains are added to nodal account.

For each 100/ 1000/ 10000 Rs contributed (configurable) the product receives 1 credit point. These credit points serve three purposes.

1. It will ensure that the gains earned by a product should be attributed to itself even if it has contributed to nodal account and total gains visible in its own account are less(due to the donation described above)
2. It will enable them to request for similar help from nodal account when similar situation may arise to them OR clearance sale need to be initiated for them OR Seasons sale need to be initiated for them OR additional discounts need to be provisioned for them for various reasons.
3. It will indicate their demand score in the form of credit points earned by them in business monitoring/reports which will help analysts take appropriate decisions while setting sales targets for them.

## Product Pricing

As we have discussed earlier, competition in retail (instantaneous) business has led to price wars. A Merchant tries to offer heavy discounts on the products so as to gain more customers. In reply to this another merchant offers even bigger discount thereby trying to get an edge over other merchants.

As a result multiple approaches and business models have been evolved to figure out appropriate instantaneous price for a product based on current demand as well as current prices being offered by competitors. These models make use of statistical techniques, machine learning, and artificial intelligence so as to empower software systems to keep analysis performance of product, performance of their competitors and keep offering adequate prices at every instance due to which merchant can take lead in sale over its competitors.

In subscription business exact same techniques may not be useful as well as required. Firstly there is no notion of instantaneous price, because nature of association between merchant and a customer is long term. Price or percent discount offered to a subscriber may stay constant for the whole duration of his/her subscription. It is the benefit that subscribers are getting for having long term agreement with a merchant.

Secondly it is very difficult to directly compare price of a product across multiple competitor merchants at any point of time. This is because price of a unit of a product being finally paid by a subscriber is a function of

1. Offer (discounted) price offered at the time subscriber has subscribed to the product.
2. Pricing category of the product (price committed, per cent discount committed or None committed)
3. Further discounting/benefits in the offered price, may come in the form of “basket level benefits”. Basket level benefits are calculated based on volume of basket, duration length of basket, demand density of products added to basket etc. So even if other subscriber subscribing for different products on same day and with same total subscription amount, they may be offered different basket level benefits. This is because their basket volume is different, subscription length is different or one has subscribed to highly demanded/monopolistic products whereas other has subscribed to moderately demanded/newly arrived products.
4. Further discounting/benefits in the offered price due to other attributes such as loyalty benefits (benefits earned by subscriber for remaining associated with same merchant for long period).

Thus it is very likely that different subscribers subscribing to same product at the same time in same quantity may pay differed final price for that product per unit. So direct price comparison by customers does not help them choose right merchant. But their long term association with same merchant, volume of goods subscribed and type of brands selected will determine their gains.

Hence it is essential to form set of rules for determining price of a subscriptionable product. Here are some of the rules.

## Rules for calculating offer price of a product

1. Offered price should contain item level discounts (reduction of fixed amount from MRP in case of price committed products, reduction of percentage of MRP in case of percentage discount committed products) as a default mechanism. Every product being bought will carry some discount against its current MRP, so that overall basket price to be paid may be lesser than total MRP of all items added to basket. Though offering some level of price discount is a default mechanism, it is not mandatory. In case the demand is too high than supply the few subscribers may have to subscribe for a product with its MRP.
2. Item level (per unit) discount should not depend on subscriber specific attributes such as subscription duration of an individual or volume of its items being purchased by a specific subscriber. It should mainly depend on current demand of that product, available profit margin and overheads (operating expenses/marketing expenses) being incurred per unit for that product. Mostly everyone who has subscribed to the same product on a same day will see the same (per unit) price/percentage discount for that item.
3. Although same price/percentage discount is offered to subscribers subscribing at the same time, it may vary from time to time every day for each product depending upon variations in their demand (and overheads) so that subscribers subscribing for same products at different time may see different offered price/percentage discount.
4. Though single price is offered to all subscribers subscribing at the same time, the actual price that each of them will be paying may be different due to various subscriber specific and subscription specific benefits (different for each subscriber).
5. As offer price of a product is primarily a function of its demand, when price reduces in most cases demand will increase. It is best represented by demand function. Though demand function illustrates effect of price change on the demand, it is being used to use in the inverse order; where demand is getting forecasted and price to be offered for that demand is determined with the help of demand function.
6. Price of a product can also be impacted by price variations in its substitutes and complements. When price of a substitute product increases, it may result in increase in demand of this product as people may shift from substitute to this product. So it will impact price dynamics of the product. Similarly if price of its complement increases, its demand may decrease resulting into possibility of lowering its price. This phenomenon is commonly referred as “cross price elasticity” in economics and hence may play a role in determining price of a product. This is optional and should be opted by the merchant through configuration.
7. Similarly price of product may also be a function of marketing and advertising expenses, but this attribute is optional.

## Introduction to demand function, Cost Function and price elasticity

The basis adopted by the subscription platform for calculating offer price of a product is the demand function. Demand function states that for a price sensitive product the demand of a product increases if its price decreases. This is represented as

**Price= Intercept + slope\* quantity**

Similar to demand function there is a cost function which states that cost of a number of products being sold is a sum of fixed cost and variable cost.

Cost= fixed cost + variable cost.

Fixed cost is usually independent of number of units being sold. Example: rental expenses, electricity charges, communication (phone, internet) charges etc.

Variable cost is dependent on number of units of a product being sold. So as quantity of product units being traded increases, cost increases. Example: purchase cost of products, special maintenance charges per unit of a product, labour charges per unit of a product etc.

Example cost function is :

Total Cost= 140000 + (10\* Quantity of product units)

Where 140000 is fixed cost and (10\* quantity of product units being traded) is a variable cost component.

This can be best represented by following graph depicting demand figures for a product having 30 Rs purchase price, 3 Rs. per unit operating expenses and 50 Rs as MRP.

X Axis represents the “quantity demanded”. The demand is ranging from 0 to 25600 units.

Y Axis represents offered price. Offered price ranges from 0 to 60 Rs.

MRP of the product in consideration is 50 Rs.. As subscription platform assumes that it will (almost) always offer some discount on MRP in order to win any subscription, we can assume that 50 is an intercept (point of demand curve cutting Y axis) where demand is assumed to be 0.

Slope of demand curve is determined by the trend by which one unit decrease in offer price determines amount of increase in demand. It varies from product to product. In some product small decrease in offer price may result in large increase in demand, whereas in some other change of price may have negligible impact on its demand.

But in case of demand curve it may not be an actual straight line. So regression techniques can be used to determine slope as one of the coefficients. We will see in price determination section how it is determined in subscription platform.

Typically slope of a trailing straight line is defined as

Slope of demand curve = - (y2-y1)/(x2-x1)

As shown in the graphical representation above, as offer price starts declining from Rs 50 to a lower price, the demanded quantity starts increasing. This behaviour is represented by the “demand curve” showing negative (declining) slope. In this example case, based on trend the slope is 0.002.

At the same time as the quantity demanded starts increasing the overall cost also starts increasing because

Cost = (purchase price per unit\* number of demanded units) + fixed operating cost + (variable operating cost per unit\* number of demanded units)

Thus increasing demand does not necessarily ensure increasing revenue or increasing profit at all the offer prices because

Revenue = quantity demanded \* price at which quantity is demanded

Profit = revenue –cost.

Increase in demand is compensated by decrease in the offer price. So at higher offer prices the revenue starts increasing from 0(though demand is low). At certain offer price it reaches to maximum .Until this point increase is demand is dominating over decreasing in offer price. After this threshold price, the decreasing price starts dominating the revenue, so that increasing demand no more compensate for decreasing price, so revenue starts decreasing. The yellow arc represents this behaviour. At demand 25600 the revenue is 0, as offer price is zero.

50- (0.002\*25600) =0

Similarly profit will be initially negative because cost is higher than revenue (see the intersection between cost curve and revenue curve). This is because sum of fixed operating cost and variable cost is more than the revenue due to less number of demanded units.

Profit starts increasing as demand increases and revenue grows greater than cost (Observe that profit curve is entering into non-zero zone at a demand where revenue curve is growing greater than cost curve). Operating cost per period remains more or less same and increased purchase cost (due to increase in demanded quantity) is compensated by the increasing revenue (despite of lowering price).

But after a cut-off point (seen at demanded quantity of 10600 in the above graph) the profit starts falling and eventually turning negative. Here the decrease in the offer price for the increased demand could not compensate increase in cost due to increased variable operating expenses.

One more term that should be understood is the “price elasticity of demand”. It is defined as percentage change in quantity demanded for one percent change in price. It is mathematically represented as

e(p)= (dQ/Q)/(dP/P)

Due to inverse nature of relationship between offer price and demand this formula usually yields negative value.

Price

e(p)< -1

e(p)= -1

e(p)> -1

Quantity demanded ---🡪

As shown in figure above, across the demand curve price elasticity is not the same at all the points.

In the initial stage when there is a large variation in demand in response to very small variation in price, the price elasticity is less than -1(e(p) <-1). In this phase the product is said to be highly price elastic. It means that minor variation in product price can make a significant impact on its demand.

At certain demand for a given price the elasticity becomes equal to -1(e(p) =-1). In this phase the product is said to be unit elastic; i.e. for one percent change in price there is one percent change in demand.

After the unit elastic stage, the price elasticity is increased further so that it becomes greater than -1 (e(p) >-1). Here the product is said to be in price in-elastic stage. It means that for a considerable change in the price there is minor/no change in its demand.

If we try to establish the relationship between price elasticity value and profit/revenue we will find that profit is maximum when price elasticity is less than -1 but close to -1. It means that profit and revenue maximization happens when the product demand is elastic to price.

So it means that when a product demand is in-elastic is profit is trailing. As price recommendation engine need to determine a new price to be offered it should change the price when the demand in “in-elastic” phase. Since in this demand range demand is not sensitive to price change, even a slight increase in current offered price does not impact its demand.

This is the core fundamental behind offer price determination. Lets get into more details on how offer price determination happens when a product is in “in-elastic” stage of its demand, and where its profit has started declining.

## Demand Function based offer price determination

The process of offer price determination is explained here in stages.

## Determination of opening offer price a start of product launch

As stated earlier, when product is first time getting launched in subscription business, absence of historical data requires that merchant should open the offer price of his choice based on his experience.

Merchant may adopt either of two strategies for manually opening offer price.

1. He/ She may open up lowest possible (equal to or little more than breakeven price) offer price and expects the pricing engine to increase price when demand is increasing.
2. He/ She may open up offer price close to (may be little less than) MRP and then expects pricing engine to adjust the price as per demand dynamics.

Pricing engine is capable handling both scenarios and takes the price determination from there.

## Determination of forecasted demand

We have already seen in detail how the demand forecasting is done by forecasting job. The newly forecasted demand is then received by pricing engine. As we have seen the demand function is

Unit offer price of a product = Intercept + slope\*demand

This forecasted demand is fed to demand function so as to derive a new offer price.

## Determination of Demand Function based on available data

Determination of demand function is determination of its intercept value and slope value. Pricing recommendation engine makes an assumption that if product is sold at MRP, no one will subscribe to it. So MRP is the price where demand is 0. Thus MRP of a product becomes the intercept.

When opening prices are manually determined by the merchant, no demand function is needed.

Slope calculation and Slope adjustment is handled with a special process. Let’s first understand how the initial slope is calculated.

For manually opened up prices some subscriptions start getting registered. So for every available price subscription platform starts registering actual demand.

Because this is initial stage of product business as price drops, demand increases. As shown in example graph, calculated profit is initially negative but starts picking up.

If merchant has started with highest offer price approach then until the profit is increasing, offer price will keep decreasing.

Slope will be calculated as

Slope = (latest (last) offer price - earlier (current minus 2) offer price)/ (demand associated with last offer price - demand associated with earlier offer price)

As “current -1” price will be lesser than “current-2” price, the slope will be a negative value.

## Substitution of forecasted demand for obtaining offer price

When slope calculated in above stage is substituted in demand function it will further decrease offer price, as

New Offer Price= Intercept + (-slope\*demand).

The same slope continues until the offer price is decreasing but the demand (total subscription count to that product) is increasing exponential resulting into increasing revenue and profit. The slope will be discontinued when profit starts declining.

## Verification of forecasted profit against current profit

Every time a new price is offered its actual revenue, cost and profit are repeatedly getting calculated by subscription platform for every new/churned subscription and stored in repository.

When a new offer price is determined using the same process, its forecasted revenue, cost and profit figures are calculated using the forecasted demand figure. This forecasted profit is then compared with actual profit associated with current offered price.

## Case “Profit Increasing”: continue with existing slope

If the forecasted profit is more than current profit, it means that increase in demand is more than compensating to decrease in price, resulting into increasing profit. It also means that product demand is in “elastic” (sensitive) to price change. Hence further decrease in price may bring even better increase in its demand.

So same slope is continued to be used for price determination and the new offer price is recommended to the merchant.

## Case “Profit declining due to demand declining”: Continue decreasing price

If forecasted profit is getting lesser than current actual profit, it means that product’s increasing demand is no more compensating for its decreasing offer price.

This situation can happen in case of following two scenarios

1. Profit is decreasing because demand is decreasing
2. Profit is decreasing despite of increase in demand, due to decrease in offer price.

First scenario indicates that either less number of new subscribers is subscribing to the product, OR more number of existing subscribers is cancelling subscription to the product. There may be many reasons behind decline in the demand of the product, but what merchant can only do in short term is, provide even reduced/discounted offer price in order to boost the demand.

So the same approach of calculating price using the demand function with continued slope value is exercised which will provide next lower offer price value. This value is then recommended to merchant for launching.

## Case “Profit declining due to price declining”: Adjustment of slope for increasing price

When profits starts declining despite of increase in demand, this scenario indicates that more number of subscribers is subscribing to the product OR subscription churning is significantly lesser, but offer price is brought down to such a low level that it is unable to compensate for increasing demand.

It also means that its demand is in the “in-elastic” price zone (refer to graph and explanation associated in earlier section) where profit has started declining. Also as demand is in “in-elastic” price zone, increase of offer price (in order to restore declining profit) **does not** significantly impact its demand. So this is the time to increase price so as to bring profit in the growing mode.

The same demand equation i.e. New offer price= intercept + (slope\*demand) Is going to be used. Demand is obtained through forecasting job, as usual. Main change is in how to calculate the slope.

The approach adopted to increase the price, is to increase the slope which is used in demand function for calculating offer price. So that in the equation Price= Intercept + (slope\*demand), the slope( it is negative) is increased( lesser negative value),so that offer price will get increased instead of getting decreased, as in all other scenarios.

But how much increase should be made to the slope value? The approach adopted to determine the amount of increase in slope value is to use the weighted average of prices and demands so far.

**Corrected Slope = latest slope value – (Latest slope value\*Latest weighted average of price and quantity)**

**Latest weighted average of price and quantity= (sum of products of actual price and demand for that price)/ (sum of all demands (for each prices so far)**

The reason why weighted average of prices and demands is used as a slope magnifier is, slope itself is calculated using price and demand.

Slope= (latest offer price-last offer price)/(latest demand – last demand)

So impact of change in demand on price as well as that of change in price on demand is best captured by relationship of both. Weighted average represents summary of trend of relationship between impact of price change on demand and vice versa. This trend decides ultimately how much price increase advisable.

## Example of all above scenarios

In order to understand all scenarios described above, let’s consider a hypothetical example. A Merchant is launching product X. He/she is purchasing the product in 30 Rs. and its MRP is 54 Rs.

He/she is periodically receiving operating expense to be borne by Subscription business on a monthly basis. It includes fixed operating expenses and variable operating expenses. In order to cover these expenses, he/she distributes them across all subscriptionable products. How the expenses are distributed across products is a separate topic where it will be described in detail, but for now let’s assume that product X has to bear 2 Rs per unit operating expense.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **BrkEvn price** | **Slope** | **offered price** | **demand** | **Cost** | **Revenue** | **Profit** | **Description** |
| 32 | 0 | 50 | 540 | 20277 | 27000 | 6723 | Opening price by merchant. No slope calculation required. |
| 32 | -0.0074 | 49.26 | 640 | 22105.6 | 31525.93 | 9420.33 | New demand is forecasted. |
| Latest price is taken as opening price. |
| Last price is MRP |
| 4.       Latest demand is actual demand for earlier offered price (50 rs) |
| 5.       Last demand is 0. |
| 6.       Slope is calculated using above price and demand figures and used to determine next price for the forecasted quantity. |
| 32 | -0.0074 | 48.89 | 690 | 23184 | 33733.33 | 10549.3 | 1.       New Demand is forecasted. |
| 2.       Latest price is taken as latest offered price. |
| 3.       Last price is earlier offer price. |
| 4.       Latest demand is actual value of demand associated with latest price. |
| 5.       Last demand is last demand associated with earlier price. |
| 6.       Slope is calculated using above price and demand figures and used to determine next price for the forecasted quantity. |
| 32 | -0.0074 | 48.15 | 790 | 26251.7 | 38037.04 | 11785.3 | Same as above because profit is increasing. |
| 32 | -0.0074 | 46.81 | 970 | 31845.1 | 45410.37 | 13565.3 | Same as above as profit is increasing. |
| 32 | -0.0074 | 47.93 | 820 | 26789.4 | 39299.26 | 12509.9 | Same as above as profit is increasing. |
| 32 | -0.0074 | 44.74 | 1250 | 40662.5 | 55925.93 | 15263.4 | Same as above as profit is increasing. |
| 32 | -0.0074 | 43.26 | 1450 | 47009 | 62725.93 | 15716.9 | Same as above as profit is increasing. |
| 32 | -0.0074 | 44.22 | 1320 | 42702 | 58373.33 | 15671.3 | Using Same as above, profit has decreased as compared to last price. |
| 32 | -0.0074 | 40.22 | 1860 | 60059.4 | 74813.33 | 14753.9 |  |
| 32 | -0.0041 | 46.94 | 1740 | 56115 | 81668.63 | 25553.6 |  |
| 32 | -0.0041 | 46.77 | 1780 | 57351.6 | 83257.02 | 25905.4 |  |
| 32 | -0.0041 | 44.95 | 2230 | 71783.7 | 100231.2 | 28447.5 |  |
| 32 | -0.0041 | 44.13 | 2430 | 78148.8 | 107247.5 | 29098.7 |  |
| 32 | -0.0041 | 42.8 | 2760 | 88706.4 | 118114.3 | 29407.9 |  |
| 32 | -0.0041 | 41.33 | 3120 | 100214 | 128960.6 | 28746.2 |  |
| 32 | -0.0023 | 47.4 | 2930 | 94082.3 | 138890.6 | 44808.3 |  |
| 32 | -0.0023 | 46.23 | 3450 | 110745 | 159500.8 | 48755.8 |  |
| 32 | -0.0023 | 45.53 | 3760 | 120658 | 171208.3 | 50549.9 |  |
| 32 | -0.0023 | 45.98 | 3560 | 114205 | 163704.6 | 49499.8 |  |
| 32 | -0.0023 | 45.13 | 3940 | 126356 | 177807.7 | 51451.9 |  |
| 32 | -0.0023 | 44.39 | 4270 | 136896 | 189527.5 | 52631.3 |  |
| 32 | -0.0023 | 45.04 | 3980 | 127599 | 179254.4 | 51655.6 |  |
| 32 | -0.0023 | 44.27 | 4320 | 138456 | 191260.5 | 52804.5 |  |
| 32 | -0.0023 | 42.52 | 5100 | 163455 | 216836.9 | 53381.9 |  |
| 32 | -0.0023 | 41.23 | 5670 | 181724 | 233794.8 | 52071.3 |  |
| 32 | -0.0012 | 47.21 | 5430 | 174032 | 256366.5 | 82335 |  |
| 32 | -0.0012 | 46.76 | 5790 | 185512 | 270757.9 | 85246.3 |  |
| 32 | -0.0012 | 46.05 | 6360 | 203774 | 292881.6 | 89107.2 |  |
| 32 | -0.0012 | 46.34 | 6130 | 196405 | 284052.2 | 87647 |  |
| 32 | -0.0012 | 45.96 | 6430 | 205953 | 295542.5 | 89589.6 |  |
| 32 | -0.0012 | 45.39 | 6890 | 220687 | 312724.1 | 92037.4 |  |
| 32 | -0.0012 | 44.93 | 7260 | 232538 | 326160.2 | 93622.4 |  |
| 32 | -0.0012 | 45.45 | 6840 | 219085 | 310882.2 | 91797 |  |
| 32 | -0.0012 | 43.76 | 8190 | 262326 | 358420.8 | 96095.1 |  |
| 32 | -0.0012 | 43.88 | 8100 | 259362 | 355393.3 | 96031.3 |  |
| 32 | -0.0012 | 42.19 | 9450 | 302589 | 398679.8 | 96090.8 |  |
| 32 | -0.0012 | 41.5 | 10000 | 320200 | 415008.9 | 94808.9 |  |

## Benefits

1. Platform should provide an interface using which rules for configuring any additional benefits such as basket level benefits, loyalty benefits, brand loyalty benefits, seasonal benefits etc. can be defined in a consistent fashion. Each benefits should adhere to following rules.
   1. Benefits are applicable to one of the **domain entities**. For example: In case of Basket level benefit, the benefit is applicable on basket (and thereby products added to it). In case of loyalty benefits it is applicable to subscriber.
   2. Benefits are dependent on some **independent attributes** of the domain entity to which they are applicable. For example: As Basket level benefits are applicable to Basket, they are dependent on total basket amount for entire subscription duration, demand density of products added into it. Loyalty benefits depend on number of subscription renewals, duration of each subscription and total subscription amount for ach subscription.
   3. Dependency of Benefits on **independent attributes** of applicable entity is linear or non-linear, proportional or inversely proportional. For example basket level benefit is non-linear and proportional to total basket amount AND linearly proportional to average demand density of products contained in it.
   4. Benefits are offered in various **instruments** such as discount, redemption vouchers, cashbacks etc.
2. Basket level benefits should also be offered as an optional configuration. Subscription business is not sustainable if subscriptions for single/few products are encouraged. In order to handle the equilibrium between profit and loss among products, in order to minimize operating expenses and in order to maximize benefits on sales and marketing expenses it is essential to encourage a subscriber to add more and more items in his basket as well as remain subscribed for as longer duration as possible.
3. Basket level benefits depend on
   1. Demand of the items added to the basket(thereby profit margins available on these products)
   2. basket worth
   3. Subscription duration.
   4. Static basket definition vs changing basket definition

Consider following scenarios as below

* 1. In case two subscribers who has subscribed for the exact same set of items on a same day will be given different basket level benefits if their subscription duration is different.
  2. In case two subscribers who have subscribed on the same day with same duration will be offered different basket level discounts if their basket worth are different. Basket worth is a function of basket amount as well as demand level of basket ingredients.
  3. In case two subscribers who have subscribed on same day with same total basket amount, may get different basket level discounts as demand levels of the products added to respective baskets are different. The subscriber who has added more high demand products will get lesser basket level discount than the one who has added more low demand products.
  4. If two subscribers who have subscribed for same set of products and for the same duration are offered same basket level discount until their basket definition remains unchanged. Now if one of the subscribers has made changes to his basket content, his basket level benefits will get recalculated and he will be offered lesser basket level benefit.

1. The basket price with benefits (with item level as well as basket level benefits) will remain same only until the content in the basket remains unchanged. In case a subscriber modifies the content in the basket (replace few items with few other etc.), the basket level benefits will be recalculated. In this case item level discounts for the items subscribed in the past should remain unchanged.
2. For the same reasons platform should make provisions for offering benefits for the customers loyal to the merchant, brand etc.. The more association a subscriber has with a merchant the more benefits he/she can be awarded. This benefit will be in addition to item level and basket level discount and is optional.

## Constraints

1. There should be rules around how many maximum units of a same product can be subscribed by a subscriber. Also the rule regarding what should be the maximum allowed subscription period for any subscriber. The first rule is to eliminate the possibility of some retailers pretending themselves as subscribers and subscribe for large volumes of products (thereby getting heavily discounted) and selling those to their actual customers. The second rule is to limit the price commitment period in the truly volatile and uncertain market situations.

## Collaboration

1. Products should collaborate among each other indirectly through an intermediator (nodal account) so as to share their profits and losses as well as for building corpus for basket and loyalty level benefits. The reason they do not directly collaborate is to avoid any bias in sharing benefits among competitors.
2. On every day when a profit is registered for a unit of product, this profit amount should be distributed to various portfolios and in the given sequence/priorities
   1. Operating expenses share( even if loss occurs still this share needs to be given mandatorily)
   2. Nodal account share( money will go here only if profit is registered else no money is deposited)
   3. Product account share (If profit is registered the product will hold its own share of profit equal to the targeted/forecasted profit or less, in case of loss nothing goes here)
   4. Merchant account share: the remaining (in case of profit) after distributing the above components will get added to this account. No money is deposited if there are losses.

## Provisioning needs

When a merchant is about to set retail subscription business for subscribers, he is expected to have some estimation/forecast regarding

1. Probable number of subscribers he may win over a period(monthly, quarterly, yearly) as well as probable turnaround of subscribers(subscribers leaving their subscription OR they are not renewing their expired subscriptions due to competition or other reasons)
2. Average subscription amount per subscriber per period(say Rs. 2000 per subscriber per month)
3. Probable average distribution of subscription basket (how many product categories an average basket will constitute. Example: grain, bathing soap, washing powder, sugar, house cleaning items, spices, sauces/jams, ready to eat food items etc.)
4. Periodic operating expenses(total monthly/yearly as well as per subscriber monthly/yearly )
5. Sales and marketing expenses to acquire every new subscriber.
6. Probable changes in the prices of items due to inflation, short of stock or other reasons.
7. Other losses due to situations like payment defaulters, rejection/returning of goods by subscribers, wastages and handling damages, interest on delayed payments etc.

Based on this estimation merchant is expected to allocate some annual budget for the subscription business. It is the provision of amount he has made to run the subscription business, as well as to recover from any possible losses. Typical provisions include

1. **Cost of goods/purchase price** for different products as per the estimation about their demand and usage volume. Since the subscription platform does not take care of the actual purchase process and relies on the main shopping application to take care of it, this is simply a purchase price of an item when someone subscribes for it. The job of procurement of goods is out of scope for the subscription business and main shopping application is expected to take care of it. Subscription platform will periodically provide the demand of each product so the main application in order for the merchant to negotiate better with suppliers/manufacturers. This price becomes the investment reference against which the margins are estimated, sale prices are decided for each product as well as actual margins are realized. Ideally there should not be any separate provision required at item level discounts as the products provisioned for purchase are expected to make it through their sale.
2. **Provision for additional benefits**. Basket represents set of products (each with certain quantity) which a customer has subscribed to for periodic buying. Subscription business suggests more benefits at basket level than at individual product level, so as to attract subscribers to add more to basket thereby increasing overall revenue.

Similarly in order to retain a customer for long term different loyalty benefits (subscriber loyalty, brand loyalty etc.) should also be provisioned by a merchant. Seasonal discounts on seasonal as well as clearance products needs provisioning as well.

This provision is expected to be required only for initial set up of subscription business because after it is stabilised every profit making product is expected to contribute into it.

1. **Provision for recovering loss making products/establishing new products by promoting overall sale**. This amount is typically expected to be used for offering additional /time bound/surprise benefits in addition to the normal discount/benefit calculations already made for every product as well as at basket level. In case of crisis situation for some products which are incurring losses, this can be used as a rescue mechanism in order to boost the sale for these products. Similarly n order to launch a new product in market for which the demand is not known, such kind of promotions will be useful. This provision is optional. Whether to make this provision is on merchant’s discretion.
2. **Provision for Operating expenses**. It includes the expenses incurred on managing the inventory of subscribed products, cost one periodic deliveries to subscribers; cost of managing the software systems for subscription business, cost on personnel required to run the business etc.

Again actual dispatch to customers or managing any systems for that is not in scope of the affiance platform. But it is important to account for these expenses (proportional to subscription business out of total operating expense incurred by the shopping enterprise) in identifying the breakeven quantity/price below which sale of any product is not recommended. Also the gross and net profit calculations are heavily based on this.

1. **Sales and marketing expenses** so as to acquire more subscribers as well as an attempt to retain them. Again the actual efforts on sales and marketing is not in scope for subscription business but will be carried out by the parent organization along with normal/instantaneous business. But the investment being made on subscription specific sales/marketing should be known to compute the impact of it on acquisition and retention of customers for subscription business. Its computation provides some metrics (Lifetime subscriber value(LSV), Lifetime subscriber period, Cost of acquiring a subscriber(CAS), LSV/CAS ratio etc. which indicate health of subscription business.
2. **Provisioning for losses** due to reasons mentioned above.

## Business Forecasting

Every product being sold under the subscription portfolio is expected to contribute some percentage to the total revenue and profit depending upon the demand associated with it in current market as well as the margin it offers the merchant. The same two factors are also used determine its pricing and benefits.

Target setting is the process by which merchant need to carefully evaluate and set probable demand for a product for the probable price, possible changes in its price(due to supply shortage or inflation) and thereby calculating the overall revenue generation by that product as well as net profit earned by it.

Progress of a product is not only a function of its own credibility but also depends on how its competitors are doing at the same time. So every product should be aware of its “substitutes”.

Thus demand of that product will be a relative function of total demand of all products in a given category and how much contribution a specific product has in it. (product A’s demand(quantity per unit period) in category X/total demand(quantity per unit period) in category X).let’s name it as “demand density”.

## Inputs Forecast parameters

Following parameters need to be entered by the merchant at start of the year **for every product** during the initial setup of platform.

## Calculated Forecast Parameters

## Correction of Forecasts

When subscription business is initially set up using the subscription model described in this document, one does not have much historical data to validate and correct the forecasts made on certain business parameters (as described above). So initial forecast made by a merchant is merely a reflection of his experience, perceptions about various products and expectations from each of them (as well as from overall business).

In reality when the actual subscriptions start getting registered and sale is starting to happen, the actual attributes and performance may be way different than the forecast. Some merchant’s may have provided very ambitious forecasts where they have expected large boosts in revenue and net gain. On the other side few might have made cautious forecasts where they have kept their expectations to bare minimum in terms of profit and revenue growth.

Also some parameters are almost impossible to forecast. Offered price of a product may vary almost daily based in price elasticity of that product. So averaging it out for the whole month would not provide very precise forecast about it. Similarly probable changes in purchase price in a year are almost impossible to predict as they may not follow any pattern.

But it does not allow us to let the forecast be merely based on merchant’s expectations and experience. When adequate historical data on actual transactions is accumulated in initial months it can be used to correct the forecasts for the future period.

Following process is recommended in order to keep the forecasts in alignment with actual business trend.

1. There should be a configuration to decide how much historical data should be accumulated in order to trigger the correction of forecast. Also another configuration on forecast for how much duration should be corrected using the historical data.

Example: Merchant may want to trigger the forecast correction after accumulation of every **three** months of business data. Also he would want the correction of next **six** months of forecast.

1. Extrapolation technique should be used to derive future projection based on historical data. We will see in next subsection about extrapolation technique and which methodology to be used for the same.
2. Following among the input parameters should be considered for forecasting using extrapolation technique.
   1. Purchase price
   2. MRP
   3. Average Offered price per month
   4. New subscriptions per month
   5. Churned subscriptions per month affiliated to each offered price

Example outputs will be seen like the following (by plotted on graph)

## Extrapolation

Extrapolation is a mathematical concept which is used for estimating values beyond the original observation range. The forecasted values of a variable are predicated based on values in original observation and their relationship among another values.

There are number of extrapolation methods used based on the context where it is to be applied and business need, such as Linear Extrapolation, Polynomial Extrapolation, Conic Extrapolation, French Curve extrapolation etc.

We are using time series analysis method to extrapolate values based on actual time based values.

A time series is a sequence of data points typically consisting of successive measurements made over a time interval. Time series forecasting is a method to use the time series analysis model to predict future values based on previously observed values.

Moving average or smoothing: Collection of data spread over time, which has been picked up for analysis is some form of random variations . Number of methods exists for reducing or cancelling the effect of random variations. This process is called “smoothing”. Two types of smoothing methods exist.

* + 1. Averaging methods
    2. Exponential smoothing methods

A manager of a warehouse wants to know how much a typical supplier delivers in 1000 dollar units. He/she takes a sample of 12 suppliers, at random, obtaining the following results:

Supplier Amount Supplier Amount

1 9 7 11

2 8 8 7

3 9 9 13

4 12 10 9

5 9 11 11

6 12 12 10

The computed mean or average of the data = 10. The manager decides to use this as the estimate for expenditure of a typical supplier. Is this a good or bad estimate?

Mean squared error is a way to judge how good a model is. We shall compute the "mean squared error":

The "error" = true amount spent - the estimated amount.

The "error squared" is the error above, squared.

The "SSE" is the sum of the squared errors.

The "MSE" is the mean of the squared errors.

The results are: Error and Squared Errors

The estimate = 10

Supplier $ Error Error Squared

1 9 -1 1

2 8 -2 4

3 9 -1 1

4 12 2 4

5 9 -1 1

6 12 2 4

7 11 1 1

8 7 -3 9

9 13 3 9

10 9 -1 1

11 11 1 1

12 10 0 0

The SSE = 36 and the MSE = 36/12 = 3.

So how good was the estimator for the amount spent for each supplier? Let us compare the estimate (10) with the following estimates: 7, 9, and 12. That is, we estimate that each supplier will spend $7, or $9 or $12.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Estimator | 7 | 9 | 10 | 12 |
| SSE | 144 | 48 | 36 | 84 |
| MSE | 12 | 4 | 3 | 7 |

The estimator with the smallest MSE is the best. It can be shown mathematically that the estimator that minimizes the MSE for a set of random data is the mean.

What is exponential smoothing?

This is one of the popular technique to produce a smoothed time series. Exponential smoothing assigns exponentially decreasing weights as the observations( being used to derive time series) get older. In other words recent observations are given relatively more weight in forecasting than the older observations. The Exponentially Weighted Moving Average (EWMA) is a statistic for monitoring the process that averages the data in a way that gives less and less weight to data as they are further removed in time.

Single exponential smoothing:

For any time period t, the smoothed value St is

St=αyt−1+(1−α)St−1 0 < α ≤ 1 t ≥ 3.

This is the basic equation of exponential smoothing and the constant or parameter α is called the smoothing constant.

Why is it called "Exponential"?

Let us expand the basic equation by first substituting for St−1 in the basic equation to obtain

St = αyt−1+ (1−α) [αyt−2+ (1−α)St−2 ]

St = αyt−1 + α (1−α) yt−2 +(1−α) 2 St−2.

By substituting for St−2, then for St−3, and so forth, until we reach S2 (which is just y1), it can be shown that the expanding equation can be written as:

t-2

St=α ∑ (1−α)i−1yt−i+ (1−α)t−2S2, t ≥ 2.

i=1

For example, the expanded equation for the smoothed value S5 is:

S5=α[(1−α)0y5−1+(1−α)1y5−2+(1−α)2y5−3]+(1−α)3S2.

In the current context we are using triple exponential time series method of extrapolation to forecast future values based on set of actual current values.

Trend

Seasonality

INCOMPLETE

## How target setting is used?

The main purpose of forecasting is set reference point against which actual business performance can be compared. The detailed description of how the targets are used to determine price and benefits will be elaborated in respective sessions but this section lists the basic approach for using targets to let the platform know the comparison between forecast and actual performance and make a decision on how to alter price and/or benefits.

1. Forecast for each product is initially set manual using merchant’s expertise/expertise and expectations. Assume that they may be far from reality on the higher or lower side.
2. Since targets are set at monthly interval they are transformed into daily targets by appropriate interpolation algorithm so that daily actual performance of a product can be compared with daily targets.
3. Rules are set by merchant regarding at what difference between forecasted revenue and actual revenue the price should be recalculated.
4. Appropriate pricing formulation/algorithm is used to recalculate the price when the set threshold is crossed, in such a way that offered price will be increased when actual value(revenue) is more than forecast value for a day by threshold percent(say 10%),else offered price will be lowered.
5. Similarly forecast can also be used to predict if (actual) customer base (in form of number of subscriptions) is increasing or decreasing so as to pump in more money on sales/marketing efforts. Or if churning is happening more indicating customer’s reluctance to adopt subscription model due to possible flaws in it.
6. Lastly the forecast is used to correct itself. When forecast is found vastly different than the actual business trend the historical data of actual business is extrapolated and becomes the new forecast of coming months. Thus it helps in minimizing human errors in forecasting.

## Calculating Operating expenses

Subscription business may run as a dedicated business or it may run along with regular (instantaneous) retail business as a business sub model. In case it is run as a sole dedicated business, all the infrastructural and operational expenses borne by the business will be attributed to subscription business. But in case it is run as a segment of overall retail business then theses expenses should be shared in the proportion of their revenue. For example: Amazon is already into regular retail business. If they provide an option for subscription business(presently they do but it is a simpler model) and follow the subscription business model, they will share the same inventory, payment channels, and delivery channels for delivering goods to customer doorsteps, same staff, and same infrastructure.

In such cases subscription business will “share” common operating expenses out of total expenses borne by the total business based on its revenue contribution to the total revenue.

Example: If total monthly revenue of a retail business is 200,00,000 Rs. and subscription business contributes 40,00,000 Rs. of it then subscription business share in revenue is 20%. Hence the 20% of the common operating expenses should get attributed to subscription business. In case total operational and infrastructural expenses are 5,00,000 Rs. then 20% of it, 1,00,000 Rs. will be attributed to subscription business.

In case of shared business model usually fixed cost is not attributed to subscription business, if subscription model has been launched by already running and established retail business. Only recurring costs are to be shared between regular and subscription business.

Operating expenses can be broadly categorized into two; common expenses and dynamic specific expenses.

## common expenses

The expenses which are applicable to all the products registered as subscriptionable products are recurring in nature and are more or less constant for long period are called static expenses. Following are few expenses which can be considered as static expenses

* + - Software maintenance and enhancement cost(includes procuring/revising third party software licenses, hosting charges, Expenses on integration with third party paid services (payment gateway, goods tracking system etc.),hardware/data backup)
    - Expenses on communication charges(phone, internet usage)
    - Electricity charges
    - Rental expenses
    - Personnel related expenses(salaries, bonuses, HR)
    - Taxes/Service charges to run business
    - Housekeeping expenses( maintaining office, disposing/returning expired goods, personnel transportation, furniture/interior, repairs)
    - Cost of recurring travel( personnel traveling across locations for any official purposes)
    - Printing/stationary
    - Renewals of licenses/permits/certifications

In general any static expense header is expected to have following common characteristics

1. It should have periodicity (example: software maintenance can be attributed annually, rental can be attributed monthly etc.). The model may internally convert all expenses to monthly periodicity.
2. An expense may exhibit a ‘sensitivity characteristic’ to which some products are sensitive (example: electricity charges exhibit “electricity consumption” as a sensitive characteristic to which few products are sensitive (milk, butter etc.), rental expenses exhibit “space consumption” to which some products are sensitive (10/20 litre water bottles occupy more space than average subscriptionable products), housekeeping expenses may exhibit “perishability” characteristic to which perishable goods such as milk, fruits, vegetables will be sensitive).
3. Every product will have ‘sensitivity weight’ for every characteristic it is sensitive to. This weight will decide, at what proportion it will bear an operating expenses (out of total expense value under that header). Default sensitivity weight for products is 1 for all sensitivity attributes. It means they will bear even proportion of operating expenses. But few products (mentioned in 2) need to bear more proportion for certain expenses than average products as they may have different sensitivity weight for specific sensitivity characteristic.

Example:

Operating expense: Electricity charges

Sensitivity Characteristic exhibited: Electricity consumption

Sensitivity weight: 1.2

Product: Milk

Sensitive to: Electricity consumption

In this case milk is expected to bear 20% more “share” of electricity expenses as compared to those products which are not sensitive to “Electricity Consumption” (or we can say default sensitive, having weight as 1).

In order illustrate this concept further lets understand example below.

There are 5 different products on sale. There will be few thousands of customers for each product. The common electricity expenses incurred on total business are to be distributed as per the sensitivity of each product.

Few products need additional refrigeration for preserving them. So they should carry more operating cost than those products which do not require refrigeration. These products can be configured to have been sensitive to “electricity consumption” characteristic exhibited by electricity charges operating expense.

Following example shows how to allocate expenses to each unit. Total monthly electricity expenses= 20000 Rs.

|  |  |  |  |
| --- | --- | --- | --- |
| Products | Units sold/subscribed | Sensitive to electricity consumption | Weight for distribution |
| Washing powder | 22000 | No | 1.0 |
| sugar | 34000 | No | 1.0 |
| milk | 38000 | Yes | 1.2 |
| butter | 41000 | Yes | 1.2 |
| Wheat floor | 28000 | No | 1.0 |
| Total | 163000 |  |  |

Let x1 be the per unit electricity charge to be borne by washing powder,x2 by Sugar,x3 by milk,x4 by butter,x5 by Wheat floor.

Total expenses = sum of weighted distribution of expenses to units of each product.

20000=22000\*(1\*x1) + 34000\*(1\*x2) + 38000\*(1.2\*x3) + 41000\*(1.2\*x4) + 28000\*(1\*x5)

1. Every product should pay any operating expense in proportion to its price. The percentage of an operating expense to the overall revenue should be maintained at each product level.

Example: If monthly overall expected revenue is 77,10,000 Rs and overall electricity expenses per month are 20,000 Rs. So electricity charges are (20,000/77,10,000) =0.002594 of the total revenue. It means unit from each product will pay 0.002594 of its sale amount.

Let’s give sale prices of each of the products

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Products | Units sold/subscribed | Sensitive to electricity consumption | Weight for distribution | Price per unit  (YN) | Operating expenses to be borne per unit  =0.002594\*price per unit |
| Washing powder | 22000 | No | 1.0 | 20 | 0.05188 |
| sugar | 34000 | No | 1.0 | 40 | 0.10376 |
| milk | 38000 | Yes | 1.2 | 50 | 0.15564 |
| butter | 41000 | Yes | 1.2 | 50 | 0.15564 |
| Wheat floor | 28000 | No | 1.0 | 70 | 0.18158 |
| Total | 163000 |  |  | 7710000 |  |

As we know offered price of every product as well as factor of offered price which should be used to compute per product unit expense, let’s revise the formula

So revised formulation will be

20000 = 22000\*(1\*0.002594\*20) + 34000\*(1\*0.002594\*40) + 38000\*(1.2\*0.002594\*50) + 41000\*(1.2\*0.002594\*50) + 28000\*(1\*0.002594\*70)

20000 approximately equal to 22049

## Subscription specific expenses

Subscription being a recurring business model there are certain recurring expenses which should be specifically attributed to subscription business

## Goods Delivery expenses:

These are recurring expenses for every product and customer and hence require special calculation.

Different companies follow different delivery models in case of grocery business.

Some companies maintain their own network of distributed warehouses where they maintain inventory of products and they supply them from their to all nearby subscribers.

Few companies do not maintain inventory of their own but have a tie up with local grocery merchants in every town and they pass on the delivery requests to these merchants. The merchants then are responsible for delivering baskets locally to all nearby subscribers. In tur they pay commission to the company owning subscription business.

So in first case one need to identify the delivery cost in terms of transportation and local dispatch (personnel, fuel etc.) OR in terms of courier charges (in case shopping company is using third party courier agency for the same). In both the cases it can be represented by the basket delivery cost per kg. Let’s call it as “Distribution Based Delivery Costing Strategy”.

## Distribution Based Delivery Costing Strategy

Following factors determine the share of operating expenses to be borne by different entities.

Number of products being subscribed has different demands. Some products are sold more than others. So they should share more of the delivery expenses

Different customers opt for varying frequency of basket deliveries such as weekly, monthly, and quarterly. More is the basket frequency more will be the operating expenses. So the baskets being delivered more frequently than others should share more of the delivery expenses than those which are delivered less frequently.

Delivery expenses are determined by the weight of the basket. So the baskets having more weights should share more contribution to operating expenses than those which carry less weight.

So we can use the following sequence to determine per unit delivery cost for every product.

1. Get the list of all delivery rates for every weight range (20 Rs. up to 1s kg, 25 Rs for goods from 1 to 2 kg etc.).
2. Get monthly baskets fitting into each weight range. In case of weekly baskets multiply each by two. In case of quarterly basket divide total baskets by 3 to arrive at total monthly baskets).
3. Apply appropriate delivery rate for baskets in each weigh range and find out total delivery cost to be paid for delivering basket in each weight range per month.
4. Now get each subscriptionable product associated with number of baskets falling under each weight range. Same product may be contained in baskets falling under different weight ranges. Since each product has its weight registered with it, multiply unit product weight with number of products(contained in baskets with specific weight range) so as to calculate total weight getting delivered under each weight range. Multiple per kg delivery cost to this total weight (in kgs) to calculate how much delivery cost a product is bearing under each weight range. For the same product calculate it for all weight ranges.
5. Calculate the total delivery (per month) is to be borne by a product, by summing up the costs calculated for each weight range in step 4.
6. Repeat this for all products contained in baskets falling under different weight ranges.
7. Total sum of monthly delivery cost for each product should match the cost found at basket level in step 3.

Thus total delivery cost will get distributed across products as per their volume per month (which is translated from their frequency of delivery) as well as per unit weight.

Example:

|  |  |  |
| --- | --- | --- |
| Price category | Rule | Amount |
| Distribution price1 | below/up to 1 kg | 20 |
| Distribution price2 | 1 .01 kg to 2kg | 25 |
| Distribution price3 | 2.01 kg to 3kg | 28 |
| Distribution price4 | 3.1 kg to 5kg | 34 |

|  |  |  |  |
| --- | --- | --- | --- |
| Basket category | Baskets per month | weight(more than) | Total deivery cost per month |
|  |  |  |  |
| cat1 | 6507 | 3 | 182196 |
| cat2 | 6557 | 2 | 163925 |
| cat3 | 4272 | 1 | 85440 |
| Total | 17336 |  | 431561 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| product ID | weight | product count in cat1 | total weight A in cat1 | cost of delivery- A in cat1 | product count in cat2 | total weight of A in cat2 | cost of delivery- A in cat2 | product count in cat3 | total weight of A in cat3 | cost of delivery- A in cat3 | total cost per unit |
|  |  |  |  |  |  |  |  |  |  |  |  |
| A | 0.2 | 6507 | 1301.4 | 12146.4 | 6557 | 1311.4 | 16392.5 | 4272 | 854.4 | 17088 | 2.6319162 |
| B | 0.3 | 6507 | 1952.1 | 18219.6 | 6557 | 1967.1 | 24588.75 | 4272 | 1281.6 | 25632 | 3.9478744 |
| C | 0.25 | 6507 | 1626.75 | 15183 | 6557 | 1639.25 | 20490.63 | 4272 | 1068 | 21360 | 3.2898953 |
| D | 0.5 | 6507 | 3253.5 | 30366 | 6557 | 3278.5 | 40981.25 | 0 | 0 | 0 | 5.4613633 |
| E | 0.3 | 6507 | 1952.1 | 18219.6 | 6557 | 1967.1 | 24588.75 | 4272 | 1281.6 | 25632 | 3.9478744 |
| F | 0.2 | 6507 | 1301.4 | 12146.4 | 6557 | 1311.4 | 16392.5 | 0 | 0 | 0 | 2.1845453 |
| G | 0.25 | 6507 | 1626.75 | 15183 | 6557 | 1639.25 | 20490.63 | 0 | 0 | 0 | 2.7306816 |
| H | 0.3 | 6507 | 1952.1 | 18219.6 | 0 |  | 0 |  |  | 0 | 2.8 |
| I | 0.3 | 6507 | 1952.1 | 18219.6 | 0 |  | 0 |  |  | 0 | 2.8 |
| J | 0.3 | 6507 | 1952.1 | 18219.6 | 0 |  | 0 |  |  | 0 | 2.8 |
| Total |  |  |  | 176122.8 |  |  | 163925 |  |  | 89712 |  |

## Calculating offered price

This is the most complex phase of overall lifecycle. Price of a product is a function of various parameters such as

1. Its purchase price
2. Its MRP
3. Available margin
4. Demand of the product
5. Demand of the substitutes
6. Demand of complementary products
7. Operating expenses to be borne by product(common + subscription dependent)
8. Sales and marketing expenses to be contributed by the product (optional).

When the platform is initially set up determination of price is merely based on the general idea of market in which the product is being sold and costs associated with product. Section 8.1 addresses the initial price set up for each product when not historical data is available.

There are two variants of offered price set

1. Offered Price when basket level discount is not applicable: If a subscriber adds few items of a product in basket but due to basket rules he/she is not eligible for basket level discount, then this is the price offered to him/her.
2. Offered price when basket level discount is applicable: If a subscriber who has added few items of a product in the basket becomes eligible for the basket level discount then this is the price to be offered to him. Actually he will be shown the price when basket level discount not applicable but the added discount is shown at basket level.

## Calculate price based on expected margin

Initially we do not have any historical data and setting the forecast for the first time. So we will start with the basic pricing calculation based on expected margin.

Margin = gross profit/selling price

## Adjust price based on demand curve

## Adjust price based on extrapolation of profit/revenue

## Adjust price of associated products(substitutes and complementary)

## Budget Distribution and lifecycle management

Based on the above provision needs, platform defines different accounts which are responsible for managing transactions in respective areas as well as flow of money from one account other in case of specified events. These accounts help in

1. Tracking the impact of different events/activities on the overall money being invested.
2. Making provisions for contingencies
3. Getting ready information on how different products are doing, and how overall business is doing

## Subscriber account

Subscriber account keeps track for all transactions such as payments made, provision for different expenses, payment due, loyalty points, prices committed for every product he has added to basket, basket level benefits committed, last subscription history ( should it be in Subscriber instead?).

## Item prices – Price Committed products

When a subscriber confirms subscription to few items for a specific period, the item level prices are committed to him in case of price committed products. For every item he has subscribed to, the identifier of the **price bucket** (described in Product Account) has been linked against that item for the periodic quantity he has asked for.

In case subscriber increases the quantity of some product later (than subscription date) the new quantity gets associated with latest price bucket, so that his total quantity of a product may get distributed into one or more price buckets. When a subscriber decreases the quantity of some product then the total quantity remains associated with original price bucket of that product. Also basket level discount will be recalculated

In case subscriber removes some product from his list completely, no price will be charged to him on that product then onwards but basket level discount will be recalculated.

## Item Prices – Percentage discount committed products

Similar to price committed products, when a subscriber confirms subscription to few items for a specific period, he is linked to latest price bucket of every product active on that day. For every item he has subscribed to, the identifier of the **price bucket** (described in Product Account) has been linked against that item for the periodic quantity he has asked for. But here he is not associated with the latest offered price but the latest MRP (as the committed percentage discount is always calculated on latest MRP). In fact in this category, there is no need to calculate latest offered price.

When offered price changes (in product account) for a product that he has subscribed to, then he gets associated to the new price bucket. This is how all subscribers are always associated with latest price bucket for a product that they have subscribed to.

## Item Prices- No commitment products

The behaviour is exactly same as that in percentage discount committed products. All subscribers subscribed to a product are always associated with its latest price bucket.

## Basket level Benefit

This will have the discounted on total basket price per period (per month/week). When subscriber confirms subscription the basket level benefits (per period) should be calculated and kept here. It should also keep the mode of redemption. The mode of redemption can be either of

1. Redemption points of the discounted price per period, every end of a period they will get added here. Different rules should be configured on how the redemption can be done.
2. Direct discount form the total basket amount every period. In this case while subscriber is paying for the subscription duration he/she will pay the total basket amount minus discount per period.
3. Cashback option where the subscriber will pay for the total basket amount and discount money will be refunded him/her after certain duration( based on set rules)

How to calculate Basket level benefit: Basket level benefit should depend on following factors and in the given sequence

1. Demand of the products being added to basket. More demanded products will yield lesser benefits. Demand can be realized by credit points earned by each product. Each product added to a basket should contribute to basket level benefit and the same can be calculated by using the credit points earned by that product.
2. Total amount of basket. Obviously higher the amount of basket, more will be the benefits.
3. Duration of the subscription. More the subscription duration more will be benefit.
4. Payment mode. Full advanced payment for the whole subscription duration will attract more benefits
5. Stability of basket content. If no content is changed in the basket after subscription then it will attract full benefits. But if the content is modified /reduced the benefits should be reduced.

## Payments

When a subscriber confirms subscription for some items for a specific period,

1. When subscriber confirms his subscription for a desired period the total subscription amount is registered in the “Payments to be made by Subscriber” attribute of this account. The total amount in this attribute indicates the total subscription value for a subscriber, which he will be expected to pay (as per the agreed payment modes) during course of subscription.
2. If subscriber has made partial payment or full payment of the total subscription value, then amount paid will be set as credit amount (positive) in “payments made by subscriber” attribute.
3. Every time when a basket is delivered successfully to a subscriber, the basket amount (offered) is debited (negative) in the “payments or equivalent made to subscriber” attribute.
4. If subscriber changes content of the basket due to which total basket value changes for the remaining period, then the difference amount ( positive or negative) will have to be added in “Payments to be made by Subscriber” attribute depending upon whether new basket price is more or less than original basket price. In case new basket amount is more than original basket amount then the difference is positive. If it is less, then the difference is negative.
5. After the change of basket content system should ensure that revised basket amount should get debited in the “payments or equivalent made to subscriber” attribute, when next time the basket with revised content is delivered to him.
6. If subscriber cancels subscription in between the subscription period, then the total basket amount paid by him for the remaining subscription period is calculated by total payments made by him minus “payments or equivalent made to subscriber”. This amount should be debited (negative) in the “payments or equivalent made to subscriber” attribute, so that payments made by subscriber should get nullified by payments or equivalent made to subscriber.
7. Even if subscriber does not cancel subscription, the difference between payments made by him and payments/deliveries made to him should be periodically calculated so that when they nullify each other but registered subscription period is not yet over, then a notification event should be sent to subscriber telling him the payment of the remaining subscription period is due, which he should pay in order to ensure next delivery.

## Product Account

The product account represents snapshot of product targets/forecasts as well as actuals for the given period (month/week).

When platform administrator registers a product for subscription its product account should get created.

## Forecast

When platform administrator creates forecast for every subscriptionable product, it goes in this section. Else at the end of the year The EOY batch should replicate actuals of current year as a forecast for next year, as default configuration. Administrator can modify its values wherever he wishes to.

1. Its purchase price from the manufacturer/wholesaler(Cost of goods sold-COGS)

* If this price changes in a month due to inflation/excess demand and low supply then the changed price should be marked from that month onwards

1. Its MRP( manufacturer suggested sale price)

* If this price changes due to change in purchase price (due to any reasons mentioned above), then the changed price should be marked from that month onwards.

1. Its weight, which may be impacting its operational cost.
2. List of all substitutes in the same category and weight scale
3. Ratio of Its expected quantity demanded per month against total quantity demanded of all products in the same category( product and all its substitutes)
4. Its categorization as high frequency/regional/perishable/semi-perishable etc.
5. Expected number of new subscribers/item registrations(?) each month
6. Expected number of churned subscribers/item registrations(?) each month

When churning of subscribers happen, one need to also register

* + Churned subscribers/items affiliated to price at start of the years
  + Churned subscribers/items affiliated to the changed sale price1
  + Churned subscribers/items affiliated to the changed price2 and so on.

1. From date of the forecast
2. To date of the forecast.

Based on these forecasts following values are calculated.

1. Monthly operational expenses to be borne per product.
2. Monthly sales and marketing expenses calculated per product.
3. Breakeven price.
4. Percentage of break-even price to obtain unit level price without any other benefits.
5. Percentage of break-even price to obtain basket contribution (addition for obtaining unit level price with basket contribution).
6. Net new customers and Total customers per month(to indicate demand)
7. Total churned customers and % customer churn per month(- #number of churned customers current month/total # customers at last month)
8. Monthly recurring revenue due to new customers in a month( MRR New)
9. Monthly Churned MRR among customers affiliated to every price bucket and total churned MRR( approximate indication of impact of changed price on customer churn),percentage net MRR churn( churned MRR/starting MRR)
10. Monthly Average revenue per new subscribers.
11. Total monthly revenue
12. Cost of goods sold.
13. Selling price derived from margin percentage.
14. Operating profit/loss and Operating profit/loss percentage.
15. Subscriber Lifetime Value(SLV
16. Subscriber lifetime period.
17. Cost of Acquiring a customer (CAC).
18. SLV to CAC ratio.
19. Months to recover CAC.

## Actuals

Actuals should have similar attributes which forecast section has. Every day a multiple data procuring jobs run which keep on updating different attributes. Every day a job should run and compute different metrics (listed in forecast) and store in data repository in order to compare them with interpolated forecast values.

Some of the attributes behave differently depending upon the category lf the product among price committed products, percentage discount committed products and no commitment products

1. Actual operational expenses spent per product.
2. Monthly sales and marketing expenses.
3. Net new customers and Total customers per month.
4. Total churned customers and % customer churn per month.
5. Monthly recurring revenue due to new customers in a month( MRR New)
6. Monthly Churned MRR among customers affiliated to each price bucket, and total churned MRR, percentage net MRR churn.
7. Monthly Average revenue per new subscribers (ARPS (New)).
8. Total monthly revenue
9. Cost of goods sold (COGS).
10. Selling price derived from margin percentage.
11. Operating profit/loss and Operating profit/loss percentage.
12. Subscriber Lifetime Value(SLV).
13. Subscriber lifetime period.
14. Cost of Acquiring a customer (CAC).
15. SLV to CAC ratio: SLV/CAC.
16. Months to recover CAC.

## Credit Points

A batch job is targeted to calculate the performance of every product at the end of configurable period (typically every month). When it runs for a product it calculates the forecasted operating profit and actual operating profit.

If actual operating profit is a positive amount and is more than the forecasted profit then the surplus amount should be credited to nodal account.

If actual profit is a positive amount but less than forecasted figure then nothing gets transferred to nodal account. SHOULD IT GET TRANSFERRED TO SOME INTERNAL ACCOUNT??

If actual profit is a negative amount (it is loss) then the money equal to the break-even situation (no profit no loss) is borrowed from nodal account and it is used to reduce the price of that loss making product.

For every deposit that a product account will make to the nodal account it will get 1 credit point for every 1000 Rs (configurable), which is stored in this attribute. Similarly when a product wishes to borrow any money from the nodal account it will lose 1 credit point per 1000 Rs.(configurable) borrowed.

Credit points will be an easiest mechanism to track the credit history of any product and weigh it against its competitors. Also credit points are the investments a product is making so that it can first use it for itself (offering instantaneous, basket, loyalty level benefits) as make a social contribution towards upliftment of loss making products.

## Total Debit

This field is computed on a daily basis by some job. The product account also has total debit where sum of products of every purchase price and the items subscribed at that purchase price ( (purchase price1\* subscriptions at price1) + (purchase price2\* subscriptions at price2) +….) is calculated.

## Total Credit

This field is computed on a daily basis by some job. Then it will have total credit where sum of products of every sale price and number of items registered at that sale price has been calculated.

( (sell price1\* subscriptions at price1) + (sell price2\* subscriptions at price2) +….)

## Contingencies:

Finally it should have provision for contingencies. In case the product needs money in addition to the money that it is earning, then it will refer to this contingency before borrowing it form the nodal account. Thus in case of loss making products, if product wish to offer more discount in an attempt to recover from losses it will make use of this provision. In case available provision is not enough then it will try to borrow money from nodal account. It should be typically an annual deposit which few percent of the total spend (purchase) on the product.

Most importantly this account should be self-sustainable. In case it is unable to sustain itself it should raise a notification to the merchant so that the merchant will do manual intervention either by pouring additional contingency amount or by deciding to take the product out of subscription business.

One Rule to be followed is that when a product is making profits beyond the set targets, then this account will hold only amount equivalent of targeted profit in addition to the spend. The incremental/additional profit will be deposited to NODAL account for it to be used for provisioning across products and customers.

Example: Consider at start of the year merchant has targeted 3000 per month sale of a product, whose purchase price is 30 Rs and sale price is 50 Rs. So this is how the flow will happen.

A forecast is created by merchant for each month, where he will set the forecasted sale volume, forecasted purchase price and sale price and finally from and to dates for each forecast. These figures are completely based on his past experience. So volume forecast is 3000,forecasted purchase cost will be 3000\*30=90,000 Rs and forecasted sale amount with proposed offered price of 50 Rs will be 3000\*50= 150,000 Rs.( so expected profit of 60,000 Rs.), from date of forecast 1 Jan 2016 ,to date as 31 Jan 2016.

A contingency amount of 9000 Rs. (10% of purchase cost) has been added in the contingency provision.

A price bracket will get created with purchase price 30 Rs dated say 1st Jan 2016 and offered price 50 Rs, MRP as 56 Rs.

Say 300 subscribers register for this price bracket. So they get registered with the first price bucket. Total debit will be 300 \* 30 = 9000 rs and total credit is 300 \* 50 = 15000 Rs.

At the end of Jan 2016 if there is a volume of 3400 subscriptions for that product. The profit incurred out of the forecasted sale volume(3000) is the earning of this product( 3000\*(50-30)=60,000 Rs).

Since this is more than the forecasted volume of sale of 3000 the profit earned from additional sale of 400 items (400 \* (50-30)= 8000 Rs) is a bonus which should be transferred to the nodal account.

So in above cases the product has earned 8 credit points.

## Operating expenses Account.

This account keeps track of forecasted vs actual operating expenses and notifies the merchant if the provisioning (based on forecasting) is not enough to meet the actual expenses. We can broadly classify operating expenses into “common expense” and “subscription dependent expenses”. Common expenses are fixed expenses are not handled by the platform (as the platform is not an independent shopping application but acts as a subscription agent of some shopping application). But their share to be borne by subscription platform should be received from main application as they will get distributed among all the subscribed products volumes equally.

Subscription dependent expenses are used to handle the lifecycle of subscription business and hence should ideally be managed by products themselves.

Again here the same philosophy is recommended where since every product item being sold is consuming its portion of operating expenses, hence it is responsible to contribute to it in such a way that overall expenses should get nullified by the overall contribution by the subscribed items.

Initially merchant has to make forecast about the probable operating expenses he may incur throughout the year. Actual expenses are reported back by the main application when items are actually shipped to subscribers. Against these expenses all subscribed items will contribute so as to nullify the effect of expenses.

## Forecast

Merchant need to forecast the periodic (monthly) recurring operating expenses. He can choose some of the following headers for entering forecasted expenses per month under each, for the whole year.

## Common Expenses

* + - Creating and maintaining the web application(obtaining domain on cloud, procure number of servers, hosting site)
    - Expenses on integration with third party paid services (payment gateway, goods tracking system etc.).
    - Expenses on communication charges(phone, internet usage)
    - Data Backup and software maintenance/enhancements cost
    - Office and Inventory storage space expenses( rent)
    - Personnel related expenses( salaries, bonuses, HR)
    - Taxes to run business
    - Resources expenses
    - Housekeeping expenses( maintaining office, storage spaces, disposing/returning expired goods, electricity bills, personnel transportation)
    - Cost of recurring travel( personnel traveling across locations for any official purposes)
    - Renewals of licenses/permits/certifications

## Subscription dependent expenses

* + - Goods Delivery expenses: A merchant need to specify average delivery expenses per basket for every KG. When a subscriber confirms registration of basket items, the same event should calculate the total weight of that basket and registers total delivery expenses per delivery.

Forecasting should be typically based on historical data and platform should provide some mechanism to prefill the forecast based on the actual data that is getting received in the past.

## Actuals

* + - Credit:

Thus every product is sparing some amount from the profit that it has earned (as customer has paid for it, it has earned some profit) for the operating expenses incurred by the system to manage it’s own subscription lifecycle.

The interesting part is how to calculate each item’s contribution to the operating expenses.

Simpler approach is to divide total monthly operating expenses by total number of items subscribed (in different baskets) so as to arrive at the “per item” expense. Here all the items are considered equal in terms of weight, frequency of delivery etc.

A tedious but precise approach is to

1. Divide the recurring expenses into subscription independent expenses and subscription dependent expenses. So among the type of recurring expenses listed above ,the categorization will be
   1. Subscription independent :
      1. Creating and maintaining the web application(obtaining domain on cloud, procure number of servers, hosting site)
      2. Expenses on communication charges(phone, internet usage)
      3. Data Backup and software maintenance/enhancements cost
      4. Office space expenses(rent)
      5. Resources expenses
      6. Personnel related expenses( salaries, bonuses, HR) -
      7. Housekeeping expenses( maintaining office, storage spaces, disposing/returning expired goods, electricity bills, personnel transportation)
      8. Cost of recurring travel( personnel traveling across locations for any official purposes)
      9. Renewals of licenses/permits/certifications
   2. Subscription dependent
      1. Expenses on integration with third party paid services (payment gateway, goods tracking system etc.). – frequency dependent
      2. Inventory storage space expenses( rent) – weight dependent and frequency dependent
      3. Goods delivery expenses – weight dependent and frequency dependent
2. Categorize the subscription dependent expenses into weight and/or frequency dependent.
3. Distribute the subscription independent expenses equally among all items subscribed.
4. Distribute the subscription dependent expenses across items depending upon their weight and frequency of delivery.
5. Summarize c and d so as to arrive at total credit to be made to this account.
   * + Debit: The main shopping application is expected to provide actual operating expenses made on subscription business by provide this feed to the platform on a monthly basis. The feed should contain different ingredients of operating expenses (as listed in headers above). When such as feed is received it should be used for realizing the actual expenses and hence an amount equal to every product’s contribution towards operating expenses should get debited from this account. Again the same calculations should be made (as in credit procedure) to derive operating expenses per item delivered in that month.

Example: If total monthly operating expenses are forecasted as Rs. 200,000 and if there are total 100,000 items subscribed so far for monthly subscription then per item operating charges= 200,000/100,000 = Rs.2 per item. Every item so far added in every basket will credit Rs 2 upon subscriber payment per month. If a subscriber has added total 15 items in his basket and made a full yearly advanced payment then total credit by that subscriber = 15(items pm) \*2(Rs. per item pm ) \* 12(months subscription)=360 Rs.

In this case every month a basket is delivered successfully 15\*2 = 30 Rs get debited from this account.

If another subscriber has subscribed for same number of items but made an advanced payment of only 3 months then his contribution towards operating expenses as a credit = 15(items pm) \* 2(Rs. per item pm) \* 3(months subscription)= 90 Rs.

In this case too, every month a basket is delivered successfully 15\*2 = 30 Rs. get debited from this account.

In ideal situations the debit and credit entries should nullify each other. But there a few cases where this may not be true.

1. When a basket delivered to a customer has returned back and it needs to be resent(resulting into double dispatch charges)
2. When the planned/forecasted operating expenses are no longer valid due to environmental factors but products have already provisioned for them as per the forecasts.

These cases should be handled by platform carefully and should make provision to add more money to this account externally if required.

## Account for sales and marketing expenses (should we have this under scope??).

This amount is spent for acquiring more subscribers and retaining existing subscribers. These expenses should be correlated to the number of new subscribers joining each period to check the effectiveness of the effort. In case it is not enough then a separate additional provision should be made for it.

## Nodal Account

For motivating customers for buy more as well as to remain associated longer. This provision is used for basket level discounts for the eligible subscribers. There should be rules on how much basket level discount should be provided and to whom. Initially some provision will be made by the merchant but later all products should contribute to this account, as basket is an aggregation of these items for a customer. So if a product is making excess profit than its forecast, then it should contribute this excess profit amount to this account.

## Merchant’s account.

A Merchant will anticipate some periodic profit for himself on each product that he is selling under subscription. So every product should deposit that expected percentage of profit out of total profit into this account. The products who are making lesser profits than merchant’s expectations for himself or those which are making losses will not contribute to this account. Merchant can decide to spare the money from this account for any purpose that he wishes to and it will be a manual process.

## Calculating the price of a Product

This is the most crucial step of the overall process. We will define steps for determining price of a product for all three types of products (price committed, discount percentage committed, no commitment)

### Interpolation for transforming monthly target parameter values into daily values

1. Targets are set at monthly level as it is not practically possible to set target for every day, for the whole year. But they need to be available at daily level so that they can be compared with daily actuals. Comparing them at month interval may be too late as non-performing product may cause significant damage to the overall scene. So in order to compare the targets with actuals on daily basis the target parameters for the set discounted price(say 5%) are getting interpolated using cubic spline interpolation method. A Java code for cubic spline interpolation (SplineInterpolator) has been provided by apache.commons.math3 library and can be readily used here.

### Extrapolation of actuals for the current day for comparison

1. With the start discounting price product is getting sold every day in some volume. The sale volume on a day may be more than the set target or it may be lesser.
2. Values of parameters for a current day (where sale is not yet happened) and until the end of current month are obtained through extrapolation of actual parameter values until yesterday (which one??)
3. These extrapolated figures are compared with target figures for that day (obtained at day level through interpolation). If the actuals are higher than targets it indicates that the product is doing better than expected and hence no more discounts pouring is required at this time.
4. If the actuals are lesser than targets then it indicates that the demand trend may be on negative side than expected but cannot be confirmed with a single day
5. Demand Curve???
6. Elasticity : strength of the relationship between price levels and consumer demand. A product is highly elastic if consumer demand varies considerably with price.
7. Non-Price shifts: Sometimes, non-price factors such as consumer taste, income or expectations affect a change in the relationship between price and demand. In these cases, businesses responding to non-price factors stimulate sales of a product by lowering prices to increase demand. In this way, a non-price shift in demand will result in a change in price, even if price did not originally cause the shift.
8. For every product the intended profit target is considered to have been reached if the target volume (for the specified period) of units is sold at the carefully calculated target retail price, all other parameters (purchase price) being constant.
9. Usually the target exceeds for some products whereas for some it falls short of its targets. If the volume of sale exceeds beyond target, the additional profit (in addition to targeted profit) should be considered as the “**bonus**” for that item.
10. There is more likelihood of guaranteed profits (though limited per unit volume) on established brands. So these products should be considered as vehicles for sustainable business with gradual growth. In order to get considerable bonus from them the volume of sale (sale target per unit period) should be substantially high as these items usually yield lower profit margins per unit for the retailers. So the unique sales proposition for selling established brands is to earn a very high volume of business for them. Let’s call them “Volume Driven” products.
11. There are brands which are so popular that despite of considerably higher retail price than all their competitors they undoubtedly rule the market. But again, more the monopoly lesser is the margin for the retailer.
12. On the contrary less popular/secondary demand products do everything to conquer considerable portion of market and hence yield much higher profit margins for the retailers even for a moderate volume of sale. Their consumption turnover may not be guaranteed and can change across geographies. A clever retailer needs strategies to promote sale of few carefully chosen such products (without compromising his reputation) in order to rip more profits and eventually start gaining bonuses from them. The investment for promotional measures for these products can be provisioned form the bonus gained from high demand/monopolistic items.
13. But all low demand items do not necessarily yield greater profits, as few of them cannot pick up well in the market, despite of adequate promotional measures. Also as the “bonus” available out of sale from high demand items is limited and hence retailers need carefully crafted strategies to determine how to effectively promote these items and which products are the best candidates for promotional investments.
14. How to choose right products which are eligible for increased promotion? And how to decide on how much promotional investment to be made on every item (obviously it will be different for every product based on its proven historical merits)?
15. First let’s see what can be the strategies to earn more and more bonus. First let’s make an assumption that few products exceeded their target sale at target retail price and hence won some “bonus”.
16. This strategy considers use of the accumulated “bonus” from various items to aid in determining
17. The revised price of the same item for new subscriptions, so as to lift more “bonus” on them.
18. For determining and sustaining the price of low demand items, who are unable to make their targets.
19. For maintaining the corpus to yield additional benefits to subscribers such as offers, loyalty points, basket level discounts, brand loyalty discounts etc.

## Benefits

Apart from product level discount if subscriber is to be offered any additional benefits they all fall under this category and a separate domain is required for managing them. Some common benefits that merchant may want to offer them are as follows.

There are some ground rules for the benefits which should be commonly applied for benefits.

1. Benefits are applicable to one of the **domain entities**. For example : In case of Basket level benefit, the benefit is applicable on basket(and thereby products added to it)
2. Benefits are dependent on some **independent attributes** of the entity to which they are applicable. For example: As Basket level benefits are applicable to Basket, they are dependent on total basket amount for entire subscription duration, demand density of products added into it.
3. Dependency of Benefits on **independent attributes** of applicable entity is linear or non-linear, proportional or inversely proportional. For example basket level benefit is non-linear and proportional to total basket amount AND linearly proportional to average demand density of products contained in it.
4. Benefits are offered in various **instruments** such as discount, redemption vouchers, cashbacks etc.

## Basket level benefits

A clever merchant would always try to attract subscribers to load as much good in their baskets as possible. He can achieve this by offering basket level benefits in addition to product level discounts which are calculated and maintained by pricing engine.

When a subscriber sees his/her gains getting increased by subscriber for more and more they will be tempted to add more and more items to baskets. It will be a win-win condition for both as subscriber is getting dual benefitted (item level discounts as well as basket level benefits), where merchant is achieving substantial increase in revenue thereby profits.

Basket level benefits are determined in the following way.

1. Entire basket amount is calculated by multiplying periodic basket amount with total period. Example: For monthly basket of Rs.1800 subscribed for the duration of one year the entire basket amount will be 1800 \* 12 = 21600

This way basket’s dependency on basket amount and duration both will be taken care.

1. Total breakeven cost of basket is determined by adding breakeven costs of items added in it. This is the minimum price at which basket can be sold without making any profit.

## Out Of Scope

The domains which are not managed by affiance are inventory management, actual payments, portal (UI) for subscription business and actual deliveries. The context assumes that the subscription platform is to be integrated with a full-fledged shopping portal which is already taking care of inventory management and supply of goods, deliveries to customer, payments through payment gateways etc. Also the user interface requirements (and channels) are very brand specific for every Shopping provider site.