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# Introduction

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.

Retail shopping portals provide customers an ability to choose their products from among thousands of options available and make them buy these online with hassle free home deliveries. They also provide 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.

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.

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 by different competitors and choose their supplier based on the lowest price offers for the desired brands.

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.

## Product Categories.

Since the business is revolving around buying needs of customers, it would be wise to categorize various products as per the buying needs they generate among their customers. Following broad categories of products determine the needs that products in each category can generate and also indicate how much a merchant needs to position himself/herself for each product category so as to maximize gains.

### 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. Typically brands of same product type are always substitutes. Example: Maggy Tomato Sauce and Heinz Tomato Sauce.

If demand for a product decreases, there is a more likelihood that demand of few of its substitutes may increase. Thus it will 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.

## Online selling Trends

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 well the merchant is financially doing, how is he/ she managing his overheads 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 organizations (example: Amazon, Alibaba) and provide online platform for merchants across the region 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. These merchants, 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.

Materialization of a customer to a merchant is the result of

* Lot of advertisements/brand building efforts/promotional campaigns to establish themselves in the market as a brand
* Continuous efforts of attracting new customers and engaging them by offering competitive prices
* Assured quality of products/services being offered.
* Collaboration with secured payment instruments( credit card providers, PayPal, apple pay etc.) to provide attractive payment options
* Customer’s 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.

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.

## Buying Patterns

When we consider patterns in customer buying of their needs, primarily two buying trends emerge out based on their need patterns.

### Instantaneous Buying

Few products are required by the customers on need basis and nature of need may be spontaneous, triggered by some incident or occasion. Customer buys a product as a response to this trigger. Example: Customer buying a new headphone when his earlier one breaks down OR he wishes to upgrade to a latest one OR he/she wishes to gift it to someone.

Customer buys a new mobile handset as a result of breakdown of earlier one OR he/she wishes to upgrade to a newer version with more speed and capabilities.

Customer buys furniture when he is fed up of using the existing one OR it is broken OR it does not match the new colour scheme/theme which he/she has adopted for his house OR when he buys a new house.

Due to spontaneity of need and its trigger/event based nature, periodicity of buying such products is not fixed. Usually products purchased in instantaneous buying patterns last longer/used for relatively longer period. Next time when buying the product under same category, customer’s choice may have changed due to changing trends. Example: A customer who had bought a Nokia Lumia phone (Windows based) may want to opt for an Android phone, as it is currently more popular and then try for some other brand. Similar behaviour may be observed while buying fashion apparels (Jeans, trousers etc.).

Similar to periodicity and choice customer’s association with merchant may also change. Customer may not buy the product from the same merchant every time. He/she will first surf available product catalogues provided by different merchants, compare prices and then decide from which merchant the product should be purchased. For non-branded/trivial products where price variations are huge, lowest offered price is usually most significant determination factor. Even for branded ones relatively lower prices does make a significant difference.

Thus customer’s association with merchant for buying a product is more “instantaneous” in nature. Customer approaches desired merchant, makes his purchase and walks away. There is no commitment from either side that purchase of same/related/similar product next time will be done by that customer from the same merchant.

As customer’s affinity cannot be ensured in sale of these type of products, the main revenue/profit determination factor is the volume of sale of these items. Once a customer purchases a product from the merchant, instead of tracking the same customer for probability of him/her coming back to same merchant next time, the merchant focuses on acquiring more and more (old/new) customers so that overall volume turnover of sale will increase(at least remains constant). Though by offering lucrative discounts/cash back offers as well as ensuring sale of good quality products, merchants try to create an opportunity for gaining more and more customers including the same customers back repeatedly, there is no science by which the same can be assured and predicted.

#### Challenges

Such an “Instantaneous” nature of business poses multiple challenges in front of merchants.

The first and foremost challenge is to keep the business in a predictable state. Merely increasing customer base for some period does not suffice the need as such as growth may be unpredictable/short lived. A merchant would be considered to be doing bad if an average 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 acquisition of new customers, its stability will always be a question mark, if some percent of earlier customer do not come back to him.

Second challenge is associated with keeping control on offered prices by controlling expenses and waste. 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 per product 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 for each of the product 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 demand decay resulting into expiries of batches of goods. Discounted prices for each of these products are determined based on certain demand predictions and assuming assured revenue/profits. Such an unpredictability shatters these assumptions and ultimately may result into vast underperforming of business on revenue and profit fronts. Unpredictable demand also significantly impacts operating expense per unit of goods, as utilization of resources such storage space, electricity charges, expenses on operating staff, expenses related to delivery of goods as part of supply chain etc. are impossible to optimize in case of unpredictable demands.

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/on site retailers and fulfil local orders through them. In turn the local retailers pay them commission for awarding business.

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

In second approach merchants rely on the local retailers for inventories being managed by them, quality of the goods 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. As the regional purchases are negligible in volume (as volume is sufficient just to take care of regional needs), the purchase price per unit of goods is much higher as compared to first approach. Benefit of this approach is saving of inventory cost, 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. Though these predictions may provide higher probability of getting closer to the reality but there is no assurance of them meeting the reality because nature of business is instantaneous and there is no guarantee that a customer once made purchase from a merchant will come back again to the same merchant.

Another challenge is to determine the right price of every product being sold in order to ensure predictable gain. Due to turnover of huge volume of goods, 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.

#### Pricing

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 offered by competitor merchants.
* Price/Demand of substitute products
* Price/Demand of its complimentary products
* Geographic +demographic aspect determining purchasing power and perceptions of buyer population

Considering “demand” as the primary factor driving offer price, see 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 ensure 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.

Now if the prediction system predicts a demand of 4000, based on which unit price is determined as 75 Rs. and actual sale is 3000 units then profit is reduced to 75000 Rs (which is 25% less than forecasted profit)

3000\*75 -3000\*50=3000\*25=75000 Rs.

If 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 blue collared people are living, it may negatively impact the sale.

Online shopping sites may not have this luxury of charging different prices in different geographies because the same site is accessible from all locations. Some of them provide the option of selecting the state/city before initiating any purchase just for this purpose.

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 price of substitute of a product (competitor products) goes up it may positively impact its demand. This is because price hike of a substitute reduces its demand, and with the assumption of constant customer base for a product, the reduction in substitute’s demand may turn as increase in the demand of that product. Thus price of substitutes also plays a major role in price determination.

Similarly when price of its compliment of a product goes up it may result into reduction in demand of a product. This is because if people are into habits of buying a pair/group of compliment products, increase in price of one of it may cause customer think of not buying the whole group/pair. For example: Increase in price of a cereal/corn flakes may reduce demand of milk too.

All 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, branding/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.

### Periodic Buying

If one categorizes the range of products being consumed by an average customer for his routine use it can be realized that large range of products is repeatedly required by 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, Protein supplements are required in a prescribed quantity every month, tea/coffee, spices, food items, shaving blades, diapers, mouthwash, dry fruits, biscuits/cookies, corn flakes etc. etc. The list is very long in retail world.

Needless to say, their consumption pattern and hence buying pattern is almost predictable. Each product may have its own consumption frequency.

Example: In my family I consume two Miswak toothpastes, one 200 gm Taj Mahal tea pack,3 packs(10 in each) of Huggies diapers for my baby,4 lux soaps, half kg of rice, half kg of lentil, two body sprays,2 bottles of Dove shampoo,1 Kg sugar,…. Etc.

Other characteristic of periodically needed products is that brand preferences per person/family are usually fixed and rarely change OR they change over a relatively longer duration. Typically people do less experiments with items related to their daily consumption and health and hence their preferences vary rarely.

If you apply the same rule for health associated products such as protein drinks/health supplements, medicines, medicated oils, skin creams, hair dye and certain range of health related products such as diapers you will see that it follows exact same behaviour as described above.

In retail/medicine world there is more probability and likelihood of buying a package of periodic needs from the same merchant and at fixed intervals. Variations is each of their prices across competitors have negligible impact on buyer’s pocket (but can cause impact at package level) and hence people do less scrutiny while choosing a merchant for buying these type of products. Of course It should not make merchant take his/her customers granted for an assured business. They should have policies in place which should influence customers to buy more and more items from them and for longer duration.

Hence there is a more likelihood of retaining customer affinity in case of products exhibiting periodic buying patterns. So in addition to increasing volume of sale by acquiring new customers merchant can concentrate on efforts to retain existing customers in such category of products.

If you introspect range of all products that you are using in your daily life and categorize them down you will realize that it has a significant proportion of the products which have been periodically bought by you.

If a merchant compares the impact of demand predictions in managing inventory, operating expense decisions thereby determining right offer price per unit in products exhibiting periodic buying pattern, he will realize that the percentage of precision is way higher as compared to products exhibiting random/instantaneous buying pattern and random selection of merchants. This is because a customer buying two Colgate toothpaste a month will continue buying the same volume every month and probably buy them from same merchant. Also for all such FMCG needs he will probably buy the whole package of periodically needed goods from the same merchant (if he sees considerable advantage in buying the same from a specific merchant).

In other words you can say that existing periodic buyer may remain associated with same products and with same merchants for much longer duration. Hence their future demand of those products from the same merchant is not just a prediction but it is real.

The scope of this analysis is to focus on the trading of products which exhibit periodic buying pattern and study how their business by means of subscription not only benefits the merchants but also helps maximize gains of the customers.

# Subscription space

As we have seen above, periodic buying pattern unleashes opportunities of building a sustained and retained (not just increasing) customer base by establishment of long term relationship between merchant and customers is possible in a large segment of products.

The opportunities are not obvious just because these products are periodically needed by customers with a relatively fixed periodicity. If customer does not find any incentive(s) to get into periodic engagement with the same merchant such business model may not work.

Merchant needs a business model by which prolonged loyalty by customers should pay them off very well along with maximizing merchant’s gains. A systematic engagement between merchant and a customer where the customer gets more & more benefitted by buying more volume of goods and by buying for longer duration from the same merchant, is essential in ensuring predictable and sustainable business for the merchant.

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.

Let’s elaborate simple terminologies associated with subscription.

A ‘subscriber’ is the one who subscribes (registers for periodic receipts) for a set of products (example: articles and/or magazines in case of publications) or services (example: software licenses in case of SAAS or mobile plans in case of telecom business) by getting into long term agreement with merchant in lieu of more cost savings as compared to random instantaneous buying, and keep on receiving these products/services periodically at a predefined interval. Periodic deliveries of desired goods/services save subscriber’s efforts on procuring them every time by new agreements with different suppliers or renewed agreements with existing suppliers.

A ‘merchant’ in subscription business is the one who proposes a lucrative periodic buying business model to customers, and convinces them to get into maximum and long term association from each of the customers, thereby ensures a sustainable revenue and profit for himself.

The “Subscription” concept tries to complement the expectations of customers to obtain their “periodic” needs along with maximization of their cost savings, with merchants who wish to retain their existing customer base for as long duration as possible (in addition to gaining new customers) in order to ensure a predictable, sustainable and thereby prospering business.

In publications as well as SAAS business models the market and cost vulnerabilities are limited and predictable as compared to retail business.

Subscription to products in other periodic selling business (such as retail, health products and medicines etc.) is not yet so popular/ practiced. 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) gains for both stakeholders (subscriber and merchant).

Two main factors which fully influence subscription business model are discussed as follows.

### Long term association

The basis and intent of subscription concept itself 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. That is where a customer is termed as ‘Subscriber’.

The first obvious advantage for a subscriber of ‘subscribing’ is ‘saving of lot of time and energy on buying his periodic repeatable needs’. An order needs to be placed by customer just once for a fixed length of period, mentioning the number and periodicity of every item being subscribed. Packages with appropriate product contents are delivered to his doorsteps on completion of every delivery period. No periodic visits to malls, no standing in long billing queues, not even periodic ordering online thereby paying different prices for the same product at different times; Order once and you are done for subscription period. Let’s term it as the “Convenience” aspect of subscription model. It is one of the attracting force for a customer to turn into a subscriber. A Merchant who offers a subscription business is expected to enable a subscriber to register for set of products at respective delivery frequencies for a finite subscription period and deliver branded as well as good quality products precisely at the defined frequencies to the customer’s doorsteps.

But merely “convenience” may not ensure long stream of subscribers getting associated with same merchant for longer term. A subscriber may wish to get into a longer term agreement with a merchant also because he/she would expect extra benefits for his/her ‘loyalty’ with same merchant, in addition to the his own “Convenience” aspect described above. Merchant should have proposition to answer “What’s there in it for me?” question from the customers who are intended to get into long term associations with him/her.

# Objectives of Subscription Ecosystem

So far we have understood in detail about the importance of subscription business in retail, medicines or any such business where buying pattern is periodic.

Now we will try to lay out foundation of this model and how it offers huge potential to connect with customers for longer term, thereby increasing the predictability and sustainability of the business manifold. Here we will try to get into the comparison between instantaneous business and subscription business and try to evaluate customer and merchant expectations in both business models and verify that both stakeholders will be greatly benefitted by adopting subscription business model wherever it is applicable.

But is it so straightforward, just to start selling products in periodic buying pattern?

There is a need to study in detail the objectives of subscription model so that if any such ecosystem needs to be built then there should be a ready reference available to provide detail guidelines, best practices, dos and don’ts and metrics to monitor and introspect each business decision which is influencing overall business.

We will try to turn every cornerstone possible as well as try to relate different objectives together to analyse the impact of one onto others.

Let’s start with defining these objectives are based on their obvious expectations from the long term relationship notion in subscription business model as well as few innovative advantages which are available due to nature of business model

Ultimate goal of these objective is to design a “subscription eco-system” (I would like to term it as subscription engine) which is configurable, intelligent, fault-tolerant, self-corrective, introspective and capable of assisting all stakeholders by providing appropriate recommendations at precise times.

## Subscriber centric objectives

### Quality

Regardless of nature of business (periodic or instantaneous) quality of purchased goods has always been and will always be the first criteria for most customers. In case of branded products this is not needed to be handled by merchants as customers are already associated with some brands or the other. This may be an issue for non-branded products such as non-packaged grains, dry fruits, sugar etc. .

Merchant has to ensure that whatever products (branded or no branded) products he/she is offering they should be of good quality. Many new/upcoming products get launched in market with highly competent prices as well as lucrative margins for merchants. Hence merchant as well as subscribers may get tempted to offer them/buy them. But if these are later found to be of inferior quality, subscribers will not blame their own choices but will blame the merchant who offered these products.

Subscription eco-system itself does not influence quality of product and it is up to merchant to determine what quality of products to sell through it. So we will not take this objective further in eco-system design. But this objective is discussed here to emphasize the fact that selling inferior quality of good cause more harm to subscription business than it is to instantaneous business, as the basic success factor is long term retention of subscribers.

### Convenience

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

* Subscribers 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. The interface can be a web portal, sophisticated mobile app, Amazon Echo (Alexa) etc. The interface should be so simple to operate that any newbie to internet world can also be able to operate them. The type of orderers depend on nature of business. For retail/grocery/medicine business may include non-working house wives, elderly citizens and lower middle class members. These people may not be internet aware and their mobile usage may be limited. So they may not be able to operate big workflow driven interfaces. Chatbots or Amazon Echo can be extremely handy for such customers. Such interfaces can also save lot of time of internet aware customers. Since the mission is to reach the remotest and last citizen of the region effective human interface make significant impact on the success of subscription business. Though all above requirements are true for instantaneous business too☺.
* Subscribers should be able to check/track status of their subscription such as completed/pending deliveries, pending/completed payments, benefits gained and reasons for each benefit received, reasons for excess/lesser payments, new promotional campaigns matching their usage profiles etc. though these interfaces.
* Through offline communications such as e-mail, sms, voice message etc. he/she should be notified of important events such as order confirmation, renewal confirmation, confirmation of content change, change of offer price of subscribed product, confirmation of received payments, deposition of marked benefits in his/her account, pending payment, status of any grievance /complaints made etc.
* Subscriber should be allowed to make any changes to their subscription content any times during subscription period. This is not good for subscription business as the predictions get negatively impacted due to frequent changes in subscription content. But still it’s a required trade off so as to ensure subscriber’s flexibility as they may not want to get bound by the earlier commitments made during subscription initiation (as those commitments were based on their past needs context which may have changed during the time). Also such a constraint may negatively impact the duration of subscription that subscriber may wish to commit to, as he/she may not have visibility of remote future. So he/she will not want to get into longer term commitment with merchant. Instead of the constraints, promotional measures such as benefit/reward scheme can be offered where subscribers 100% adhering to initial commitment for full subscription period should be additionally rewarded.
* Subscribers will want 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.

### Multidimensional Benefits model

Merchant needs to answer “What’s there in it for me?” when a customer is intending to turn into a ‘subscriber’.

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

* Brand preference: Out of various brands available which brand he/she would like to buy.
* Quality of non-branded products
* Prices and benefits being offered per quantity/duration of subscription.
* Quality of service by the merchant (on time delivery, flexibility to change the agreement (change of subscribed goods/periodicity/volume etc., delivering products form latest batch etc.).

In case of packaged buying, 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?

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: Discounted Price

The first benefit that a subscriber would expect is to get every item at maximum possible discounted price. This is how he/she may feel respected for his/her long term association with a merchant.

Since success of subscription business lies in

1. Achieving large subscriber base
2. Ensuring prolonged relationship with each of them
3. Attracting them to buy maximum volume of goods
4. Minimizing churning of existing subscribers

The total benefits to be awarded to subscribers should be determined according to each of these attributes.

A Merchant should be able to offer products at discounted prices (prices lesser than their MRP) as an offering to subscribers for registering subscriptions with that merchant. Merchant should have mechanism to calculate the instantaneous discounted price per product that can be offered based on performance of that product.

But how will this be different than those in instantaneous business? Even merchants into instantaneous business are also offering products at discounted prices in order to attract customers.

Also if two merchants are providing different discounts on the same product on a given day, should a subscriber choose to subscribe to the merchant offering lesser price? Well, the answer is not so straightforward like it is in instantaneous business.

This is because the total benefits that a subscriber is going to gain is not just limited to discounted product prices. As described above the benefit a subscriber is getting will depend upon his duration of subscription, volume of products subscribed, his affinity to the same merchant for the whole agreed duration and his affinity to the same merchant beyond a given subscription but through recurring subscriptions. Let’s see other aspects below.

#### Topping 2: Committed Price/Discount

When a subscriber subscribes to a product for a six monthly/yearly subscription, he/she is registering to receive that product multiple times throughout the subscription period. He/she is doing it because the discounted price offered by the merchant is appearing a good deal to him. The challenge is on the merchant side. Can merchant keep the same price for him throughout the whole subscription period, by which he has initially attracted that subscriber?

As we know that demand vs supply dynamics, changing trends, competition and inflation greatly impact the prices of different products. Some brands are monopolistic or close to it and offer considerably more but stable prices, but they usually offer very less margin to the sellers. New products gets launched with heavy discounts in the initial settlement period and later increase the prices. Some of them are really volatile in pricing and their price depends on demand vs supply dynamics. When adequate supply, these are offered at standard prices but soon prices may turn exorbitant if supply reduces.

Subscription business model should make provisions for some sort of price commitment at least for some products, if not all. A merchant may identify products for different types of price commitments, based on experience related to their ‘price elasticity’. But eventually the subscription system should be capable for analysing the price variations among different products in history and “recommend” few products where some sort of commitments can be made. Based on the historical data a committed product for last year may turn non-committed in current year and vice versa.

Subscription business model should assume three types of product pricing categories which will be offered to subscribers for appropriate products based on 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 either negligible or within acceptable limits. Also if the price fluctuations are dependent on inflation, they are may be regional in nature. For example: In USA prices of most of the products are more or less stable as compared to India for the same set of products. So the merchant may find it safer to commit prices of such products to subscriber for his/her entire subscription period.

In case of price committed products, price of a product **committed to a subscriber** **or group of subscribers** should remain same until end of his current subscription period. This should hold true even if the offered price OR price of that product gets changed one/many times during that subscription period resulting into product/merchant is incurring losses on that product.

The idea here is not to commit same price to all the subscribers subscribing for a product at all the time.

Every hour/day/week, based on changing business situations such as supply vs demand dynamics/trend change etc. a new offered price may get published for a subscriptionable product.

At/after that moment any new subscriptions for that product will get the newly published offered price. Thus subscribers subscribing to the same product but on a different day/time may subscribe at different offered prices. Every subscriber may have his/her own version of committed price for a product, which is different from other subscribers subscribing to the same product.

Thus after committing an offer price, even if the purchase price/break-even price of that product goes higher than its earlier committed offer price, is limited only to few subscribers and for a limited duration for each subscriber.

The maximum “allowed” subscription period should be restricted to a reasonable period (say one year) so that the committed price for each subscribed product is expected to be served only during that period. After exhausting of current subscription period if subscriber wishes to continue with his/her order he/she will need to renew the subscription (contract) where new/latest price for each product will be committed to him/her.

Thus if earlier committed prices are now resulting into loss (because earlier subscribers are committed old offer price for whole subscription period but merchant is not bound to purchase new batch of goods with revised purchase price) the loss is limited due to few subscribers and for limited duration.

1. Percentage discount committed products: Some products may fluctuate more frequently and considerably but they provide relatively constant margin (difference between MRP and breakeven price). 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 MRP at the time of every delivery. In this case the actual price to be paid by subscriber will vary if its MRP changes, though discount percentage is fixed because the percentage discount is calculated on latest MRP at the time of every delivery.

Merchant may start incurring loss for any such product if the product starts offering lesser margin for him, even less than discount percent being offered. This may happen due to various reasons, such as the product may be getting very popular in the market very fast and hence squeezing on the margins being offered.

Alternatively if the product is getting more popular as compared to its substitutes (which is recognized by increasing profit figures on its account) but supplier has not yet changed the margins being offered, then merchant may squeeze the percent discount being offered to subscribers thereby riding on the popularity wave.

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.

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.

Why to Commit???

Few words on the notion of committed price. No product is inflation proof and in most cases after committing a price/percent discount on a product, the purchase/breakeven price of that product may increase, resulting into loss of profit or even loss to the merchant. Then why does merchant need to commit anything to subscribers?

Establishment of Trust:

Products are not just being sold once but they are subscribed for a repetitive sale. In such case showing them one offer price for the sake of subscription and later changing it every now and then ruin the subscriber benefits and it may ruin the intent behind subscribing to the product. Moreover it may generate a feeling, of being cheated among subscribers.

Instead it would be appropriate to publish an offer price for a product with its commitment category, and provide a disclaimer associated with each category.

Example: For Product X having MRP of 50 Rs., merchant may publish an offer price of 43 Rs. and also publish its commitment category as “Price Committed”. Somewhere in the disclaimer for “Price Committed Category, a rule is published which says that “once committed a price for a current subscription will remain constant until the end of that subscription”

Similarly for some other product “Y” having an MRP of 60Rs, merchant may have published an offer price of 49 Rs. and also published its category as “Price Non-committed”. Somewhere in disclaimer of “Price Non-committed” category, a rule is published which says that “current published price is just applicable for products getting delivered at the current time, and it may change even at every delivery.”

Such categorization related to price commitment and related disclaimers exhibit merchant’s intent to provide best prices to the subscribers and possible variations in its price due to demand/supply dynamics are clearly conveyed to prospective subscribers at/before subscriptions.

Limiting of loss due to finite subscription period limit:

When some subscribers are receiving delivery of a product at an offered price relatively lesser than its latest offer price (or even lesser than its latest purchase/breakeven price) resulting into loss to the merchant, the loss is only limited to those few subscribers (who subscribed earlier at lesser offer price). Also this loss will only last only until end of their current subscription period. Since merchant has put a caveat on maximum subscription period to say, one year, it means that the price/discount commitment (and hence probable loss) is going to last only up to maximum one year. At renewal of subscription new price/discount will be committed for the same product, resulting into overcoming the loss from now onwards.

Price Corrections for compensating limited losses:

It is not enough to limit the loss due to correction in price, to a finite limit. Because loss is a loss. Hence some compensating mechanism to recover from that will be required to be embedded in the business model.

In case of loss (or loss of profit) like situation, the offer price should be able to correct itself by use of appropriate pricing algorithm. In the detail description on pricing policies and algorithms we will see this in detail. But just for illustration of one scenario, in the situation where demand is increasing but profit is diminishing (because product is being offered at price much lower than its current worth), the newly calculated offer price is expected to be more than earlier offered price so as to bring the product up to its current worth. Such an upward price revision should automatically compensate for the loss due to lower price quoted earlier and bring product business into profit figures.

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.

As a rule of thumb, subscription business model proposes that the current offered price or discount in committed or non-committed form should be offered to all ‘current’ subscribers and there is no discrimination made while offering a price at the same time to different subscribers based on any other criteria such as volume of purchase, duration of purchase or loyalty.

This is because in multi-layered model discounted offer price and price/discount commitment/non commitment is assumed to be the right of every subscriber and this is the first value proposition by which subscribers may wish to get/remain associated with the same merchant for long duration.

#### Topping 3: Volume based /Duration based benefits

If a subscriber is repeatedly buying all his needs from the same merchant, is he/she being rewarded for his/her long term affiliation with that merchant?

Looking little deeper in this kind of relationship, a subscriber 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. So the merchant is awarded with an assured business for a fixed duration. It is resulting into merchant making more precise demand predictions, negotiate better on price front, reduce losses, optimize on wastage, operating expenses and maximize self-gain.

Conscious efforts made by merchant not just for subscribers getting into longer term agreement once but also to make them repeat their subscriptions (contracts) with same merchant again and again should result into ‘loyalty’ benefits. Thus number of renewals of subscriber’s association with same merchant is tracked to determine how many loyalty points a subscriber will earn. It can be in the form of additional discounts or cash back schemes or loyalty/reward points etc. Thus this loyalty further helps reducing effective unit price of each product being subscribed by a subscriber.

As merchant is automatically wining a long term relationship with existing subscriber, he can focus more on winning new subscribers.

One variant of it is the “Costco” business model where the merchant operate on low margins but sells goods in volume to its registered customers. It ensures two main things

1. Its customers are buying their needs in high volume and in turn gain significant price benefits.
2. Its membership which assures customers of good quality high volume goods in lucrative price propositions, ensure customer loyalty.

In subscription world a parallel variant of this loyalty assurance business model should be present to compete with the “Costco: model. It should ensure that a subscriber should be rewarded in proportion to the total volume/price of his/her subscription. The volume can be assured by buying Rs.5000 per month of goods for six months, OR by buying Rs. 3000 per month of goods for one year. Here the subscriber is not buying volume of goods in one turn but because he/she has subscribed for number of months the total equivalent volume of goods should be rewarded in similar manner. This will tempt the subscribers to subscribe for more volume of goods per period, or more volume of goods for more number of periods in a subscription, as his savings/earnings are increasing in equivalent proportion.

Though the discounted pricing model offers gains to subscribers, it does not distinguish subscribers who are subscribing for larger volume of items against those who opt for much lesser volume. Similarly it does not distinguish between subscribers having much longer subscription period as against the others. Thus product offerings at a discounted prices would be necessary but not sufficient to attract people for subscriptions.

A subscriber who is subscribing to longer term association with merchant as compared with other subscribers should be rewarded with something in proportion to his/her duration of association with merchant.

A subscriber who is subscribing to more volume of good per subscription period should be rewarded benefits in proportion the volume of subscription.

A subscriber who has completed agreed subscription duration and adhered to agreed subscription content should be getting all above benefits. A subscriber who may be revoking his/her subscription before end of subscription period should get benefits in proportion to active subscription period. Similarly a subscriber changing his subscription content during subscription period should be rewarded benefits in proportion to revenue that he/she is contributing to the merchant.

Subscription business model should have the capability to calculate the above mentioned proportional benefits in advance, when a subscriber is registering his/her subscription and inform him/her that he will get these benefits on account of subscription of specific volume/duration and it may increase if either of volume/subscription is increased. The idea is to attract the customer to subscribe for more volume of goods and for longer subscription period.

The benefits awarded may be directly proportional to volume/duration of subscription or there may be “slabs” (ranges) according to which benefits for a subscription is calculated. For example: If a benefits policy is set where a subscriber subscribing in the range of 40,00 Rs to 50,000 Rs will get X value of benefits whereas those subscribed for 51,000 Rs to 60,000 will gain 1.5X value of benefits.

The subscription system should be supportive of multiple of such policies and let merchant decide how he/she wishes to frame the rules for different benefits.

#### Topping 4: Loyalty based benefits

All above benefits are limited to an active subscription contract. What if a subscriber who completed his current subscription and renewed it again. His loyalties towards the merchant shown be recurring renewals of subscriptions should be rewarded in terms of some benefits associated with loyalty.

Example: A subscriber who has subscribed for 6 months, later renewed it for 6 months thrice, the loyalty benefit should be calculated based on his period of one subscription and number of renewals. In this case it will be 6\*(1+1+1+1). The other subscriber who has subscribed for 6 months, renewed it for an year and renewed again for 8 months will be determined proportional to 6\*(1+2+1.33) and so on.

Just like volume/duration based benefits, loyalty based benefit definitions should also be flexible and merchant should be able to configure the one of their own choice.

The above multi-layered benefits model which greatly benefits not only to subscribers but also to merchants is only possible in subscription business mode. Those subscribers who are contributing to more assured business for merchant as well as to maximizing his/her gain will be in turn maximize their own savings in form of multilevel benefits as described above.

Another intangible benefit of this multilevel benefits model is that, as the total gain to the subscriber is determined at multiple levels/with multiple factors, it is not possible to do an ‘apple to apple’ comparison between the gains by two subscribers. Thus though the price war among competitors is still very much there, merchants have various level where they can fight it effectively.

For example: Some merchant may not provide any discount on offer price (offer price same as MRP) but provide opportunity of maximizing gains on duration/volume/number of renewals of subscription, by providing exponential increase after crossing each slab/threshold of benefit rule. Others may opt to provide heavy discounts on offer prices but no products are price committed, thus providing benefits to subscriber without the risk of incurring the loss. Third category of merchants may make all products price/discount committed with lucrative price discounts but no providing any other layer of benefits. Thus there are enormous combination of benefit schemes which will enhance overall savings of subscribers but make them difficult to compare the one provide by merchant with the other.

This is where one can answer to the question asked earlier, “Should the subscriber subscribe to a merchant for a product merely based on lowered offered price than others”.

### Flexible Payment schemes

Payment is a challenging endeavour in subscription business. This is because

* Subscriber will be subscribing for multiple products which will be delivered in very near future as well as in not so near future. It may not be appropriate to mandate 100% payment for the whole subscription by subscribers in advance. Total subscription amount may be huge, which a subscriber may not be ready to invest/block upfront. Also any such mandate may not be possible in every class of the society. Hence such a payment scheme may make subscription business limited only to rich customers.

On the other hand maximum advance payment significantly boosts merchant’s capital. Merchant may as well gain attractive interest on huge corpus collected out of advanced payment. So the intent should be to promote an environment where subscribers are motivated (not mandated) to make maximum advance payment. It can be done by setting up some benefits/discounts schemes where more advance payment will attract lucrative benefits to the investing subscribers.

* We have seen earlier that products are categorised in “Price Committed”, “Discount Percent Committed”, “Non-Committed” categories. They indicate fluctuations in offer pricing due to which total subscription price keeps on changing during subscription period. Hence it may not be possible to calculate total amount for the whole subscription upfront, as the products selected by a subscriber may be falling into any of the above categories and hence price of each product may not remain constant across deliveries. For example: For non-committed product different price may be charged at the time of almost every delivery. Thus the notion of “Full Advance payment” is not realistic if merchant has decided to use any pricing categories other than/in addition to ‘price committed’ category, for categorising different products.
* Subscriber may be altering his/her earlier orders during subscription period, due to which total as well as due amount will keep on varying.
* It may be annoying experience for subscribers, to claim the dues periodically through monthly reminders. He/she should be provided easier options of payment suiting to his/her appetite. Some may prefer majority of payment to be done in advance whereas others may prefer cash on delivery kind of options. Few may make some payment in advance but process the remaining payment in instalments.

The business model should offer definition of payment schemes in a flexible manner and track incoming/due payments according to these schemes. In case of multiple schemes, merchant may want to offer them as options in front of the subscriber where subscriber will agree in what phases/instalments he/she wishes to make payments.

An optional rule that merchant may want subscribers to adhere to, is that they will get only those deliveries for which merchant has received/is receiving payment (if cash on delivery option is chosen). So subscribers at least need to pay in advance for any upcoming delivery. But again it is up to individual merchants how much liberty they want their subscribers to enjoy for fulfilling their dues.

We have already understood that prices for products under the ‘price committed’ category are going to remain constant for the current subscription duration, the arithmetic for payments of these products is relatively simple.

Let’s understand the treatment required for the products categorized under either of the ‘variable’ pricing category (percent committed OR none committed).

There are two parts of payment processing

1. Calculate the due payment at each delivery dispatch event as well as at each subscription content change event. Delivery dispatch event is the latest event where offer prices of deliveries goods in variable pricing categories are picked up for calculation of delivery amount. At subscription content change event new products are getting added with different price buckets (than the earlier price buckets for the same products). Also if products are getting removed they should be removed with lowest offer prices between the one at confirmation and at an instance of removal. Hence these two events seem to be most appropriate for calculating payments.
2. Define delivery cycles as ‘payment schemes’ where part of the due payment calculated so far will be received from the subscribers.

#### Calculation of due amount due to variations in offer price and variations in subscription content

We know that due to three pricing categories, the products lying in percent committed and none committed category offer variable prices. Since the offer prices are assigned to the deliverable content just before the ‘delivery dispatch’ event, the latest price of products in percent/non committed pricing category are picked up of billing.

How will the payments be processed if the prices of few deliverables keep varying from delivery to delivery? This is the complex scenario applicable only to subscription business, where content commitments are made in advance (at the time of subscription confirmation) but price commitments come at the time of deliveries and only specific to those deliveries for many products.

Let’s see the lifecycle of due payment calculation in detail.

1. At the time of ‘subscription confirmation’ the total due payment of a subscription is determined by considering current prices of all products subscribed to, and notified/displayed to the subscriber with appropriate disclaimers for products associated with variable prices. Let’s name is as ‘TENTATIVE SUBSCRIPTION AMOUNT’ for the full subscription. The word ‘Tentative’ indicates that it will undergo number of changes/corrections during the tenure of subscription, for products lying in variable pricing categories.
2. Appropriate payment scheme (from amongst the one listed below) should be chosen by subscriber at the time of subscription registration. So the same gets applied on ‘subscription confirmation’ event. It will calculate the amount to be paid by the subscriber before first delivery, if any as well as delivery numbers after which some proportion of due amount till date is to be paid by the subscription and the proportion value. So upon subscription confirmation subscriber should be notified on his channel console, something like,

*Thanks for confirming subscription with us, your tentative subscription amount is Rs. 36,000.*

*You will have to pay Rs.3000 in advance in order to start the deliveries.*

*Your next instalment will be after 5th delivery and will be 2/3rd of the total due amount.*

*Your next instalment will be after 7th delivery and will be 1/3rd of the total due amount.*

*Before last delivery you will have to pay the remaining dues those may arise after 7th delivery.*

1. At the time of ‘delivery dispatch’ event, latest offer price for none committed products and MRP (if changed after last delivery) for percent discount committed products is fed to the Due Correction Engine. The responsibility of this engine is to calculate the due amount corrected due to variation in offer price of variable priced products.

The difference in offer price at the time of subscription confirmation and the one at the time of dispatch, for a variable priced product, multiplied by quantity of that product currently being dispatched, will provide the due amount for that product. With similar logic the total due amount arising due to all variable priced products being delivered in that delivery is established. This procedure is repeated for each delivery.

If latest offer price is less than the one at confirmation, the difference will become negative and hence total due will be reduced, else it will increase.

1. When a subscriber makes changes to the subscription content, it warrants recalculation of due amount due to products/quantities being added/removed. The change will induce more due amount if any addition is made to the subscription. If change will induce reduction in due amount if any product is removed OR quantity of any product is reduced.

If quantity of any already subscribed product is increased, the newly added quantity is added with the latest price bucket. It means the same product will have some quantity with one price bucket and some quantity with a different price bucket.

If any product is removed/reduced in quantity, the correction to the due amount is required so as to understand the refund amount that may need to be paid back to the subscriber. When a quantity is reduced or product is withdrawn, the lowest of the offer price at the time of subscription confirmation and the latest one is considered while calculating the refund amount. The refund amount is adjusted with total due amount to be recovered so as to understand if any amount is due form the subscriber or it is to be refunded.

1. For price committed products the incremental quantity should be charged with latest offer price at the time of subscription change.
2. For percent discount committed products the incremental quantity should be charged with latest percent discount (on latest MRP) at the time of subscription change.
3. For none committed products the incremental (and total) quantity should be charged with latest offer price at the time of subscription change.
4. In case of decrease in quantity of a product OR cancellation of a product the reduction in due amount is made with the lowest offer price/percent discount between latest offer price at the time of change OR the offer price at the time of subscription confirmation.

Needless to say that this correction to due amount due to subscription content change will be applicable to products belonging to all three price categories including ‘price committed’ category, if content change has happened to them.

1. In case a subscription has undergone one or more content changes, a deliverable consignment may include one or more products having some quantity associated with a price bucket and remaining quantity associated with different price bucket. This may happen because subscriber may have added some quantity later during subscription tenure.
2. Correction to the due amount due to offer price variations is made only to the latest delivered consignment; No corrections are made to the future deliveries. This is because such a correction will become useless, as the offer prices may undergo change again at each of the next deliveries and hence will demand corrections again with revised prices.

But the correction due to subscription content modification is applied to all remaining content (till end of subscription) yet to be delivered after content modification, for the products for which content is modified.

Now as we have understood the calculation of due amount as well as calculations of ‘corrections’ in them, let’s go and explore few possible payment schemes which determine when the calculated due amount is expected to be received from subscribers.

There are two approaches those can be adopted to set the collection scheme.

1. Merchant sets the scheme rule in the computer based system in a generic way so that it will be applied to subscribers.
2. Subscriber himself configures how he/she want to pay the due amount (after paying 100% tentative advanced payment)

#### Instruments for Payment

Money should not be the only instrument for making payments. When subscribers are subscribing for large volume of goods or for longer subscription duration they should be rewarded with appropriate number of reward points proportional to the added revenue/profit being added to merchant’s wallet. They should have an option to pay their dues using the accumulated reward points. It is synonymous to an investor making investment in a business to grow it and gains returns from the business in proportion to its growth and his/her contribution to the growth. It will be a very big “feel good” factor for subscribers that their current/earlier associations with a merchant is paying them good returns and thus motivates them to retain or even extend this association for longer period and for bigger volume of orders.

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### Deliveries close to needs

If subscribers are subscribing for multiple products, they may not need all of them at the same interval. This is because consumption rate of each of the products may be different. Example: customer may want two toothpastes per month but need toothbrushes or razor blades to be delivered every four months.

Hence they will need different items to be delivered to them, at different periodicities, closer to their need time. It means that subscription ecosystem should manage multiple deliveries spaced with different intervals for a registered subscription, each of them having their own periodicity and these deliveries are received by subscriber close to their needs.

In order to optimize on the delivery cost, overlapping deliveries should be clubbed together. Example: if a subscriber has ordered for few monthly and few quarterly deliveries as part of subscription, items to be delivered quarterly should be delivered along with every third monthly delivery. Similarly in case of weekly deliveries along with monthly deliveries within same subscription every 4th weekly delivery should be clubbed with monthly delivery and so on. Timetable of deliveries will be projected upfront to the subscriber and his/her consent is taken on this delivery schedule.

### Enabling subscriber as a brand ambassador

The best promotion for any business is achieved when its own beneficiaries act as brand ambassadors for that business. We have always seen around us that if a person is using product X and he/she likes the quality of that product, he/she does not hesitate to appreciate that product in relevant discussions, which may influence listeners to think of buying same product/brand or replacing their existing product/brand with product X. Such promotions happen as a spontaneous reaction of customer based on self-experience and hence unintentional. But there is no guarantee of such promotional conversations to happen. Furthermore its impact on the listeners is also uncertain.

But if such a rejoiced beneficiary is appreciated /rewarded for such promotions then he/she may get motivated to wishfully promote a product/brand/business approach and will take intentional efforts to describe its benefits to their near ones.

Benefits can be planned for such promoters. Example: If an existing subscriber refers someone and if the referred person subscribes to the same merchant, then either fixed benefit points or points equivalent to the volume of subscription by referred should be rewarded to the referrer upon actual materialization of the reference.

## Merchant centric Objectives

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### 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 a 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 increase affinity towards him.

So when merchant is adopting subscription business model the model should provide him appropriate metrics which are not just useful to measure business growth but should also be useful in

* Analysing customer behaviour
* Current buying trends/Changing Trends
* Current Products/brands trends
* Customer expectations
* Tracking of individual product /business performance
* Identification of products which prove themselves eligible for subscription model whereas some others which may prove to be not suitable for trading through this model
* Effectiveness of efforts put on cost optimization and areas where cost may be optimized further
* Effectiveness of promotional/benefits schemes
* Areas where investments need to be increased instead of spend optimizations

Merchant can make strategy decisions based on these inputs and tune the business so as to improve further on current improvements as well as avoid policies which are hindering customer experience.

### Optimizations through precise predictions

Through subscription business model merchant should be more equipped to make considerably precise predictions related to business forecast. 60-70% of his future business will be the actual active subscriptions, as they are going to continue in near future. Remaining 30-40% will be predictions about new subscriptions based on current trend. This is how the future prediction are much more precise as compared to those made in case of instantaneous business.

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 by analysing the deliveries and volume of goods getting delivered per delivery, he knows many baskets/packages 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). Also he will manage ordering goods in specific quantity for every period depending upon predicted demand for those products for that period. It will help him reduce wastage cost to minimum (as there are hardly any batches “expiring”). In turn he can launch his products at competitive prices which will be difficult for his competitors to beat.

The reduction of wastage which is improvising his gains can be used to feedback subscribers in terms of discounts as well as different form of benefits and this process should be recursively goes on which is improving customer satisfaction more and more.

### Optimization of operating cost

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. Few customers make purchase of multiple items per instance, but most 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.

This cost is justified when the price of the item being shipped is considerably higher than shipping cost and also the margin to the merchant is good enough to take care of absorption of shipping cost. In all the cases, it may not be possible to absorb the shipping cost by merchant if 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 may be 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 as usually a package of multiple items is being subscribed to and being delivered. So a shipment may contain 10-20 items. Thus in same number of deliveries, around 100,000 to 2, 00,000 items are getting delivered. Hence the shipping cost of the package is getting distributed to each item’s cost. Even if average shipping cost per delivery is relatively considerable (as weight of delivery increased due to more items in it), its distributed bourdon per item is significantly minimal. Due to subscription being repetitive nature of ensured business, and shipping cost per items being less as compared to price of item, it will be more possible ‘absorb’ this cost in the available gains.

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

As a summary, merchants can increase their profits by optimizing their costs per item sold. And they can do this by motivating a subscriber to subscribe for and more products.

Given the average shipping cost per kg of delivery anywhere in the region subscription business model should be capable of deriving per unit shipping cost for each product. This per unit cost should be proportional to the price of the product, though delivery itself is evaluated based on its weight. This is how more expensive products will absorb more portion of package shipping cost as compared to their less expensive buddies.

Shipping cost per product per unit will get added to the breakeven price of that product. Lower the shipping cost lower will be the breakeven price for the product and hence the margin increases.

### Optimization of wastage cost

Wastage of goods is typically an outcome of ordering excess goods than its demand. But it may also be an outcome of ordering appropriate quantity of goods but at wrong time. As demand is forecasted through some sorts of predictions, it is not enough to get precise number of predicted demand for a product for a period but it is also important to know the ‘distribution’ of this demand over the period. Demand is never going to be same over a period but either it may be gradually increasing, decreasing, or demonstrating the combinations of increase and decrease.

Though precise predictions run relatively closer to actual demand, procurement of these goods should also be very closer to their shipment to subscribers. Let’s term it as ‘Just in Time’ procurement. No customer will want to buy items which have very old manufacturing date. This rule gets stringent when products belong to food or health related categories.

If demand prediction of a product X for a quarter is 90000 units, it should be known how it is distributed for each month (or to be precise for each 15 days). If the business is able to tell merchant that demand for first month is 20000, for next month is 30000 and for last month of quarter is 40000, this information is more precise than earlier information as merchant exactly know the distribution of shipment of product X in coming three months.

If a merchant wants to ship 2000 units of product X by say 30th Jan, then 2000 +/- 5% units should land in his inventory on 20th or on 25th. Thus the supply chain management is very closely tied to the precision of predictions.

Techniques/models of predictions/forecasting makes significant impact on the procurement timings.

Some popularly used forecasting techniques include Time series analysis, Regression Analysis or machine learning techniques.

We will describe each of them in detail. But before understanding the techniques themselves it is important to understand the problems they are trying to solve.

Consider the graphical comparison below where a subscription forecast for a product and its actual subscription are shown for a period of few weeks.

If merchant has procured units of that product as per forecast then for days ranging from 35 to 53, the procurement has been more than actual consumption. It means that batches of goods will be left unconsumed during this period.

From week 53 to the surge it actual demand of the product surpasses procured goods. In such case even if he has some stock left from earlier dip, he may or may not be able to use it as it may be too old to dispense. So he may land up in “Out Of Stock” kind of situations in spite of having stock for that product present in the inventory.

It means he will need to revise his current predictions based on this new trend. Now in such case if again the pace of actual demand slows down, his prediction may again deviate considerably. IN this situation will have to incur losses due to wastage of procured goods because from week 64 there is again a big dip in demand.

Ultimately even if the merchant ends up tallying his total annual predictions with his total annual consumption precisely, he may still be incurring losses because at the time of negative deviation of consumption from its prediction, the procured stock is left with him/her. In case of positive deviation of consumption, this unconsumed stock may or may not be fully useful as some of them might have been ‘expired’ (to old manufacturing date to dispense). So despite of having left out stock merchant may experience ‘out of stock’ kind situation.

The seasonal goods, which are consumed only in some period of a year require special attention as their demand prediction is not a linear & gradual trend but more like a surge which starts growing then stabilize and lastly diminishes down. Some seasonal goods are almost not consumed in period other the period of their actual purpose (example: winter cream), whereas some other some may be consumed at finite rate and considerably increase in their demand during their period of usage. (Example: Glycerine soap).

Also Change of trend may introduce high volatility in the market of few products (Example: Patanjali toothpaste has suddenly started grabbing a long term conventional market of Colgate toothpaste).

Mere mathematical forecasting techniques which are mainly based on trend and seasonality propagation may not provide enough precise demands predictions in such scenarios. Various machine learning techniques are essential to study historical data such as increasing trend of using a specific brand/product, subscriber behaviour, variations in demands of complementary and substitute products etc. help provide or at least complement precise demand prediction which ultimately helps reducing losses due to goods wastage.

### Value based benefits instead of competitive benefits

In instantaneous business world, 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 determining the most ‘optimal’ price value for a product among all competitors.

In subscription approach the price of a product being offered to subscriber, should be the function of all of the following

1. Breakeven price of the product, and margin available( between MRP and breakeven price)
2. Anticipated demand of the product
3. Time of subscription(every day new/same 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 may be offered at different resultant prices based on all above criterion.

Due to this 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 and subscription’s characteristics.

Instead of giving haphazard discounts on individual products (just for beating competition), 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.

### Intelligent Pricing

As we have seen above the net value that a subscriber has to pay for a product is result of multiple factors.

Among all these multi-layered benefits the ‘offer price’ component does not depend on subscription dynamics (such as volume of subscription, duration of subscription, recurrence of subscription etc.) but more on market dynamics.

As per rules of economics except monopolistic products, price of a product is mainly driven by its demand. When a product is launched in the market it starts its journey with a certain MRP. The MRP typically has taken into consideration all the overheads it has to bear before it reaches into customers hands. Due to long supply chain from the manufacturer of a product to the customer, every element in this chain reserves some gain before passing the product ahead to the next element in the chain. That is how a regional distributor receives the at a certain purchase price, he applies his margin onto it and then passes the item to the local distributor with a higher purchase price. Finally it reaches into customer’s hands at an MRP.

Assuming that large subscription business may break the long supply chain and directly purchase large volume from manufacturer or from main supplier, the merchant will have large margin in his hands behind each product.

Merchants usually pass on some portion of this profit to the customers, depending upon how much yield the product is bringing to them.

As we have seen earlier the demand predictions in subscription business are more accurate as compared to instantaneous business as major proportion of the predicted demand is the already committed business (same customer will be receiving the subscribed products in future) . So demand based pricing can be an effective way to derive appropriate offer price depending on proportionate fluctuations in demand.

The default principle of demand function will be followed here which states that in most cases if the price of a product is reduced its demand increases proportionally. The proportionality is non-linear in nature and is defined by ‘price elasticity’ of the product. We will see it little more details in next sections and intent to mention this principle here is to set the trend that price of a product will be maintaining declining trend by default, with the intent of gaining more and more demand.

Merchant may start with MRP or lower offer price than MRP, by reserving only some portion of total available margin for himself and passing the rest to subscribers so as to attract large volume of subscribers. For each demand figure he will keep calculating profit for this offer price. If profit is increasing due to increase in demand, he will reduce the offer price further.

At certain demand the total operating expenses may outperform the profit figure (because shipping charges, storage expense etc. will increase with demand) and profit start decreasing. In such situation where demand is increasing but profit is decreasing he will make moderate stepwise increase in the offer price to ensure stable or gradually increasing profit without disturbing growing demand. Now product has achieved new normal offered price.

Once this price normalization is done then again the price moves on the path of declining trend (so as to grab more demand) until the profit is getting compromised again (despite increasing demand). And the scenario of price increase repeats.

Instead of increase in demand, if the demand starts decreasing (due to churning of existing subscribers) the merchant should continue decreasing offer price so as to boost sale. He may continue doing so (while demand is decreasing) until the offer price reaches equal to the breakeven price (cost per unit of product to the merchant). If demand still continues to decrease then he may decide to incur loss and continue decreasing offer price further or he may decide to take that product off the subscription business.

Such as precise calibrated offer price calculation may not be possible at right triggers manually. Merchant may need sophisticated algorithms implemented by software systems which will be responsible to tracking the price and demand of each product and come up with price change recommendations at appropriate times.

### Predictive Benefits Allocation and Distribution

Benefits are the additional gains that subscribers will be having upon fulfilling certain business criteria which has yielded additional profits to the merchant. Some part of these additional gains are being shared with subscribers in the form of reward points, cashback and other similar options.

For example

In case a subscriber has subscribed to more than 40,000 Rs. of items for a year he/she should be given some additional benefits. Let’s term such a benefit scheme as ‘Annual business booster benefits’.

OR

In case a subscriber has completed three renewals of his/her annual subscription each being more than 20,000 Rs. he should be rewarded with additional gains. Let’s term this scheme as ‘loyalty benefits’.

OR

In case a subscriber has subscribed for goods worth Rs. 20,000 or more amount during specific period (say June to Oct) of a year, then he/she may be eligible to gain some benefits. Let’s term it as ‘Seasonal business booster benefits’.

Many such benefit schemes can be formed and merchant should be able to define these benefits scheme according to current business promotional needs.

Usually benefits are disbursed in the form of reward points and each reward point carries certain money value. In some cases value of a unit reward points may be dependent on type of subscription (normal, premium, platinum etc.), whereas alternatively merchant may decide to keep a constant value of a unit reward point regardless of types of subscription but may decide to provide different number of reward points for the same eligibility for different types of subscriptions. In either of these cases it is convenient to calculate the benefit value to be shared to eligible subscriber in money units and then the same can be converted in the form of appropriate reward points.

During a financial year a merchant may start with few benefits (one or two) but later may add few more benefits schemes. In such cases the challenge is to identify how much money that a merchant wishes to spend on each benefit scheme so that

* He can retain a handsome gain for himself as well as for future business expansion.
* He can precisely allocate budget for each benefit scheme in proportion to the gains that they are expected to yield to the merchant.
* He can ensure that the budget allocation for a benefit scheme would be sufficient to distribute benefits to eligible subscribers throughout the year. Thus he is expected to have tighter control on spends related to business promotions.

But how to determine how much budget should be set for a benefit scheme? And how to determine how much benefit value should be passed on to each subscriber who stands eligible for that benefit scheme?

A much simpler way can be, the merchant defines the money/reward points to be awarded in proportion to the eligibility strength. Thus the rule its self-states something like "A subscriber who has subscribed for more than 40000 Rs. for an year should be given the reward points equivalent to 3% of total profit from his annual subscription" OR something like "A subscriber who has renewed subscription of each of minimum 20,000 Rs., three times or more than three times, should be given 4% of total profit gained form that subscriber".

But in this case how does the merchant control the profit percentage being shared as part of different benefits? Also how will it get reconciled with the annual budget set for all benefits? As different subscribers subscribe for different annual subscription amount as well as they subscribe for different items/brands/volume of each products, gains from each of them may significantly differ. Third problem is associated with a subscriber becoming eligible for multiple benefit schemes. If each benefit scheme is snatching some percent of gains from his/her subscription profit, then it may wipe off the total gain of the merchant from that subscriber. Last problem is associated with unpredictable profit figure from a subscription. Since many subscribed products do not commit offer price for full subscription period, their prices will vary during a subscription period and hence total profit from this subscription cannot be predicted in advance. How to calculate percent of total gain as a benefit for the subscriber?

Due to making benefit amount proportional to gains from a subscription total benefits dispensed in a year may go way overboard to merchant’s expectation of the total spend on benefits OR it may fall significantly negligible. More benefits to subscriber may ruin merchant's profits whereas negligible benefits may adversely impact subscriber satisfaction. So merely fixing some percent of profit earned from each subscription for each benefit scheme is not the way to go.

Let’s solve both puzzles by a (probably computer based automated) solution which will

* Identify for each benefit scheme how much amount per eligible subscriber should be awarded.
* Recommends to the merchant what amount to be budgeted if certain threshold/minimum benefit to be ensured for each eligible subscriber.

For this purpose let’s introduce a hypothetical automated solution called "Benefits Brainstormer" which is responsible for analysing available budget, predict subscribers who will be eligible for a benefit schemes for current year end and arrive at budget for that specific benefit scheme.

Either of following two types of inputs are expected to be provided by merchant. Based on the type of input provided brainstormer should make complementary recommendations as follows.

1. Merchant may decide how much portion of each rupee spend by eligible subscriber should be rewarded to him/her as a benefit. Upon providing amount per rupee that should be rewarded to eligible subscriber under a benefit scheme, it should recommend how much budget should be defined for that benefit scheme.
2. Alternatively merchant may decide to allocate a fixed budget for each benefit scheme (based on historical data of profit figures). In such case the brainstormer should recommend how much portion of each rupee spend by eligible subscriber should be rewarded to him/her as a benefit.

So merchant either should determine how much budget amount that he/she wishes to allocate for a specific benefit scheme OR he/she should determine how much percent of each unit amount should be offered to eligible subscribers under a specific benefit scheme. Let’s see how brainstormer can determine either of the recommendations.

1. Single criteria flat benefit schemes: The brainstormer forecasts expected number of eligible subscribers under a specific benefit scheme based on historical data. In case of single criteria benefit schemes this information may be enough to decide either budget/portion of each rupee spend by eligible subscribers as follows,

Let’s take an example of single criteria benefit scheme. If the benefit scheme defines a rule that each subscriber who has more than 6 months of subscription and who does not make any change to his subscription will be rewarded some bonus points.

In such case a forecast based on historical data, eligible subscribers (those who have more than 6 months of subscription and who do not make any change to their subscription during this period) for the current year can be predicted.

If merchant has set budget of 7,00,000 Rs for this benefit scheme and if prediction of eligible subscribers comes out to be 10,000 then each subscriber should get flat 7,00,000/10,000 =70 Rs equivalent of reward points.

Alternatively if merchant has set flat 70 Rs. for each eligible subscriber, then based on this prediction total budget required will be 70\*10,000= 7,00,000 Rs.

1. Multi-Level Benefit Schemes: Consider an example of following benefit scheme

All subscribers who subscribe for more than 40,000 Rs. worth subscription will be eligible for business booster benefit scheme and each of them will gain reward points equivalent to each additional rupee of goods subscribed above 40,000 Rs.

In this case total forecasting of eligible subscribers (those who may subscribe for more than 40,000 Rs goods) may not be helpful. The brainstormer executes more refined forecasting for categorizing subscribers having range of subscription prices and tries to establish a ratio-proportion among them.

For example: If forecasting has found that there will be probable 10,000 subscribers who will purchase more than 40000 Rs worth annual subscription the same will be further categorized through forecasting for each category into

* Number of subscribers who will subscribe between 40000 - 42000 Rs
* Number of subscribers who will subscribe between 42001-45000 Rs.
* Number of subscribers who will subscribe between 45001-47000 Rs.
* Number of subscribers who will buy between 47001-50000 Rs and so on

Now the engine has established a ratio proportion of subscribers eligible under different subscription amount buckets. For example among 10,000 eligible subscribers, 2500 buy in range of 40K-42K,  3000 in range of 42k to 45k,2500 in range of 45k to 47k and 2000 in range of 47k-50K so ratio of them is 25:30:25:20.

In case merchant has specified fixed budget for this benefit scheme then Brainstormer uses that available budget (say 10, 00,000 Rs) and distribute them in proportion of 25:30:25:20 to arrive at amount to be spend per rupee of subscription.

In case merchant has specified 3 % of each additional money unit (rupee) of subscription made by the eligible subscribers and arrive at budget figure as

2500 subscribers subscribing for average 41 K (1,000 Rs of average additional subscription).So each one will gain 3% of 1000 Rs= 30 Rs. So total budget for this subscription range will be 30 \*2500 =75000 Rs

3000 subscribers subscribing for average 43,500 Rs (3500 Rs of average additional subscription). So each one will gain 3% of 3500 Rs=105 Rs.. Thus total budget for this subscription range will be 105\*3000=3, 15,000 Rs

2500 subscribers subscribing for average 46,000 Rs (6,000 Rs of average additional subscription). So each one will gain 3% of 6000 Rs = 180 Rs. Thus total budget for this subscription range will be 180\*2500=4, 50,000 Rs

2000 subscribers subscribing for average 48,500 Rs. (8,500 Rs of average additional subscription). So each one will gain 3% of 8,500 Rs = 255 Rs. Thus total budget for this subscription range will be 255\*2000=5, 10,000 Rs.

Thus aggregate total annual budget for this benefit scheme should be =75,000 + 3, 15,000 + 4, 50,000 + 5, 10,000 = 13, 50,000 Rs.

#### Merit Based Budget recommendations for seasoned benefit schemes

I refer ‘seasoned’ benefit schemes for those which were defined before few years and still being applicable. In any such benefit scheme there is an opportunity to collect lot of historical information which will be indicative to the effectiveness of that benefit scheme. Thus in such scheme it is possible to recommend the budget proportional to its effectiveness. Obviously a benefit scheme is considered to be ‘effective’ if has brought in significant business boost after its introduction. The more effective benefit scheme should draw more investment. It may in turn result into increased benefit value for eligible subscribers than before.

Consider an example of ‘Business Booster Benefit Scheme’ which states that.

All subscribers who subscribe for more than 40,000 Rs. worth subscription will be eligible for business booster benefit scheme and they will gain defined proportion of reward points for each additional rupee of goods subscribed above 40,000 Rs.

Suppose this scheme has been effective since more than 2 years. Before starting this scheme, number of subscribers subscribing for more than 40,000 Rs were growing at the rate of 2% per month for six months. After introduction of this scheme the subscribers subscribing for more than 40,000 Rs started growing by 4.5% for first six months, 6 % for next six months, 7.4% for next six months and 8.6% for last six months. Thus this benefit scheme indicates business boost, as more and more subscribers are tempted to subscribe for more than 40,000 per subscription.

Analytical techniques are needed to identify close to precise impact of each benefit scheme. Since many benefit schemes have been operational simultaneously and overall business is growing more than predictions. In such case this is a tricky job to quantify influence of each of these schemes on the business boost. Such analysis will help merchant to determine which benefit schemes should be continued and which ones to be shelved.

### Result based budgeting and corrections

As significant portion of the future business is getting registered in advance and remaining portion is forecasted based on this actual business figure, such a business forecast should drive budget provisioning for different cost headers/activities.

Due to precise predictions it may be possible that merchant may be fixing the purchase volume of each product in the beginning by negotiating with suppliers. Hence provision for purchase should be recommended by the business engine instead of merchant calculating/speculating how much investment is needed for purchasing of goods.

Also majority of the delivery schedule as well as volume per package of already booked subscriptions is known in advance and from that delivery volumes/schedule for new additions can be easily predicted, expenses on deliveries (shipping of goods) should also be recommended relatively precisely.

Same applies to investment on goods space, electricity/other operational charges as well as need for staff to manage the business. The same predictions can help calculating fixed operating expenses mentioned above and should be recommended by business engine.

It may be obvious that some products are doing bad (contributing lesser revenue as compared to investment or trailing behind profit expectations or event bearing losses) and hence more sales promotion efforts and money will be needed to boost their sale (before concluding on taking them out of the business). If forecasts are revealing bad performers and difference between target performance and actual performance of each of them, business engine should recommend how much provision should be made on an effort to boost their sale.

So far we have been talking about aggregates annual budget provisions to take care of each of the cost components. But all this investment will not be needed at the beginning of a year. Merchant shall wish to better optimize his/her investment sources rather than blocking all of them in advance. Moreover he/she may wish to reinvestment, the gains drawn from earlier investment.

The business engine should tell the merchant when a slab of budgeted amount should be released for its consumption for each cost header. Even if annual provision under each expense category has been made ‘on paper’, one should also be able to determine how much of the provision should be released in each cycle and how are the cycles scheduled. This way merchant will be notified if out of cycle release of some provisioned amount under a specific cost header is required. It will provide him/her an indication that spend of budgeted money for a category is not going as per the predicted periodicity and there is some intermediate surge in demand of money due to some deviation in business.

Such an indication of deviation may be a good or bad sign. For example if merchant comes to know that he has to release additional money for purchase of additional goods stock much ahead of its anticipated purchase date, it may be a good sign because it indicates that business is growing much faster than anticipated. Whereas if merchant needs to release additional money for branding/advertising expenses of a product or for making provision for additional discounts, out of schedule it means that product may be doing really bad business and hence needs urgent monetary support to boost its sale.

Another approach is to feed back the deviations in anticipated/forecasted demands to the business engine so that business engine should be able to recalculate revised needs for additional/lesser monetary provisions. For example: Sale of a product is exponentially growing much ahead of its forecasted demand. It indicates more provision for purchase of its additional stock. It may also indicates more provisions for delivery expenses as more subscribers are connected to business than anticipated.

If the business rules in subscription business engine help the merchant make the budgetary decisions, he will be able to equip himself very well against the dynamics in the market.

### Products cooperation model

In banking business, few wealthy people keep their income in banks in the form of deposits and earn interest on it. Bank uses the same money to lend it to the needed but deserving people and earn interest from them. Bank charges more interest from the lenders than what it pays to the depositors and thus makes money to run the business.

Here the proposition is to have a centralized “Nodal” account where ‘well doing’ products will deposit their “excess” profits. The products are considered to be ‘well doing’ when they are exceeding their profit than the forecasted profit. The difference between excess profit figure and forecasted profit figure is considered to be ‘excess profit’.

This money is lend to the new coming products or non performing products to launch/boost their business. It can be used on advertising expenses on these products or offering additional/promotional discounts. The “Donor” products will gain credit points in proportion to the contributions that they have made and the “Lender” products will lose credit points in proportion to the amount they lend. This credit history will be used to clearly distinguish Top rated products from the low performing products. In case of top performing products merchant may wish to adopt different pricing strategy due to their dominant/monopolistic business growth. In case of low performing products merchant may work on appropriate business recovery measures or may decide to take some of them from subscription business.

### Metrics to track/measure performance

A successful merchant who arranges a business proposition so as to attract such longer term agreements with his customers then have stable and predictable business as he almost precisely knows the demand of each of the products being sold and then can focus his efforts on minimizing wastage as well as negotiating better rates from his suppliers.

Conventional Instantaneous business measures growth in terms of volume of sale. Since it does not offer a facility to remember existing customer base, it does not track the duration and volume of association with each customer. So it merely measures /predicts growth based on actual volume of sale against predicted demand and per unit gain aggregated into total gain.

Subscription business is association centric. And hence health of customer-merchant association is an important metric in measuring its success. Hence overall performance of subscription business should be measured in terms of

1. Monthly operational expenses
2. Monthly sales and marketing expenses
3. Volume of incoming (new) subscribers per month measured by Net new subscriptions
4. Volume of churning subscribers per month
5. Total subscriptions per month(to indicate demand)
6. Monthly recurring revenue due to new subscriptions in a month( MRR New)
7. Monthly recurring revenue lost due to Churned subscribers
8. Monthly Average revenue per new subscriptions (ARPS (New)
9. Overall monthly revenue
10. Total Cost of goods sold
11. Operating profit/loss(gross margin – operational expenses) and Operating profit/loss percentage( operating profit or Loss/COGS)
12. Subscription Lifetime Value(SLV): ARPS(New)\*Gross margin%/%MRR churn
13. Subscription lifetime period = 1/%customer churn
14. 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?
15. 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.
16. 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.
17. Strength of merchants association (subscription) with subscribers tracked through percentage of subscription renewals out of total subscriptions made during year. It will provide the effectiveness of subscription business model as well as different loyalty programs launched to promote subscribers to renew their subscriptions
18. Distribution of average purchase volumes (basket sizes) in terms of weight, periodicity and price. This will help optimize delivery expenses. Also it will provide an analysis of effectiveness of different benefit schemes launched to attract subscribers to subscriber for more.
19. Average frequency of changes in the subscribed content per subscription. This will provide analysis on how much committed an average subscriber is to the initial subscription content. If the content changes are too frequent and more than a threshold percentage of total subscribed content ( say 20% of the total subscribed content) then the business starts behaving like and instantaneous sale business and such behaviour may require to be curbed. Else it will ruin away all multi-layered benefits that everyone used to get due to nature predictability associated with subscription business.

These health indicators provide a multi-dimensional view of subscription business to merchant and help him/her provide attention to a specific dimension to ensure appropriate measures are taken in a timely manner.

If large volume of new subscribers are getting added to merchant’s portfolio, but large volume of subscribers are continuously getting churned out in during their subscription period, then something is going wrong in the business and merchant needs to introspect and correct wherever required.

Similarly if majority of subscribers are changing their subscription content too frequently, forecasting, price determination and benefits offering get major hit.

## Summary

So far we have seen relevance of subscription business approach for the applicable category of products and their benefits to both stakeholders, the customers and the merchants practicing subscription approach.

We then converted required principles for subscription business and expectations of both stakeholders from this type of business in the form of objectives of subscription business. Now we will try to lay out design of an “ecosystem” to drive these objectives.

The ecosystem will be set of roles and responsibilities of each contributor element and its correlation and collaboration with other elements so as to form subscription lifecycle. Also it lays out relevant processes and rules being followed by these elements so as to contribute to the business lifecycle. Finally it also provides decision points for each of the business event and appropriate responses to these events so as to ensure successful sustainable business.

This complete business process can be implemented by deploying team of expert professionals to carry out each lifecycle activity and take appropriate decisions when needed, supplemented by semi-automatic assisting tools and system such as Microsoft excel. The same can be implemented by an intelligent software system which will not only carry out most of the operations automatically but also take decisions based on the analysis of historical data and make appropriate recommendations to merchant at critical business junctures.

The detailed illustration of subscription ecosystem is provided from next sections onward with the intent of building an event based intelligent software platform which will analyse each activity and data fed to it and makes itself ready to take up appropriate decision. In automatic mode the decisions are seamlessly executed and merchant can track progress on business activity management dashboards or it may work in recommendation mode where important decisions are notified to merchant where merchant can validate the same and either go with it or will have ability to override the same.

# Subscription Ecosystem

Let me first define my interpretation of the word ‘ecosystem’.

An environment composed of multiple subsystems which carries out its scoped responsibilities through a well-defined lifecycle, which is a resultant of interaction of lifecycle for each of its sub-systems, collaboration among them as well as collaboration with various external supplementary systems for driving a specific purpose, it broadly termed as eco-system.

Subscription ecosystem is aimed at providing abilities to merchants to prepare for subscription business by registering set of products for the same, track business performance of each of them and thereby the whole business, analyse impact of various factors on the performance of each product and provide precise and timely notifications and recommendations so as to make necessary corrections/remediation activities to ensure sustainable and growing business. On the other hand it offers its potential subscribers a plethora of subscriptionable products and provide them various subscription ‘schemes’ which will not only fulfil their periodic needs but also enable them significant cost savings.

We do not claim this to be “all-in-one” shop for all business needs but focused around executing subscription oriented sale of products provided that the needed support such as inventory management, vendor association management, staff engagement management, infrastructure management, accounting management etc. are already available through manual processes or through third party systems to assist actual subscription business. This is done for the purpose. We strongly believe that different decision abilities are needed for carrying out each of the diversified responsibilities, for which different thinking will be required to manage every unique aspect of business. Hence intelligence required to carry out each diversified responsibility should be built in its own system. For example: Inventory management deals with optimization of stock management and logistical needs, account management deals with adherence to necessary taxation laws and financial auditing rules along with basic account book keeping. Since purposes are completely different, the systems to manage each show should also be ‘niche’, just for specific purpose. In subscription ecosystem we focused on the niche challenge of managing subscription business model for products offering periodic buying pattern and relied for all these supplementary aspects via external systems.

The layout of this ecosystem is based on the famous “Domain Driven Design” approach. Instead of defining a system as a large set of procedural and closely coupled business services, it is strongly recommended to define every business concern as a separate domain and form a loosely coupled association across multiple domains, each domain is capable of carrying 90-95% of its own responsibilities and collaborate with other domains through events to fulfil remaining 5-10% of them. Thus enhancement or change of responsibilities in one domain will have negligible impact on other domains as they hardly know each other.

Subscription ecosystem is divided into set of following domains

1. Product
2. Business
3. Subscriber(Subscription)
4. Benefits
5. Communication
6. Payments
7. Business Activity Management

Each domain is responsible for finite set of activities/functions and these activities are triggered by either external stimulus (some operation done by subscriber or by merchant) or they are triggered by the life cycle events by the same or different domains.

Each domain will have its own customization aspect where merchant can decide (configure) appropriate policies to adopt and appropriate thresholds and business rules specific to that domain.

‘Event’ based collaboration is thought here as it happens in real life rather than invocation of predefined set of activities in specific sequence. Think of a scenario where merchant decides to make a price change looking at increasing or decreasing demand. Or think of merchant changing order to suppliers to supply for more or less volume of a product. These are ‘decisions’ that merchant takes, using his/her expertise and experience in the business when he/she receives a specific trigger or an ‘event’. The same philosophy is adopted here. Every change in situation or ‘state’ is considered as an ‘event’ and there are event ‘listeners’ responsible for taking decision according to the state change. As in one of the above example if the demand of a product increases beyond its stated prediction, the change of state in prediction of product demand triggers an event describing the amount of anticipated change in demand. Such an event makes its listener take a decision to order more volume of that product.

Any user journey can be thought of, each domain carrying out responsibilities specific to it and bounces the outcome in the form of any event. The interested domain(s) then receive this event and carries out dependent responsibility. Sender domain need not know what the lifecycle sequence is or who the receivers are. Receiver do not know what set of activities have happened before receiving an event, or who has published it. This is how domains remain completely decoupled from each other and still collaborate so as to form a user journey.

This is synonymous to different departments in a big company working within themselves and collaborate across, by passing messages containing appropriate information required for further processing by stakeholder departments. Also

Hence the ecosystem design is being laid out for the purpose of implementing software platform, but it is not confined to that. The same design can as well be thought of laying out manual implementation for subscription business where the merchant may think of appropriate softwares and tools to support the same.

## 10,000 feet business flow of the subscription ecosystem.

### Subscriber perspective

1. When products of certain business line are published on the popular channels such as mobile app, web portal etc. many customers may be interested in subscribing for them. So a customer will register himself/herself as a subscriber with the merchant and obtains an identity by which he/she can be identified as a subscriber henceforth. He can use the same identity for subscriptions and their multiple renewals henceforth.
2. A subscriber subscribes for products of choice. Subscription for a product includes choosing appropriate product brand, deciding total period for which subscriber wants to receive that product, frequency/periodicity of the receiving that product and volume per delivery that he/she wishes to receive it. Thus a subscriber’s registration to receive multiple different products at defined periodicities for a registered duration is termed as ‘subscription’ henceforth.
3. He/she may have chosen different products and for each of the products with specific volume of each, he/she may have defined different periodicity and total duration of subscription. Example: Some products are expected monthly, few are needed quarterly and so on. The products having overlapping delivery date form a basket. Example: intended delivery for third month and first quarterly delivery should be combined together so as to form on delivery basket. This is how subscriber forms multiple ‘baskets’ which will be delivered to him/her at defined dates for each of them.
4. In general, in order to receive a delivery subscriber is expected to have made minimum advanced payment equal to the total price of the next basket being delivered. But this may not be mandatory, as payment rules may differ from merchant to merchant or business to business. Few merchants may want zero advanced payment or few may want some advanced payment. Also few business lines usually support cash credits where payment arrives much after delivery.
5. During subscription period subscriber may wish to make changes to subscription content. He/she can change the product/brand OR can alter the periodic volume of subscribed products/brands, or may simply remove few products from current subscription portfolio. He/she can also decide to withdraw from current subscription, where current subscription is deemed terminated and all remaining deliveries are cancelled.
6. Subscriber is typically attracted to subscribe firstly because merchant is offering lucrative prices for the products/brands of his/her choice and providing opportunities by various means to save money on individual purchase or total purchase. Since a registered product is to be supplied to the subscriber multiple times in current and in the future deliveries, prices on his/her subscription day may or may not stay the same throughout his/her subscription period (due to inflation effect or stress between demand and supply). Subscriber may have to pay more or less for a product than what he/she was subscribed for and this amount may vary at many deliveries. It may create feeling of being fooled in subscriber’s mind. So merchant should categorize each offered product/brand in either of ‘price committed’, ‘percent discount committed’ or ‘none committed’ category and publish the same against each product, as well as provide a disclaimer to the subscriber accordingly so as to make him/her ware of this fact.
7. Typically merchant may wish to set upper limit on the period for which a subscriber can subscribe set of products for. If a subscriber wishes to continue his/her association with merchant he/she can simply renews the subscription. At renewal same set of products/ brands are carried forward in the renewed subscription, which subscriber can edit/alter. But now contained products may be offered with revised commitment categories or revised price figures, depending upon current market situation. These offerings may be better than earlier subscription for few products and in other products they may cost more to subscriber.
8. Because a subscriber is committing his/her loyalty with same merchant for prolonged association by subscribing for longer duration or worth bigger amount he should be promoted to do so by offering some added benefits. Additionally he/she should be promoted to renew his/her subscriptions after completion of earlier ones, by offering additional benefits. Similarly a merchant, supplier or manufacturing company may wish to offer additional benefits for a subscriber for pursuing prolonged associations with a specific product brand. A satisfied subscriber will not only renew his/her subscriptions but also appreciates his buying experience thereby motivating his/her friends/colleagues/relatives to think of opting for the same (probably with same merchant). Thus subscriber should be promoted to refer some of the friends/colleagues to subscribe to the same merchant, and upon materialization of referral cases should be rewarded for the referral by added benefits. Since in all these cases he/she is providing support for a sustainable and prospering business to the merchant, he /she may be awarded benefits in addition to discounted product prices. These benefits can be in form of cashback options, reward points or something else. The intent of these benefits is to motivate a subscriber subscribe for more, for longer duration and to spread merchant’s business as brand ambassador.
9. It is recommended to let the subscriber use earned benefits for paying back his/her dues. Also he/she should be able to gift these points to any of the referral.
10. After completion of subscription period (all deliveries are completed), current subscription is deemed ‘closed’. In such case subscriber’s registration with merchant continues but it may not have any active subscription until he/she renews it.

### Merchant Perspective

1. A merchant lists/registers set of products for making them available for subscription business. The products which exhibit periodic buying pattern are mostly the candidates. However some products which a ‘seasonal’ in nature can also be the candidates.
2. During registration of a product to be launched for subscription merchant has to decide if the pricing category of that product should be ‘price committed’, ‘percent discount committed’ or none committed’. As we have seen earlier in detail the pricing category is typically determined by ration of supply to demand for a product as well as impact of inflation on the price of the product. If product is in ‘essential’ category and its supply is highly volatile its price may fluctuate greatly and multiple times during a year. Despite multiple price fluctuations in a year if a relatively constant profit margin is always ensured for the merchant then he/she may wish to register pricing category as ‘percent discount committed’. But with frequent price fluctuations if merchant’s expected gain is also highly volatile then that product may be registered as ‘none committed’. IN case product is relatively price stable and its supply to demand ratio is relatively constant then merchant may wish to categorize it as ‘price committed’.
3. Determining pricing category and making changes to already determined category is dependent on merchant’s personality, experience and appetite to take risks. Some merchants may not wish to adopt any price commitment category and may simply go with ‘none committed’ option for all range of products. If merchant has decided to adopt any of the ‘commitment’ category, he she may not be able to fulfil the commitment for prolonged period due to dynamics in inflation and supply to demand, as it may result into merchant incurring huge losses. Hence in case of adoption any ‘commitment’ category merchant is advised to put an upper limit to maximum subscription period. Thus his/her commitment if any, has to last only until this period. When subscriber will ’renew’ subscription new pricing category/offer price may be applied to him/her.
4. Forecast will be made for every product individually, depending upon DNA of the product. It will include how many new/total subscriptions it may win during each period and how much churning (dropouts) may take place. When business initially starts there may not be any historical reference data available for predicting how will the demand for a product shape up. In such case merchant may need to apply his/her experience of that product and define periodic forecast (thereby rate of demand increase of a product) depending upon popularity/monopolistic behaviour of that product. This manual forecast (expected to be at least for a year ahead) may not be very precise and close to reality. But as real demand for a product starts getting registered week on week/month on month it accumulates ‘experience’ on that product which can help correct the forecast as per the reality.
5. The demand forecast predicts performance of the product in coming period. The rate of demand increase/decrease makes merchant decide how much total volume for that product should be ordered in an year and in what chunks it should be procured, so that the procurement should be close to the deliveries. So after getting forecast we assume that merchant has negotiated supply of each product from different suppliers with best rates and provided delivery schedule to them as per the demand schedule predicted in the forecast. The negotiated purchase price is then fed to the ecosystem so as to arrive at budget.
6. The forecast also sets the budget required for purchasing each product from respective supplier as per unit rate negotiated with each of them and forms the demanded budgeted amount that merchant should invest in purchase of all required goods for full year. At the start of the business, if forecast is manual it may not be close to reality so some budget should be allocated as per current manual predictions later it should be corrected when actual demand data is being used for recalculating demand forecast.
7. The demand is also expected to drive the offer price of the product. There are monopolistic products in portfolio which will win assured business even if sold at MRP, but few upcoming brands for which business boost may be required, by providing extremely lucrative promotional prices almost close to breakeven price. For all other product typically offer price should vary between these two.
8. Merchant should order volume of different products in defined chunks as per demand forecast of each. Inventory management is considered to be an external/third party system which will be expected to maintain logistics. After placing the order we will assume here that the stocks of each product will be available on time in required quantities.
9. Merchant is expected to place daily delivery calendar to external logistics system each day, where delivery baskets created (as per schedule given by subscribers) will be listed for dispatch the next day. Here too, the system which takes care of delivering goods will not be in purview of subscription ecosystem and considered external/third party.
10. Merchant will add different expense headers coming under fixed expenses such as rental/infrastructure expenses, staff salaries, communication expenses etc. and define annual budget for each of them so as to arrive at total annual budget for fixed expenses.
11. Similarly merchant has expected to have been negotiated with delivery/courier agencies on delivery charges per unit weight. By forecasting for subscription business growth, thereby categorizing current + future deliveries in different weight categories and finally applying delivery charge per unit kg he/she should be able to arrive at budget required for delivery specific expenses for full year.
12. Merchant will make budget provision for offering benefits upon fulfilling different eligibility criterion set by him/her. He should arrange to deposit appropriate cashback amount/reward points in eligible subscribers’ account upon fulfilling eligibility for a benefit scheme.
13. Merchant will have some monitoring and tracking mechanism grossly grouped under ‘Business Activity Monitoring’ where he/she can view overall business performance as well as performance of individual product. He/she can also compare performances of substitutes. He should also get alerts such as bad performers, additional purchase for some products /other budgetary needs etc. Thus such an information should help him keep updated with latest business status as well as provide useful timely alerts so that he can manage the situation will instead of being victim of surprises.
14. At the end of every predefined period (say quarter, half year or year) merchant should be able to reconcile his total gains against expenses. He should be able to do that against each budget header individually so as to understand where he has saved cost and where he had to spend more.
15. Merchant should also have made provision for other expenses such as local taxes, and created a schedule to calculate each of them and pay them at timely manner.
16. Finally he/she should have set a system to manage the exceptional situations such as return of deliveries, out of stock situations, disputes over benefits/payments, subscriber grievance handling etc. where someone should track each exception to closure as well as maintain history of the same.

### Ecosystem Perspective

So far we have seen standard set of operations/responsibilities which the obvious stakeholders, subscribers and merchant will carry out. Some of these operations are straightforward, whereas others require analysis of current situation and make appropriate decisions.

For example, a subscriber subscribing for multiple products for a total annual subscription of 39,000 Rs., may be unware that if he/she just boosts his annual subscription content by few more items having total worth of 1000 Rs. then he/she would be eligible for lucrative benefit scheme which states the criteria as to reward subscribers who have subscribed for 40,000 rs or more worth of items. Due to this additional purchase the gained rewards reduce the effective value of his/her subscription to 38,750 Rs.. In order to make full advantage of the different benefit schemes, subscribers need to be fully aware of the different promotional schemes being run by the merchant and how many/which all benefits they can grab if they fill their basket little thoughtfully and intelligently.

On merchant side, merchant will have to make decision to increase the offer price of a specific product as the demand is exponentially increasing. But for this, he/she should be continuously monitoring performance of each of the product and should be able to compare it with the performance of all its competitors. Also there is no guidance to him/her on how much the price should increase. So with some calculated guess he/she will decide on increase amount. Imagine the retail situation where merchant may have published few thousand different products for subscription. It will be practically impossible to monitor each product and take timely and accurate decision on price change for each of them.

Everyone would agree that handling such voluminous business without any automated analysis and decision support will be practically impossible. Processing of large volume of data so as to arrive at probable trends or behaviour at various dimensions (example: customer buying patterns, product performance, business level delivery volumes, overall revenue/loss/profit trends, weight wise delivery volume per period etc.) without sophisticated software systems would get the business into grave risks, or it may miss multiple opportunities to grow the business beyond current level due to absence of timely triggers.

So the ‘ecosystem perspective’ is very much essential where ecosystem itself should provide the necessary ‘intelligence’ support for data analysis, decision making, timely notifications and recommendations, by which managing whole business for the merchant should become a seamless endeavour. Let’s see the kind of intelligent value additions that the ecosystem can bring for the merchant and for the subscribers so as to maximize their gains.

Here the intent is not to list down all the mundane tasks that any shopping software system can provide to the stakeholders such as

1. Show subscribers catalogue of different products each with current offer price and eligible pricing category. Enable subscriber to choose desired product with appropriate volume per delivery and complete subscription.
2. Create and Keep track of subscribers baskets
3. Receive and process payment
4. Enable shipping of delivery baskets at precisely determined times.

Such a list can grow infinite. So we will cover them in respective domain description. But here we are only focusing on the intelligent analysis or processing that the ecosystem does so as to provide appropriate recommendations by which they can correct decisions.

#### Subscribers’ Assistant

1. The ecosystem should keep track of the current subscription contract that a subscriber has entered into, and calculate how far he/she is (in terms of volume of purchase, duration of association etc.), from various benefit schemes. When a subscribers is getting closer/falling little short of being eligible for any benefit scheme, the ecosystem should advise the subscriber to bridge the short gap by which he/she can be eligible for the nearest benefit scheme.
2. When a subscriber selects a product for subscription, he/she should be shown list and offer prices of all competitor products (substitutes) and any additional offer scheme on any of them. It will help him/her take appropriate decision on whether to stick to the chosen brand or to go for a cheaper option (if the item itself has very trivial purpose).
3. When subscription has been confirmed, the ecosystem should pre-emptively create and organize deliveries, each listing appropriate content and delivery date in such a way that overlapping deliveries should be combined to form a single delivery. Then it should publish a calendar to the subscriber where he/she can see when he will get each of the delivery baskets throughout the subscription period and what each basket will contain.
4. Ecosystem should track each subscription in terms of deliveries against payments, based on stated payment rules. It should enable the merchant to set configuration rules for payments and based on that it should track if the deliveries made so far are in proportion with the payments made or not. For example: If a merchant has set the rule that for any delivery its advanced payment is a must, then the ecosystem should track each subscription so as to adhere to this rule and make sure that not delivery should be made to subscribers who has not made advanced payment for the same. Also it should provide timely intimations to the subscribers on pending minimum payments.
5. The ecosystem should dispense the benefits to an eligible subscriber in proportion to the deliveries being made to him/her so far. For example: If a subscriber has become eligible to earn 100 reward points on the total subscription, then 20% of the rewards points will be vested to him/her on 3rd delivery,30% after 6th delivery and 100% on 12th (last) delivery, depending on the vesting policy being chosen by merchant. Due to uncertainty of continuation of subscription contract until its end, by each subscriber (They are becoming eligible for some reward scheme, BECAUSE they have subscribed for specific volume/amount/duration), they should be dispensed benefits proportional to their actual business with merchant. Thus, even if a subscriber who had earlier committed an annual subscription of 40,000 Rs., has cancelled the contract in between (say in 3rd month) then he has been given only 30% of the total benefits, for which he became originally eligible upon signing an annual contract of 40000 Rs.
6. Similar to point above the ecosystem should adjust the benefit points according to the changes that subscriber is making in the subscription. If subscriber has removed few items from current subscription then the benefits are recalculated, if any new items are added then benefits are recalculated and so on. The changes in benefits should be communicated to subscriber. It would be more appropriate if the changes are ‘warned’ before subscriber commits the decision to alter subscription contract so that he/she should be aware of the consequences before committing changes.
7. Ecosystem should keep notifying subscribers about any existing/new benefit schemes and how far they are from each of the benefit schemes. It would be even better if it can calculate the amount of saving each benefit can bring to a specific subscriber based on his/her current contract. It would create a nice personal experience for his/her.

#### Assistance to merchants

1. The most important responsibility that the ecosystem should carry out is to provide the capability to do the predictions, given any historical inputs. Forecasting is a basic building block because it is going to predict future of certain aspect. Firstly the predictions will trigger appropriate notifications to keep merchant aware of changing situations. Moreover different analytics/decision capabilities will use the historical data and predictions to make appropriate decisions and recommend the same to merchant with reason for each of them. These recommendations will assist merchant take appropriate decisions. We will see how, in the coming points.
2. Historical data on new subscriptions, churned subscriptions and total subscriptions of a product is fed to the forecasting engine to forecast how the product will perform in near future. This forecast will drive the decision on how much volume of a product will be needed throughout year and hence calculate budget provision for its purchase cost. Appropriate budget recommendation is made to merchant which he/she will accept or override by putting more or less budget.
3. The product performance forecast also drives a decision on in what stages the product volume should be procured from the suppliers(as the procurement should be closer to deliveries in order to avoid wastage, through expiration of product batches). Thus it will enable creation of the calendar of procurement volume against dates for each product. Merchant can share them with respective suppliers, by which they will come to know when/how much volume to deliver for their supply item and on what dates.
4. Each product performance will help decision engine determine the latest offer price of that product aligning to demand trend. Pricing decision engine may be using multiple different algorithms which determine latest offer price of the product based on current demand vs supply trend and their impact on revenue and profit figures. Again every time price is to be changed for a product the changed value is recommended to merchant. Merchant may accept or override it.
5. As market trends do not remain same for very long time, the forecast made initially will become obsolete in short time and there is a need to autocorrect it from time to time so that forecasts will closely follow current reality. Forecasting engine should intelligently determine when to calculate new forecasts, typically when the difference between forecast values and real values grows beyond certain set threshold. As forecasts are changed they may in turn also demand alterations in budget, supplier procurement schedule or offer price and drive these changes. It makes the ecosystem fault tolerant and auto corrective. It will closely follow the real data and when earlier predictions falls off current trends, it will auto correct itself as well as cascade corrections in respective decisions made earlier.
6. The pricing engine closely follows changes in demands and their impact on revenue and growth. According to the same the configured pricing algorithm decides to make changes to current offer price. For example: The default intension of pricing engine may be to keep lowering price so as to attract more and more subscribers as long as demand, revenue and profit grows. But sometimes profit starts declining despite of demand showing increasing trend, because the total cost is closely competing with revenue thereby reduction in profit (revenue-cost). In such case the pricing engine is expected to increase price (proportional to growth rate) so as to make up profit figures. Alternatively based on historical performance data pricing engine may ‘train’ itself on the situations where price can be increased or decreased. For example: If demand of a substitute product is decreasing, demand of complementary product is increasing it is going to yield additional demand for product under concern and its offer price would ideally increase. But if demand of substitute is on increase then the offer price of the product in concern should decrease and so on.

In short there can be different algorithms, such as custom made algorithms which are profit focused, or regression based algorithms which are trend and seasonality focused or machine learning based algorithms which are comprehensively situation sensing ones and so on. But all there algorithms churn historical data and predict price based on current forecasts.

When a new offer price is recommended for a product, the ecosystem should also project the cost, revenue and profit figures for the forecasted demand for that product, so that merchant can understand the situation due to which price change is recommended and impact of price change on forecasted demand. It will justify the price change recommendation and merchant may accept it or modify recommended price.

1. Forecast should also be made on the full subscriptions. It will predict how many new subscriptions will get added, how many subscriptions may get cancelled in between or how much the total subscriptions count will grow for each period. This will give a clear picture on how the complete subscription business is doing. It will help make the merchant decide on whether to invest in promotional measures in an attempt to improve growth rate and on which segment (for attracting new potential subscribers or for stopping existing subscribers from cancelling their subscriptions by fixing the reasons of dissatisfactions or by offering lucrative benefits etc.).
2. Forecasts should be deliveries in each weight category which are getting delivered to the subscriber periodically. How many baskets between 3-5 kg are delivered per month, how many of them are between 5-7 kg and so on. It helps the delivery expense calculation engine to calculate how much delivery cost will be needed per month or for full year. It will set the budget for delivery expenses, which merchant may override. But this multilevel forecast will also help calculate per unit delivery expense for each product unit being delivered. The per unit delivery expense get added to the breakeven price of each product/brand, thereby enabling correct calculation of revenue and net/gross profit for each product.
3. Analysis of historical data on range of subscription amounts that different subscribers have subscribed will help merchant determine, in which amount ranges majority of the subscribers are subscribing for. It will then help him/her decide what benefit schemes should be defined so as to increase the average subscription amount a subscriber is subscribing to, to a new threshold. Similarly analysis of subscription historical data will provide average subscription period that majority of the subscribers are subscribing for. Similarly how many times an average subscriber is renewing his/her subscription. Similarly how many subscribers drop off their subscription contract before it finishes and what are the reasons for the same.

All this analysis should be fed to appropriate benefits decision engine which should then make recommendations to the merchant on which benefit schemes( the criteria factor(s)) are most appropriate to be launched, or if they already exist if there is a need to change their threshold values.

Ecosystem will then also determine how much budget should be set for each benefit scheme for distributing this benefit among the subscribers who become eligible for criteria set by the specific benefit scheme.

1. Defining a benefit scheme by identifying business aspects which need promotional measures and determining eligibility criteria for each of the benefit scheme is not an easy task. For example: If analysis of historical data tells merchant that average subscription period is 6 months, then he should define a benefit scheme which will reward the subscribers who will subscribe ( and complete the subscription) for more than 6 months. Similarly if the historical data tells the story that average subscription amount is 30,000 Rs, then merchant may wish to define a benefit scheme where he/she will offer lucrative benefits on subscribers subscribing for more than 30,000 Rs. Once he/she determines what benefit scheme(s) to define how will he/she defines it. The ecosystem should offer you ‘domain specific language (DSL)’ to define any benefit scheme and set its life period. Also the ecosystem should continue identifying subscribers eligible under each benefit scheme and allocate appropriate benefits to their accounts. Thus all the levels of multi-level benefits model apart from committed/non-committed and discounted offer price should be defined and executed automatically through the ecosystem.
2. As we have seen so far, budgets are set for purchase provisioning, fixed expenses, delivery expenses, for executing multiple benefits schemes, for taxations etc. based on various recommendations from ecosystem. Now it’s time to carry out business level tracking where performance of each product and the business by each subscriber should get consolidated here in the form of incoming revenue. As payments have been made from time to time to all vendors from whom products/services are being procured, the total payments should get reconciled against the set budget under each header and should tell the overall business story to the merchant. If the same needs to be done by manual process then it would be a cumbersome task attracting lot of investment of trained financial staff who will track each penny coming in or going out and finally reconcile the balance sheet. Business is much more than that.

For each business expense header it should make close to precise predictions on how much budgetary needs each will have. It should give timely notifications if budgetary provision are going out of hands with information on reasons for the same. It should account for each incoming rupee and translate it against revenue, profit or unused expense. When trend changes the budgets should adjust themselves. If a product is making losses there should be an automated recommendation to make provisions for additional discounts for the same. The product which is making excess profit should help the product which are doing bad by donating their excess gains, thereby maintaining financial equilibrium. Finally business should keep on tracking and telling the stories on any deviations from stated predictions through various measures such as activity tracking, metrics calculation and monitoring. Such an intelligent business management for subscription business is expected to be provided by the ecosystem.

### Summary

We have tried to cover the high level business lifecycle of subscription business from the point of view of stakeholders’ perspective. We have seen that the ecosystem should be capable of assisting as much as it can to help subscribers and merchants achieve their objectives without disrupting each other’s gains.

From the description above we realized that responsibilities/capabilities of ecosystem listed above requires precise categorization as some of them are related to assisting subscribers with latest rules, related to setting annual budget provisioning for different headers, related to determining of pricing for all products, related to definition of appropriate benefit schemes suitable at given time, related to tracking of deliveries and controlling wastage and optimization of cost, related to business monitoring etc. Also each of it requires lot of deeper digging so as to understand how to really achieve it, as merely guidelines may be useless.

So now we will go back to our earlier definition of ecosystem and decompose it into different domains. Each domain is responsible for specific business concern related to subscription business and will have its own lifecycle which may be dependent on life event from some other domain. The lifecycle explain how/when the domain comes to life and how/when it carries out responsibilities assigned to it as part of its lifecycle.

In this lifecycle we will describe in detail each algorithm that a specific domain is leveraging to carry out some of the ‘intelligent’ work and comes up with timely and appropriate notification/ recommendation for either of the stakeholders.

To define a domain we will also discuss characteristics/attributes of each of them and how each helps it carry out its responsibilities. The domain itself does not represent a computer software system, as the same lifecycle can be exercised as part of manual subscription business process as the business level lifecycle and the enablers required for it will remain same no matter if it is implemented through a sophisticated computer based system or through manual execution. But as we said earlier the real ‘smartness’ will be enabled only if appropriate computer based system is used for data analysis, taking inference out of its outcome and make precise recommendations. It is up to the reader to perceive it either ways. So let’s start our journey to different domains

# Elements of subscription ecosystem

## Product

Product business domain represents every product not just as a sellable commodity but as an active contributor to the business, which has its own characteristics and responsibilities. Let’s see the high level responsibilities of a product domain.

1. A products is tagged with a specific pricing category and the variations in its offered price are a function of its pricing category.
2. A product knows about all its substitutes and complements. It can decide its price by taking into consideration demand/price of its substitutes as well as complements.
3. Depending upon pricing category product may have multiple versions of offered price coexisting at the given time. This is because after making commitment of a price or percentage discount, if offer price undergoes changes, earlier subscribers should keep getting their items with committed price whereas new subscribers should subscribe with new price.
4. Every product will maintain its own profit/loss account. The annual profit or loss from a product is a function of profits and losses registered by subscription to different offered prices published for that product in a year.
5. Every product bears its own share of different costs/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. The total expenses per unit of a product determines its breakeven price which in turns impact the range of offer prices that can be safely offered without incurring losses.
6. Every product reports its own performance metrics by which its performance can be analysed in isolation as well as against all its competitors.
7. Sales targets for every product should be decided separately based on forecasting on historical actual performance data. This forecast determines the purchase budget for that product. Total provision of purchase investment is the sum of purchase budgets of all al the products.
8. Threshold percentage/value is configured for each product which decides the trigger event (decision point) to change its offer price, based on how much difference between actual revenue/profit and the forecasted value should trigger the price change.
9. In case a product is doing better than expected, then it may contribute its excess gains to a central account called “Nodal Account” and earns credit points proportional to the amount it donated. The product which is not doing well it can borrow some money from this account so as to recover from losses. It in turns loses its credit by losing number of credit point proportional to the loan availed.

Let’s see each of these functions in detail.

### Pricing categories

As we described earlier depending upon the price dynamics of a product, which are mainly associated with impact of various factors on its supply and demand, each product should be priced into one of the following pricing categories.

1. Price Committed Products: In case of price committed products, price of a product committed to a subscriber at the time of subscription, should remain same until end of his current active subscription (contract period with merchant). This should hold true even if the product may be incurring losses on that product (after committing price) OR even if offer price that product gets changed one/many times during subscription period (after committing one price). Commitment of an offer price is only applicable to few subscribers who booked that product with that offer price. Offer price can undergo change and any new subscribers subscribing thereafter will book that product with new offer price and so on.
2. Percentage Discount Committed Products: In case of percentage discount committed products a subscriber should be committed a constant percentage discount on the latest MRP at the time of every delivery. In this case the actual price to be paid by subscriber may vary as the percentage discount is calculated on latest MRP at the time of every delivery. Again, as in case of price committed products, percentage discount commitment is an agreement only with few subscribers who booked it at the published percentage discount. The percentage can change and any new subscribers booking that product thereafter will be committed new percentage discount.
3. None Committed Products: In case of no commitment products, all the subscribers have 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.

### Product

In order to achieve the objective of an intelligent product, each product will be associated with following attributes which will help define the product to be uniquely distinguished, as well as help determine various expenses incurred by each unit of that product, it also helps configure the product so that various decisions can be made by the ecosystem intelligently for that product based on the set thresholds.

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 each unit of that product.
4. Unit of measurement for the weight/volume (ml, gram, kg etc.)
5. List of its substitutes and complements; as demand and price changes for any of them also influence pricing of the product in discussion.
6. Target change threshold for price change: Every product offers a different demand growth rates. Few monopolistic products grow very fast whereas others offer a relatively slow rate. Based on this growth rate a threshold value is defined for a product as percentage value. This threshold percentage determine the difference percentage between forecasted total subscription count and actual total subscription count, which when exceeded will trigger calculation of new offer price.
7. Pricing strategy: Subscription ecosystem is expected to provide various pricing determination strategies, each applicable in specific situation and product type. For example: When lot of historical demand data is not present, some instantaneous pricing strategy which is capable of determining new offer price based on available data is useful, when considerable demand data is available then regression based or machine learning based pricing strategy should be put in place. Also some pricing strategy may consider the product in concern alone, whereas other strategies may consider impact of substitutes and complements on the offer price of a product.
8. Demand curve period: Too old historical data may distort the predictions as trends changes and very old demand dynamics for a product may no more hold valid. So it is important to define how old historical data is permitted for being used by any pricing strategy.
9. Pricing Options: Ecosystem should be capable of providing multiple price determination algorithms and merchant may choose one of them for each product OR for some products he/she may wish to rely on his/her own judgement instead of getting offer price from the ecosystem. So three pricing options should be available for him/her, either of which he/she be configure for each product.

* Manual: No pricing recommendation is required from the ecosystem and merchant may decide offer price changes by himself/herself.
* Recommendation: Merchant may get recommendation from ecosystem on offer price changes by may accept the recommendation or override the same.
* Automated: Merchant wishes to rely on ecosystem to automatically determine/change offer price of a product.

1. 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.

### Product Account

Product account is responsible for maintaining financial attributes and metrics associated with a product.

1. 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, the type of commitment is being offered to subscribers for that product. This category determines how the price buckets are managed (multiple price buckets for committed price or various committed discount percentages or single price bucket because for a “None Committed” product).
2. Tagged Price Versions: The list maintains versions of purchase price and MRP pairs that have associated active subscriptions. During lifetime of a registered product, its purchase price and MRP undergoes changes multiple times. When purchase price (and MRP) of the product undergoes change, this pair should get added as a new version of ‘Tagged’ price in this list. A tagged price version should be active until active subscriptions are associated with it. When a new offer price is calculated its base price (used to determine breakeven price) is dependent on the latest tagged price version. Hence each price bucket created for a newly created offer price maintains its appropriate tagged price version. Multiple price buckets may correspond to same tagged price version. When all price buckets corresponding to a tagged price version get exhausted, then that tagged version no more remains ‘active’ and should be archived.
3. Fixed Expense Versions and Variable Expense Versions: The business is expected to report total monthly fixed and variable expenses. The same should be distributed to each product (as expense per unit) depending upon how that product has contributed to these expenses. Total expense (addition of all fixed and variable expenses per unit of a product) incurred by a unit of product is used to determine its breakeven price, which in turn determines its offered price. A sophisticated expense-distribution algorithm is required to distribute these expenses across all subscriptionable products. We will understand more about this algorithm in the subscription domain. For a product, when it receives its contribution of fixed and variable expenses it should add a new version of fixed/variable operating expenses in the versions list maintained by Product account.
4. Current Stock of Units: The parent business is expected to keep track of periodic demand and supply of stock for each product. The business is expected to periodically inform current stock of every product against which subscriptions can be received. When the stock information arrives, and if it is different than earlier one, it should be updated in “current Stock of units” attribute.

When a new subscriber subscribes for specific number of units of a product, this number should get added to the ‘booked number of units’. Thus it will indicate how much current stock business has and out of which how many of them have been already subscribed for by subscribers.

When a delivery is made containing few units of a product to a subscriber the same number should be deducted from booked units and from current stock of units to update the latest stock situation.

1. List of active price buckets: When a new price is generated it will cause a new price bucket to be formed (except for none committed price bucket). The price bucket indicates a specific offer price and lifecycle of subscriptions associated with that price. A price bucket should exist until it has any active subscriptions associated with it. All price buckets, each having active subscriptions associated with it is called as active price buckets. We will get more description about them under Price Buckets section.
2. Registered Purchase Cost: When new volume of a product are procured from respective supplier they are purchased with the latest purchase price per unit. Assuming that purchase price per unit may change multiple times in a year, it is essential for a product to keep track of how much money it has invested in purchase of its volume. Purchasing of goods is outside of purview of this ecosystem. The ecosystem is expected to receive an intimation from time to time from some external system on the volume of units purchase per product and purchase price per unit, when fresh purchases are made. The ‘registered purchase cost’ should maintain and update the value of total purchase cost for a product when such intimation is received by a simple arithmetic.
3. Registered Revenue: When few units of a subscribed product are delivered to a subscriber, the revenue corresponding to those delivered units is expected to get accumulated in the ‘registered revenue’ attribute. This attribute is expected to get flushed at the end of every financial year, so that it will always represent the annual revenue registered by each product. The revenue accumulated from all product should get reconciled with annual revenue figure managed by business account.
4. Registered profit: When few units of a subscribed product are delivered to a subscriber, the profit corresponding to those delivered units is expected to get accumulated in the ‘registered profit’ attribute. This attribute is expected to get flushed at the end of every financial year, so that it will always represent the annual profit registered by each product. The annual accumulated profit registered by all products should get reconciled with annual profit figure managed by business account.
5. 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.

Subscription approach intends to have long term association with every subscriber. So charging different prices for a subscribed product at different times in the same subscription agreement, may ruin the trust of the subscriber. Hence subscription approach should try to provide some level of price assurance wherever possible to the subscribers, in order to make the commitments bidirectional. Of course complete price assurance for all types of products will be practically impossible, as their demand vs supply equations are different and hence prices of few products may vary significantly and such products may not be offered with absolute price assurance. In case of other products though the changes are less frequent impact of inflation is going to influence its pricing, resulting into increase(most of the times) in their base prices. So we have to answer find solution to the challenge of price assurance.

Subscription business may commit an offer price for a product to its new subscribers so that they will keep receiving the product with same offered price (regardless of changes in its base price). Alternatively it may offer commitment on discount percentage, where subscriber will always gain a committed percentage discount on latest MRP.

In case of any committed price category, when its offer price changes, a new price bucket gets created and any new subscribers thereon get associated with the latest/new price bucket. Earlier active subscriber still remain associated with earlier price buckets. If a subscriber remains associated with a single price/percentage discount or should be paying new price every time is determined by the pricing category of the product.

This results into multiple offer prices being active for every product at any time, 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 for subscriptions, its first price bucket is created for it, having some offer price. All subscribers subscribing to that product at the same time get registered with this price. Hence they are made to get associated with corresponding bucket. Then onwards until the end of their subscription all of these subscribers are assured of getting the same price.

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 with a new offer price. Subscribers subscribing on/after the price change are registered with this latest price.

Following are the attributes of a price bucket.

1. Offer price per unit
2. Start and end date of the offered price
3. Tagged price version providing base purchase price and MRP on which this offer price is being determined
4. Number of new subscriptions getting associated with this offered price
5. Number of subscriptions( registered with this offer price) churned out
6. Total number of subscriptions registered with this price at any point of time.
7. Total number of subscriptions delivered, so far from this price bucket.
8. Status of price bucket( CREATED,ACTIVE, EXPIRED)
9. Total profit earned by a price bucket(on account of subscriptions earned on the given offer price)

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 offer price of 72 Rs.. A new price bucket has been created on 1st Jan 2016, in which it has offered sale price as 72 Rs. The new/churned and total subscription count is 0 at present.

A subscriber has subscribed to two units of product X per month (for one year) on the same day. 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 product X on the same day/time, will get registered with the same price bucket. Also until new price bucket gets created, all subscriptions to product X will continue getting registered with the same price bucket.

After a few days 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, offer prices committed to subscribers so far, cannot be changed. But the same will get changed for any new subscribers subscribing after purchase price change. Change of purchase price will trigger new price calculation and it will result into calculating new offer price, thereby 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. It will denote percentage of discount on the latest MRP that the associated subscribers will get.

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. 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 so far associated with different price buckets will be charged new offer price though having different fixed (committed) percentage discount. This is because these discounts are applied on new MRP.

Following are the attributes of a price bucket.

1. Offered discount percentage(on MRP)
2. Start and end date of the offered price
3. Tagged price version providing base purchase price and MRP on which this price is being offered
4. Number of new subscriptions getting associated with this discount percentage
5. Number of subscriptions churned out from this discount percentage
6. Total number of subscriptions associated at any point of time.
7. Total number of subscriptions delivered from this price bucket.
8. Status of price bucket( CREATED,ACTIVE, EXPIRED)
9. Total profit earned by a price bucket( on account of subscriptions earned on the given price discount)

Example: Consider the same example given for price committed price bucket. But now assume that instead of committed price the product is offering percent discount commitment.

So on 1st January 2016 platform has created a new price bucket for product X where 7% discount (on latest MRP) has been committed; gets created. As a new subscriber subscribed for 24 units of product X for one year, 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 product X on and after 1st Jan 2016 will be committed 7% discount on latest MRP.

In case base tagged price (pair of purchase price and MRP) undergoes change, the new tagged price version will override current tagged price version the only available price bucket. Hence the actual offer price subscribers of this price bucket will have to pay, will also change, despite of the discount percentage being constant. This is because this 7% discount will now be calculated on new MRP.

Whenever a new tagged price version gets registers, it overrides all the price buckets of category ‘percentage discount committed’. This is because the different percentages of discounts offered by different price buckets have to be applied on the ‘latest’ MRP.

When platform changes the discount percentage from 7% to say 6%, a new price bucket gets 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 as all subscribers of this products will always be paying the latest offer price. 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, the same will be reflected as offer price in this price bucket and the same 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. Tagged price version providing base purchase price and MRP on which this price is being offered
4. Number of new subscriptions getting associated with this offered price
5. Number of subscriptions churned out from the offered price
6. Total number of subscriptions associated at any point of time
7. Total number of subscriptions delivered from this price bucket.
8. Status of price bucket( CREATED,ACTIVE, EXPIRED)
9. Total profit earned by a price bucket( on account of subscriptions earned on the given price discount)

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 merchants may usually configure 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 earlier and new) 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 made aware of 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. Number of metrics are defined below which indicate health of subscription business for a given product. Merchant can decide at what periodicity he/she wants the metrics to be calculated (default is monthly). The same are then used to monitor performance of a product on individual basis as well as comparison with substitutes.

A domain “Business Activity Monitoring” makes use of this performance data of each product to monitor overall business progress at a business level as well as at individual product level.

##### Product Level Metrics

Performance of a product in the business is tracked using following metrics

1. Number of new subscriptions each month : New subscriptions registered with a product in given month
2. Number of churned subscriptions each month: Subscriptions related to a product those are churned (cancelled) in a given month.
3. Total subscriptions per month: Total subscriptions of last month + number of new subscriptions in current month – number of churned subscriptions in current month.
4. Monthly operational expenses to be borne per product (per unit). This calculation of operating expense per product per unit is done by operating expense distribution job described in coming section.
5. Monthly sales and marketing expenses (Optional) : In case merchant is making any sales and marketing expenses in order to promote a product
6. Net new subscriptions =# New subscriptions + #churned subscriptions ( here we assume that churned subscription are denoted by minus(-) sign)
7. Total subscriptions per month to indicate demand = Total # subscriptions of last month+ Net new subscriptions of current month
8. % subscriptions churn per month = - (#number of churned subscriptions for current month/total # subscriptions at last month)
9. New MRR: Monthly recurring revenue due to new subscriptions in a month (to different offer prices) = Σ (number of NEW subscriptions for each offer price \* offer price).
10. Churned MRR: Monthly churned revenue due subscribers associated with different offer prices getting churned. = - Σ ( number of churned subscriptions per offer price\* offer price)
11. Net new MRR = New MRR + Churned MRR
12. Ending MRR = Ending MRR of last period( month) + Net new MRR
13. Starting MRR= Ending MRR of last period (month).
14. Percentage net MRR churn= churned MRR/starting MRR
15. Ratio of Its expected quantity demanded per period(month) against total quantity demanded of all products in the same category( product and all its substitutes)
16. Periodical(monthly) Average revenue per NEW subscriptions (ARPS (New) = New MRR/# New Customers \*1000)
17. Average revenue per total subscriptions (ARPS= Ending MRR/# total subscriptions\*1000).
18. Total periodical (monthly) revenue = Ending MRR.
19. Total Cost of goods sold (COGS)= Σ (Total subscriptions for a purchase price\* purchase price))

Though subscribers are committed the latest sale price of a product at the time of registration, they are periodically dispatched these products at different times during subscription period. At every dispatch time, the product being dispatched may have been purchased at different purchase price. This metric captures the total cost of number of product units dispatched in the current month having different purchase prices. This is an important indicator of impact of change in product price on the revenue and margin.

1. Gross Margin = Revenue - COGS
2. Operating profit/loss =gross margin – operational expenses
3. Operating profit/loss percentage= (operating profit or Loss/COGS) \*100
4. Subscription Lifetime Value(SLV): ARPS(New)\*Gross margin%/%MRR churn
5. Subscription lifetime period = 1/%customer churn
6. Cost of Acquiring a subscriptions (CAC)=(sales& marketing expense/number of new subscriptions) \*1000)
7. 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.
8. 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

#### Product Registration & Configuration

1. Product should get registered with Subscription ecosystem in order to be identified as a “subscriptionable” product, product to which subscribers can choose to buy. This distinction also helps merchant who are also doing instantaneous business to distinguish the products which are available for subscription business form the range of products that they offer. In order to register a product following set of activities need to be performed.
   1. Assign unique product identifier and name to a product to distinguish it from other products.
   2. List the product in appropriate category and sub category describing the product 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. Merchant can opt to define his own categories based on the product offerings he have. For retail business product categories mentioned earlier can be sued as reference point to start defining categories.
   3. Define Weight/volume 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. Define Unit of measurement in which product is measured (ml, gram, kg etc.)
   5. For each product list of all identifiers of its substitutes and complements; as price changes in them are impacting pricing of the product. It also helps in comparing product’s performance against its substitutes and complements.
   6. Sensitivity characteristic of the product to illustrate if product is consuming more electricity or more space. Per unit operating expenses are calculated according to the sensitivity characteristic of the product.
   7. Assign appropriate pricing category to the product to describe if product is ‘Price Committed’ or ‘Percent Discount Committed’ or ‘None Committed’.
   8. Define base purchase price of the product. This is the purchase price the merchant is paying at the time of product registration.
   9. Define base MRP of the product. This is the MRP of the product at the time of registration. Since purchase price and MRP of the product are going to change multiple times in future this initial purchase price and MRP pair is maintained as first element of tagged price version, a collection which keeps versions of changed pairs of purchase price and MRP.
2. Registration is followed by configuration. It’s configuration should dictate how and how much it can contribute in the subscription business. Following configuration attributes are set which determine how the product is going to be managed during its life. This configuration is required mainly in case the product forecasting and pricing is driven by a computer based system. In that case the system should know how to determine the forecast and which factors will contribute to the price determination of a product.
   1. Define Pricing Strategy Type: In case merchant is practicing multiple pricing algorithms for price determination of different products, pricing strategy determine which one should be applied to determine/change the price of a specific product. There can be multiple strategies in place such as demand based price calculation strategy, demand and cost based pricing strategy, instantaneous pricing strategy etc. We will see the different strategies in the “Pricing” section. Depending upon price elasticity of the product merchant need to decide which pricing strategy should be adopted by a product. Thus different products are configures with different pricing strategies.
   2. Decide aggregation period for target forecast: When a forecast is to be made it can be weekly, monthly, quarterly, yearly depending upon nature of analysis. The subscription model should keep flexibility for the merchant to choose appropriate forecast granularity depending upon price elasticity of a product and amount of historical data available for future predictions. A merchant may wish to use different forecasting intervals for various products to forecast demand and churn of a product. In case forecast aggregation interval of 15 days then existing daily actuals data of demand and churn is aggregated into chunk of 15 days the such as list of demands /churns each of which is 15 days is fed to the forecasting mechanism so that next forecasts those are derived are also spaced at 15 days intervals. For some products he may wish monthly aggregation of actual data so that he will get monthly forecasts and so on. Thus depending on demand and churn frequency he may choose to apply different forecasting intervals.
   3. Determine target change threshold for price change: New price needs to be calculated for a product if the difference between its forecasted demand and actual demand is consistently more than certain threshold value for a specific duration. This threshold is configurable as ‘Target Change Threshold for Price Change’. So if merchant sets this threshold as 10%, then price will be recalculated when the difference between forecasted demand and actual demand is consistently +/- 10% over a specific duration. This setting acts as a trigger to initiate price recalculations for various product and its value will be product specific.
   4. Decide if Cross price elasticity should be considered for price determination. The demand function for computing price may include cross price elasticity. Cross price elasticity denotes impact of price change in substitute products on demand of this product (and thereby price of the product). In case merchant wants to include cross price elasticity in price determination it will indicate so by setting this flag.
   5. Decide if impact of advertising expenses should be considered on price determination: The demand function to be used to determine price of a product at certain demand can also encompass impact of advertising expense on increase in demand (thereby increase in price).SO merchant can determine if this impact needs to be considered during price calculation for some products.
   6. Determine the extent of old /historical data to be used for forecasting (Demand Curve Period). While forecasting for a product too old data may add noise to the forecast quality. This is because in case of products where trend has drastically changed the data depicting too old trend may not have large relevance. But on the other hand too less data may provide inaccurate forecast due to insufficient quality of behavioural patterns exhibited by it. So one can set how much period is appropriate for a product to determine its forecast by setting appropriate period for this attribute.
   7. Determine which Pricing Options is opted by the merchant. In case automated price determination is happening merchant can decide whether he wish to rely fully on this price generation OR whether he wishes to have a recommendation of price from the pricing system (which he may or may not accept) OR whether he does not want to use pricing system. In case he decides to fully rely on automatic price generation then the price get computed when certain demand/supply thresholds are met and automatically gets set as new offered price. If he has chosen the option of getting ‘recommendation’ then newly calculated price is shown to him for ‘acceptance’. He may accept the same or may override it. In last case where he has not opted for automated price calculation option, the price will not be calculated by the system and he will drive the price of that product manually based on his experience.

#### Manual Forecasting

Forecast is used to extract all the information about the future that is already present in the past.

Typically when a product is launched in the market, it has a specific volume of fan followings. So its demands starts growing from 0 at a rate proportional to the popularity and need for it. At certain point it reaches to some saturation level and then its demand becomes constant.

In case trend changes or a product starts losing its popularity, its demand starts decreasing at a rate proportional to the change sweep in the market. In that case too, the rate of decline is predictable to a great extent.

Rise in demand of a product and fall in its demand is stored as the historical demand information and its probable behaviour (demand trend) in near future can be “forecasted” by using this historical data.

In absence of any historical data, forecasting starts with demand predictions manually set by merchant, based on experts’ judgements and experience. Since these predictions are merely expert guesses about the rate of demand growth they may not be close to reality. Actual performance of the product may go vastly different than these predictions. As actual performance of a product starts getting captured, it gets used to correct the manual forecast figures (through automated forecasting) so as to match it with current demand/churn trend for that product.

Manual forecasting is a prerequisite lifecycle activity (after product registration and configuration) in order to launch a product for subscriptions, in case no historical demand information is available for a product.

As we have seen before demand of a product depends on various factors. Many of them are related to regional dynamics, trends as well as different personas and their preferences and hence are not under the control of business. The only element that has considerable impact on demand for most of the products, is the offer price of a product. Hence the rate at which demand changes is correlated with price to determine right price which will help boost demand.

Assuming that a product is launched with a clean slate (no historical data), for first few days merchant has to manually set following attributes as a forecast of the product.

1. Define periodicity of each forecast (Weekly, monthly, quarterly etc.): Merchant can decide to set weekly / half monthly/ monthly/ quarterly/half yearly data as a forecast (projections). Based on the periodicity of this data, forecast engine should compute future forecast values in the same periodicity cycle. For example if merchant has manually set demand projections of a product at monthly periodicity for first four months, say for January, February, March and April then using this demand values the forecast engine will project next two forecast values which will also be monthly, viz. May and June. The software system should provide this flexibility to choose projection period for every projection as start and end dates for the projection element (daily /weekly/monthly etc.)
2. Define purchase price per each forecast: Based on visibility of the merchant he can predict if the same purchase price will continue until the end of forecast that he has defined or whether there is a likelihood of change in it, what will be the changed purchase price and in which forecast period it will change.
3. Define MRP per each forecast: Similar to purchase price the merchant can predict if the same purchase price will continue until the end of forecast that he has defined or whether there is a likelihood of change in it, what will be the changed MRP and in which forecast period it will change.
4. Define number of new subscriptions per forecast: Merchant based on his experience will try to predict how much will be number of new subscriptions for a product in each forecast unit period.
5. Define number of churned subscriptions per forecast: Merchant based on his experience will try to predict how much will be number of subscriptions for a product those will be churned in each forecast unit period. Based on the predictions on new subscriptions and churned subscriptions number of total subscriptions can be derived.

Example: new subscriptions of first month for product X are 1245, number of churned subscriptions for X for same month are 0, So total subscriptions for X in first month are 1245. Now if number of new subscriptions for X in second month are 1356 and churned subscriptions for the same period are 124 then

Total subscriptions for X at the end of second month= Total subscriptions at the end of first month + new subscriptions in second month – churned subscriptions in second month.

Total subscriptions for X at the end of second month= 1245+1356-124 = 2477

1. After defining the forecast values for some period when the actual subscriptions start getting registered for a product then they are used correct the values for remaining future forecasts. When earlier forecast for a period gets overridden then earlier forecast value gets expired and new forecast value is tagged as ‘Active’.

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 |

Merchant will set above mentioned forecast attributes for first few weeks/months. Based on actual performance (actual changes in purchase price/MRP, actual increase in new subscriptions/churned subscriptions) he should keep on correcting the forecast figures for respective periods manually. This is because actual forecasting/pricing calculation algorithm will be able to execute only after having at least 10/15 forecast entries. Manual forecast will not be required once appropriate historical demand data for a product is available.

The above graph represent a two months snapshot of forecasting of total daily subscriptions and daily churned subscriptions of a product. This a plain forecast representation forecast a product without considering impact of actual performance of product in the forecast. It will help us understand how the forecast undergo corrections due to deviations of actual performance from the forecasted figures.

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 to launch a product ‘X’ with opening offer price 52 Rs. and predicated that its subscription for first month will be 750 based on his expert judgement.

But soon 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 offer price, so as to further boost the subscriptions rate and offered a new offer price of 51 Rs.. Also he predicated subscription of next month as 2200 units.

He witnessed that 2200 subscriptions are covered in first 5 weeks. So he /she again corrected subscription prediction for current month to 2400 (from earlier 2200), changed the price to 50 Rs, and predicted subscription count of 3200 for the third month.

Thus initially he made few predictions manually as well as made manual offer pricing decisions. Based on the actual response to the sale, he/she keeps on repeatedly correcting forecasts as well as trying to offer products at more lucrative prices in order to attract more demand.

His predictions (new subscription count, churned subscription count, total subscription count) are stored in repository and corrected time to time when he manually modifies them. Also the actual daily subscriptions to product X are also stored in repository. After having sufficient actual subscription counts and offer price records in “actuals” repository, the same can be picked by appropriate forecasting algorithm for automated forecasts for the future period.

#### Periodic Automated Forecasting and forecast correction.

Merchant will set manual forecast for each product as described above and keeps on correcting them manually based on the actual performance for first few months/weeks(depending upon unit of forecast period selected) and then can trigger the automated forecast.

Once automated forecasting for a product is triggered it is expected to run periodically at a defined schedule (let’s say every day/week at a specific time). But performance of a product does not deviate every day. Then why do we need to run the forecasting every day? But on the other side, if we decide not to trigger forecasting every day, then how will we come to know when to trigger it?

There is a relationship between pricing and forecasting here. The flow of activities is determined as follows

1. A product forecast job once run, defines forecast for some future period (few weeks or months).
2. Every day a product keeps gaining new subscriptions as well as keeps churning few existing subscriptions. These are tracked as actual demand of the product.
3. On every run of forecast job this actual demand (and churn) of a product gets compared with its predicted value for that day.
4. When actual demand of a product starts deviating from its forecasted value by more than ‘target change threshold for price change’ for that product, it means that the product’s actual performance is considerably different than its prediction.
5. It also means that current offer price, which was set for a predicted demand (according to earlier demand trend) is not appropriate for its actual current demand, and hence the pricing algorithm gets triggered to reset the price to a new value.
6. It also means that current forecast is no more valid and hence it needs to be recalibrated according to the new actual demand trend. So day on which the difference between forecast and actual demand of a product exceeds its threshold, the pricing job sets the next forecast date for that product as current date plus the aggregation period (denoting if we need weekly forecast or monthly forecast or so on).
7. Also at this point the earlier forecast values for demand are marked as ‘invalid’ and history of actual demand values is going to be used for calculating series of next forecast values.

Thus forecast calculation job gets triggered every day but it will only triggers forecast for those products for which the next forecast date is set( by their pricing events) as the current execution day.

| Day | Forecasted total subscriptions1 | Forecasted total subscriptions2 | Forecasted total subscriptions3 | Actual total subscriptions | % difference between latest forecast and actuals |
| --- | --- | --- | --- | --- | --- |
| 1 | 530 | 521 | 521 | 521 | 1.698113208 |
| 2 | 750 | 680 | 680 | 680 | 9.333333333 |
| 3 | 970 | 880 | 880 | 880 | 9.278350515 |
| 4 | 1250 | 1080 | 1080 | 1080 | 13.6 |
| 5 | 1580 | 1379 | 1379 | 1379 | 12.72151899 |
| 6 | 1720 | 1480 | 1480 | 1480 | 13.95348837 |
| 7 | 2100 | 1899 | 1899 | 1899 | 9.571428571 |
| 8 | 2250 | 1956 | 1956 | 1956 | 13.06666667 |
| 9 | 2460 | 2356 | 2356 | 2356 | 4.227642276 |
| 10 | 2890 | 2678 | 2678 | 2678 | 7.335640138 |
| 11 | 3000 | 3145 | 3145 | 3145 | -4.833333333 |
| 12 | 3120 | 3657 | 3657 | 3657 | -17.21153846 |
| 13 | 3478 | 4217 | 4217 | 4217 | -21.24784359 |
| 14 | 3750 | 4446 | 4675 | 4675 | -5.150697256 |
| 15 | 3930 | 4678 | 4698 | 4698 | -0.427533134 |
| 16 | 4357 | 4789 | 4765 | 4765 | 0.501148465 |
| 17 | 4400 | 4965 | 5217 | 5217 | -5.075528701 |
| 18 | 4690 | 5100 | 5469 | 5469 | -7.235294118 |
| 19 | 5360 | 5360 | 5683 | 5683 | -6.026119403 |
| 20 | 5470 | 5570 | 5890 | 5890 | -5.745062837 |
| 21 | 5890 | 5890 | 6234 | 6234 | -5.84040747 |
| 22 | 5930 | 5966 | 6643 | 6643 | -11.34763661 |
| 23 | 6170 | 6270 | 6899 | 6899 | -10.03189793 |
| 24 | 6250 | 6532 | 7235 | 7235 | -10.76240049 |
| 25 | 6570 | 6790 | 7488 | 7488 | -10.27982327 |
| 26 | 6780 | 6998 | 7755 | 7755 | -10.81737639 |
| 27 | 7120 | 7256 | 7994 | 7994 | -10.17089305 |
| 28 | 7250 | 7250 | 8345 | 8345 | -15.10344828 |
| 29 | 7540 | 7540 | 8890 | 8890 | -17.90450928 |
| 30 | 7750 | 7750 | 9426 | 9426 | -21.62580645 |
| 31 | 8000 | 8325 | 10232 | 10245 | -0.127052385 |
| 32 | 8130 | 8890 | 11342 | 11678 | -2.962440487 |
| 33 | 8680 | 9234 | 11897 | 12457 | -4.707069009 |
| 34 | 8780 | 9765 | 12632 | 13441 | -6.404369854 |
| 35 | 9000 | 10342 | 13421 | 14302 | -6.564339468 |
| 36 | 9321 | 11421 | 14666 | 15671 | -6.852584208 |
| 37 | 9560 | 12012 | 15321 | 15701 | -2.480255858 |
| 38 | 9750 | 12987 | 16201 | 16012 | 1.166594655 |
| 39 | 10020 | 13367 | 17002 | 16987 | 0.088224915 |
| 40 | 10078 | 14685 | 17998 | 17345 | 3.628180909 |
| 41 | 10567 | 15399 | 18793 | 18342 | 2.399829724 |
| 42 | 10750 | 16201 | 19578 | 18999 | 2.957401165 |
| 43 | 11900 | 17092 | 20345 | 19869 | 2.339641189 |
| 44 | 12012 | 17989 | 21783 | 20253 | 7.023825919 |
| 45 | 12560 | 18367 | 22888 | 21012 | 8.196434813 |
| 46 | 13450 | 19436 | 23997 | 23444 | 2.304454724 |
| 47 | 13570 | 20037 | 25401 | 24654 | 2.940829101 |
| 48 | 14768 | 21576 | 27031 | 26342 | 2.548925308 |
| 49 | 14460 | 22679 | 28512 | 27389 | 3.93869248 |
| 50 | 14879 | 23477 | 29998 | 28545 | 4.843656244 |
| 51 | 15689 | 24321 | 32103 | 29887 | 6.902781671 |
| 52 | 15876 | 25686 | 34521 | 31279 | 9.391384954 |
| 53 | 16345 | 26544 | 36798 | 33256 | 9.625523126 |
| 54 | 16234 | 27789 | 38901 | 37821 | 2.776278245 |
| 55 | 16567 | 28955 | 40256 | 39546 | 1.763712242 |
| 56 | 16998 | 30211 | 43211 | 41998 | 2.807155585 |
| 57 | 17345 | 31989 | 47102 | 44789 | 4.910619507 |
| 58 | 17945 | 33412 | 49987 | 47983 | 4.009042351 |
| 59 | 18256 | 34978 | 52919 | 49989 | 5.536763733 |
| 60 | 18135 | 35289 | 55855 | 52001 | 6.900008952 |

Example table having forecasted and actual values of product X and its graphical illustration above explains the automated forecast correction scenario.

Suppose Merchant has set the “target change threshold for forecast change” value to 20%.

He has made some manual forecast for the anticipated demand growth for product X. It shown as “forecasted total subscriptions1”.

When actual total subscriptions count deviate from “forecasted total subscriptions1” by more than 20% on either side (increase or decrease by more than 20%),it is expected to trigger pricing for that product to reset its offered price to a new value in response to the new demand.

Also it triggers correction to the current forecast as the actuals curve no more align with forecast curve. Hence historical data gathered so far for actual total subscriptions is used to derive a new forecast “Forecasted total subscriptions2”.

Similarly when “Forecasted total subscriptions2” deviates from actual total subscriptions by more than 20%, offer price will be again correct and it will trigger a new forecast “Forecasted total subscriptions3” and so on.

This example is just an illustration of forecast correction. In reality forecast correction or pricing does not get triggered merely on an instantaneous difference between forecast and actual value crossing the threshold, but this deviation trend is observed for some period in order to conclude if the actual demand is deviating consistently from the forecast showing the real trend of deviation crossing the set threshold. This way it avoids effect of any instantaneous surge in actual demand, which may give an illusion that actuals are way more/less than forecasted value.

##### Forecasting algorithm

Forecasting of a product’s demand is dependent on volume of historical data available and will be gaining precision when more historical data is available. At the same time using too old demand data may add noise to the forecast as demand trend may have shifted drastically during the period in between, and very old trends may bias latest forecasts. Also there are number of forecasting algorithms available, each is predicting future trend and/or seasonality patterns and each of their data volume needs are different. Hence it is not advisable to use a single solution for forecasting product demands.

1. Simple Moving Average Demand Forecaster: This forecasting technique is useful when system has small set of actual data. Due to number of historical records are small in number they are unable provide any information on trend and seasonality aspects. An approximate prediction will be made by this algorithm which does not have much influence of trend and seasonality. Though it provides reasonable forecast it is not very accurate.
2. Simple Exponential Smoothing Demand Forecaster: Like simple moving average this forecasting technique too does not consider trend and seasonality aspects and considers that all observations are of equal importance and they are given equal weight when generating forecasts.
3. Triple Exponential Smoothing Demand Forecaster: 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.
4. Autoregressive Integrated Moving Average (ARIMA) Demand Forecaster: It is considered to be one of the most precise forecasting algorithms and hence takes the predictions closer to reality.

#### Receive and process new/added subscriptions

Subscription to different products by subscribers is the responsibility of Subscriber business domain. We will see that in detail there. But subscriptions to each product are received by product domain for each of the products, subscription is made to.

When a subscriber subscribers for one or more units of a product for a desired subscription period, with 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.

When subscriber confirms his/her subscription, the “subscription confirmation event” is triggered. It contains details of all the products a subscriber has subscribed to, including the desired subscription count of each subscribed product. This event is received by each product( listed in subscription) and each of them increases their “new subscription count” associated with latest price bucket by total number of subscribed units by the subscriber (for total subscription period) for that product.

If a subscribed product has been categorized as “price committed” product, there is a price bucket associated for each ‘active’ offer price. When a new subscription is made to this product it increases the “new subscription count” of its latest active 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.

This is how any new subscriptions registered with subscription business are reflected to subset of products as an increased “actual” demand for them.

#### Receive and process subscription cancellations

Cancellation of subscriptions to a product (by subscribers) is the responsibility of Subscriber business domain. But similar to new subscriptions, cancellations of subscriptions are also processed by Products.

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

For each of the cancelled 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 cancelled units of each 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.

#### Dynamic Pricing

The recurring pricing job is responsible for recalculating the offer price of “eligible” products every day. The notion of eligible products is provided in the description of forecasting job. Every day demand forecast of a product is compared with its actual demand to check if the actual demand is matching, exceeding or falling short of the forecasted demand figure by a threshold value (defined as ‘target change threshold for price change’). When the threshold value is consistently crossed in such a way that actual demands for a product rises above or falls below its forecasted demand by more than threshold value, then pricing calculation is triggered for that product.

Thus pricing job runs every day but it does not calculate price for every product but calculates price for only those products for which actual demand deviations from the forecasted demand by more than threshold limit.

There are two price calculation algorithms provided here; both are based on demand function. But there can be many more new algorithms added to compute price of a product.

Before proceeding to actual algorithms let’s first understand the basics of demand function.

##### 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. This assumption gives rise to another assumption; that product will have ideally 0 demand if sold at MRP. Though practically this assumption is no true, it is required to determine amount of discount that can be provided on its MRP for a given demand. Hence 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 represents trend of a specific product. By means of slope value one can determine that for one unit decrease in offer price how much 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. The variation of demand for various prices may not be linear. For some price range the slope value is high (it means for a small change in price there is a large change in its demand), whereas for later demand values the slope may reduce. This relation between price and demand is called as “demand curve”.

Due to non-linear behaviour, 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(MRP) 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 may get 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”, 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. Let’s 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.

##### Instantaneous price calculation

This algorithm tracks the profit associated with last two prices, and makes a decision on new offer price. The reason this is termed as “instantaneous” is because it does not monitor a trend of demands for different offer prices over a long period of time, but makes decision from demands (expressed in terms of profit or revenue) associated with last two offer prices.

The basic fundamental that has been followed is to keep reducing trend for price until merchant is making profit and his/her profit figures are increasing. When the profit starts getting hampered it may be due to following scenarios

1. Demand for that product has started reducing. In such case it may not be advisable to increase price even if merchant may be facing reduction in his/her profit figures. Hence price should continue getting reduced in an attempt to attract more subscriber for the product and eventually recover from demand crunch.
2. Demand for the product is continuously increasing but the offer price has been reduced to such an extent that the revenue (product of demand and offer price) may not yield increasing profits. In such case price can be increased gradually so that the profit will gain upward momentum again.
3. When the price is getting increased until demand is increasing but profit is decreasing, for some price threshold demand may start declining. In such case regardless of the profit health price should start decreasing again.

Here is the algorithm:

Prerequisite and Assumption: This algorithm assume that when there is no historical data present for a product it is not possible to derive an offer price based on demand function. So offer price is manually set by the merchant. This algorithm assumes execution after at least one price bucket (created for manual opening price) being present.

Receive purchase price per unit, operating expense per unit, any taxes per unit and any other miscellaneous charges per unit and calculate “Breakeven price” of a product;

Try to retrieve last (latest) two price buckets for product X;

//No price published: If merchant has provided manual /opening offer price but the same is //not published yet, then publish the same

If (number of price buckets associated with product X is 1 AND price bucket status is “CREATED”)

{

Get latest price bucket of a product set its status as “ACTIVE”;

}

//Single price published: If merchant has provided manual /opening offer price and the same is ONLY published in last execution.

If (number of earlier active price buckets associated with product X is 1 AND price bucket status is “ACTIVE”)

{

Get latest published price bucket of a product;

y2= get latest offer price;

y1=Get product’s MRP from this price bucket;

x2= number of new subscriptions associated with latest price bucket;

//as there was no earlier price bucket

x1= number of new subscriptions associated with earlier price bucket as 0;

Slope= (y2-y1)/(x2-x1);

Intercept= latest MRP; //MRP associated with latest price bucket

Receive product demand trend; //as UPWARD or DOWNWARD

//As price calculation is triggered only when new expected demand is more/less to current demand (new subscriptions) by “revenue change threshold for price change”

If(demand trend is UPWARD){

Expected demand=

new subscriptions associated with latest active price bucket +

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

Else if( demand trend is DOWNWARD){

Expected demand=

New subscriptions associated with latest active price bucket -

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

//Offer price calculation based on demand function

Offer price= intercept + slope\*expected demand

}

//If profit is growing (revenue growing more than cost) because demand is growing despite of “offer price” is decreasing… there is no harm to continue this trend

Else if( number of earlier “ACTIVE” price buckets for product are 2

AND

//“minus one” is current active price bucket; “minus two” is previous active price bucket

Total profit of “minus one” price bucket > total profit of “minus two” price bucket

AND

Total subscriptions of “minus one” price bucket > total subscriptions of “minus two” price bucket

AND

Offer price of “minus one” price bucket < offer price of “minus two” price bucket

){

Y2= offer price associated with “minus one” price bucket;

Y1= offer price associated with “minus two” price bucket;

X2= number of new subscriptions with “minus one” price bucket;

X1= number of new subscriptions with “minus two” price bucket;

Slope= (y2-y1)/(x2-x1);

Intercept= latest MRP;

If(demand trend is UPWARD){

Expected demand=

new subscriptions associated with latest active price bucket +

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

Else if( demand trend is DOWNWARD){

Expected demand=

New subscriptions associated with latest active price bucket -

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

//Offer price calculation based on demand function

Offer price= intercept + slope\*expected demand

}

// When profit is reducing because demand is reducing despite offer price is reducing, there is no option but to continue this trend (reducing price)

Else if(

number of earlier price buckets associated with product are 2 and both are “ACTIVE”

AND

//“minus one” is current active price bucket; “minus two” is previous active price bucket

Total profit of “minus one” price bucket < total profit of “minus two” price bucket

AND

Total subscriptions of “minus one” price bucket < total subscriptions of “minus two” price bucket

AND

Offer price of “minus one” price bucket < offer price of “minus two” price bucket

){

Y2= offer price associated with “minus one” price bucket;

Y1= offer price associated with “minus two” price bucket;

X2= number of new subscriptions with “minus one” price bucket;

X1= number of new subscriptions with “minus two” price bucket;

Slope= (y2-y1)/(x2-x1);

Intercept= latest MRP;

If(demand trend is UPWARD){

Expected demand=

new subscriptions associated with latest active price bucket +

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

Else if( demand trend is DOWNWARD){

Expected demand=

New subscriptions associated with latest active price bucket -

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

//Offer price calculation based on demand function

Offer price= intercept + slope\*expected demand

}

// When profit is reducing despite of demand is growing it means that there is a need to adjust offer price at higher value than before, by changing the slope

Else if(

number of earlier price buckets associated with product are 2 and both are “ACTIVE”

AND

//“minus one” is current active price bucket; “minus two” is previous active price bucket

Total profit of “minus one” price bucket < total profit of “minus two” price bucket

AND

Total subscriptions of “minus one” price bucket > total subscriptions of “minus two” price bucket

){

Intercept= latest MRP;

//Adjust slope with weighted average

Slope = slope associated with “minus one” price bucket –

(Slope associated with “minus one” price bucket \* weighted average of ALL offer prices from active price bucket AND total subscription count for ALL active price buckets);

//Weighted Avg= (Σ offer price per price bucket\*total subscription count per price bucket)/(Σ sum of total subscription count per price bucket)

//Offer price calculation based on demand function

Offer price= intercept + slope\*expected demand

}

// When profit is increased despite of increase in offer price (regardless of if demand is increasing or decreasing) then the demand function should get re-instated with based X (0 demand) and Y (MRP) values.

Else if(

number of earlier price buckets associated with product are 2 and both are “ACTIVE”

AND

//“minus one” is current active price bucket; “minus two” is previous active price bucket

Total profit of “minus one” price bucket > total profit of “minus two” price bucket

AND

Offer price of “minus one” price bucket > Offer price of “minus two price bucket”

AND

(Total subscriptions of “minus one” price bucket < total subscriptions of “minus two” price bucket

OR

Total subscriptions of “minus one” price bucket > total subscriptions of “minus two” price bucket)

){

Y2= offer price associated with “minus one” price bucket;

Y1= MRP of latest price bucket

X2= number of new subscriptions with “minus one” price bucket;

X1= 0;

Slope= (y2-y1)/(x2-x1);

Intercept= latest MRP;

If(demand trend is UPWARD){

Expected demand=

new subscriptions associated with latest active price bucket +

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

Else if( demand trend is DOWNWARD){

Expected demand=

New subscriptions associated with latest active price bucket -

(new subscriptions associated with

latest active price bucket \* revenue change threshold for price change);

}

//Offer price calculation based on demand function

Offer price= intercept + slope\*expected demand

}

The above algorithms should keep on varying offer price in response to varying demand and trying to ensure increase in profit is most of the cases except when demand is decreasing. Typical variations to offer price in response to demand is depicted in below graph.

X axis represents demand (total subscription count) and Y axis denotes prices being offered. As we see above the pricing algorithm tries to vary price in the range of 38 to 50 Rs. (50 Rs. being MRP and 37 Rs. being breakeven price) in response to variations in demand. The dimension which is not shown here is the variations in profit. The price is continuously getting adjusted in an attempt to keep increase in profit figures. Only exception case is where demand is decreasing, price will keep on decrease in order to attract more and more subscribers (thereby increase in demand at the cost of lesser profits or even losses). It can be also seen that when profit is decreasing despite of increase in demand price gets increased to keep profit upwards.

##### Regression based Price Calculation

Regression analysis is a statistical process of estimating relationship among variables. The focus is to establish relationship between a dependent variable and one or more independent variables so that for any combination of independent variables one can find value of dependent variable. In other words, regression analysis helps us understand how the value of a dependent variable changes when value of any of the independent variables is varied.

Regression analysis is widely used for predictions/forecasting. We can use regression analysis to “predict” value of offer price of a product based on changes in

1. Its demand
2. Demand of its substitutes
3. Demand of its complements
4. Increased efforts on sales, advertising and marketing ( which is influencing change in its demand)

In default/most simple case typical demand function is formed in the same way as described in earlier section as

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

In a complex form it can be something like

P= a + α \* Qself + β\*Q (sub1+sub2+sub3) + γ\*Cmktg

P= price of a product

a= intercept (typically MRP)

α= coefficient1

Qself= Product’s own demand

β =coefficient2

(sub1+ sub2+sub3) = total demand of all substitutes of a product

γ = coefficient3

Cmktg=cost incurred on sales and marketing expenses

In both the above cases we have identified “price” as a dependent variable. It depends on demand as well as other independent variables such as demand of substitutes, expenses on sales and marketing etc. Since the relationship between dependent variable and independent variables may be

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

Subscription business platform assumes that some administrator updates changes in purchase price/MRP of every product. Any such price change for a product should trigger a “Tagged price changed event”.

As we have seen earlier, “Product Account” of each product maintains list of purchase price/MRP versions. So upon receiving the “Tagged price changed event” a new version of tagged offer price (composed of purchase price, MRP and change Date) is added to the list.

Change of purchase price should first trigger offer price recalculation where new breakeven price should get calculated and used for verification of new offer price.

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 subscribers any/multiple times during their subscription period. Revenue and profit get recognized only after actual items are successfully delivered to respective subscribers

#### Receive and process subscription deliveries

Delivering desired count of units per product to a subscriber is expected managed by the main shopping application. Subscriber domain is responsible for triggering daily notifications for delivering delivery baskets to different subscribers.

When a subset of subscribed units of a product are delivered to a subscriber a delivery event is triggered by subscriber domain, the same event is received by each of the delivered product and it will update their appropriate price buckets for the delivered units.

For example: A subscriber has registered for product X with 2 units each month. When a third delivery has been delivered, the delivery event is also received by product X and it will update the delivered (2) units of a price bucket (representing price which was committed to that subscriber). So at the time of subscription ‘new subscription count’ of the price bucket was updated with count 24 (2 per month \* 12 months). At the third month delivery the “delivered count” of the same price bucket will be updated with value as 6 (2 per month \* 3).

#### Process price bucket expiration

When all subscribed units of a product, by a subscriber get successfully delivered to him/her, his/her subscription for that product is said to be completed. Each price bucket has an attribute “delivered subscription count”. When each delivery for a product is made its delivered subscription count is updated with number of unit delivered.

Among the subscribers who have subscribed for a specific product either successfully receive all their deliveries or they cancel their remaining subscription. Subscription churn is accounted under “Churned subscription count”.

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

#### 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.

### Interactions

## Subscriber/Subscription

### Lifecycle

### Interactions

# Benefits

## Lifecycle

## Interactions

# Payments

Payments domain is responsible for determining and periodically ‘correcting’ the payments to be made by each subscribers for their active subscriptions. It is responsible for tracking the payments received for each active subscription, validating them against the chosen payment scheme and accordingly conveying decision to subscriber domain if next deliveries for those subscribers are allowed for dispatch. Finally it is responsible for calculating refunds if any and providing means to refund excess payment amounts to eligible subscribers through various means.

Actual payment to be made by the subscribers through various electronic or physical means is expected to be handled by the shopping website/app/agencies and hence not being discussed as part of this domain. We will discuss how the incoming payment should get adjusted against the due amount for each of the deliveries so that 100% due payment for each delivery is fulfilled in the order of their delivery sequence.

Payment domain has to be vigilant about

1. Changes happening to the offer prices of various products
2. Changes to the tagged prices of each ingredient product.
3. Number of alterations made by subscribers to their active subscriptions during subscription lifetime.

These activities influence alterations to the total amount to be paid by the subscribers.

We have already seen in the “objectives” section that the total payment of a subscription, calculated at registration of a subscription may not remain constant due to various reasons, such as

1. Change to offer prices of “none committed” products contained in a subscription, during active tenure of that subscription.
2. Change of MRPs of a “percent discount committed” products contained in a subscription, during its active tenure, which influences alteration to its absolute value of offer price (as absolute offer price is derived by applying fixed discount percent on ‘latest’ MRP).
3. Alteration of subscription content or abrupt termination of a subscription, which may warrant recovery of remaining payment OR may warrant refund (in case major payment is received as advance).

All these above factors which influence changes in total subscription amount, expects Payments domain to possess ability to recalculate due payment repeatedly at appropriate triggers/events.

Frequent variations in prices as well as subscription content may result in access amount paid by subscriber, which may need to be refunded to him/her. So the domains should have defined policies for refund.

Payment domain is mostly reactive in nature and mainly responds to different events triggered in other domains. You will understand ‘why’, after referring to points below.

* Initiation of payment by a subscriber is a reaction of registration of new subscription (happens in Subscriber domain).
* Distribution of received payment to fulfil next deliverable consignments, so as to make them eligible for dispatch is a reaction of incoming payment (which is happening through some payment gateway or other payment sources).
* Changes happening in the offer prices and tagged prices of various products (handled in Product domain) create enablers for recalculation of due payment.
* Recalculation of due payment is also a reaction of events happening in subscription lifecycle such as alteration of delivery content by subscriber.
* Calculation of refund amount arises due to excess payments made by subscriber which are not matching the value of good delivered to him throughout subscription cycle.

Let’s list high level responsibilities of payment business domain.

1. Merchant is expected to define one or more ‘payment schemes’ at the initiation of subscription business as well as ,may add new payment schemes from time to time. A payment scheme is a rule which determines the delivery cycles before/after which the total/part of total due payment is expected to be received. Violation of the chosen payment scheme may cause halting of next deliveries as the expectations around the fulfilment of due payment as defined by the scheme may not have been met by a subscriber.

In case multiple payment schemes are offered to subscribers, each subscription should have an associated payment scheme which will act as a validation rule while determining whether to dispatch next delivery or not.

1. Registration of products with Payment domain, when they get registered with Product domain with their latest offer prices, tagged prices and product categories. This information is required for calculation of due payment of a subscription as well as periodic corrections in it.
2. When a new subscription is registered (in subscriber domain) or any existing subscription is renewed, it results into creation of new payment account for that subscription. The lifecycle of payment account is closely associated with the lifecycle of the subscription.
3. Payment account is responsible for tracking incoming payment against lined up deliveries. The incoming payment amount should be distributed across already made (but payment not fulfilled) as well as next lined up deliveries in that subscription, in the order of their delivery sequence. This is organized in such a way that due payment of a delivery with pending due amount, higher up in the sequence is tried to be fulfilled fully (100%). In case some amount of the incoming payment is left, this remaining amount is taken to the delivery next in the sequence and the same objective is tried to be fulfilled. Thus deliveries which are already dispatched or due for dispatch, but have some payment due are fulfilled on their payments. Obviously how many deliveries will be fulfilled for their due payment, solely depends on the payment received, which in turn depends on payment scheme chosen by a subscriber.
4. When the pricing engine calculates new offer price of a product, the same should be carried to payment domain and registered there. This is required for all three pricing categories of the product. In case the product is ‘none committed’, every offer price change will impact the due payment calculation of all subscriptions which contains this product. In case the product is either ‘price committed’ or ‘percent discount committed’, any new subscriptions containing this product subscribed with this new offer price/percent discount, will need to get latest offer price/discount information locally. Hence payment domain should always keep the registry of all active prices (and their price buckets).
5. When tagged price of a product undergoes changes, payment domain should keep registry of all active tagged price versions for the same reason mentioned for offer price changes. Also change of tagged price should initiate recalculation of due payment, for ‘percent discount committed’ products in each active subscription, as the discount percent should now be applied to revised MRP so as to determine absolute offer price which should be considered henceforth.
6. Responsibility of a payment account is to calculate (as well as time to time update) total due amount from associated subscription. When a delivery is prepared for its dispatch( in subscriber domain), same is expected to trigger calculation of ‘correction’ in the due payment of that delivery as well as all the deliveries which are yet to be delivered. This is required because the delivery baskets contains products belonging to “price committed” category, “percent discount committed” category and “none committed” category. So when offer price undergoes changes for a ‘none committed’ product, its due amount needs to be recalculated with new offer price. Similarly when tagged price (mainly MRP) of a product undergoes change, the due amount because of ‘percent discount committed’ products will have to be recalculated with newly derived absolute offer price.
7. Payment account maintains and dispenses reward points if any, accumulated for earlier/current subscription of a subscriber. The points can be used to fulfil part of current due payment or can be transferred from old account to new payment account when subscription is renewed. Same is true for any due payment from earlier subscription (though this is less likely) or for any excess amount left to be refunded from earlier subscription.
8. When a current active subscription ends/gets abruptly terminated by its subscriber, its payment account gets ‘deactivated’ or ‘closed’ depending on if there are any dues pending. In case the total amount paid so far during current active subscription is equal to latest total due amount, the account can be safely closed as there are no dues pending from that subscriber. But in following three scenarios, the account gets deactivated but does not get closed.
   1. If there is any excess amount that needs to be refunded to the subscriber. In such case the account can get closed only after remunerating subscriber with that amount or equivalent reward points, and transferring either of it in renewed subscription OR make subscriber utilize/encash it
   2. If there are any reward points accumulated with subscriber which are not transferred/redeemed. In this case too, the same rule as described in earlier point is followed.
   3. If there is any payment which is due with subscriber which he has not paid yet. This is a little complex scenario and needs to be handled with some settlement/collection policies adopted by merchants.
9. In case a subscriber renews subscription, which results into creation of new Payment Account, the un-redeemed reward points if any, get transferred from the old account to new account. Similarly un-paid due amount if any gets transferred from old to new account. Lastly if there is any excess credited amount in old account, which is not processed through refund process gets transferred to new account and gets adjusted against the subscription amount of renewed subscription.

I hope that, after walking through stated responsibilities of Payments domain you should have got detailed insight on its end to end functioning. Now let’s get into details of master entities of Payments domain, structure of these and their contribution in fulfilment of above responsibilities through collaboration.

## Payment Account

When a subscriber creates/renews a subscription, a new payment account is created. Main responsibility of payment account is to calculate total due payment, correct them from time to time, track incoming payments against due payment, identify the impact of changes in subscription, and finally manage refunds. So we can say that there is one payment account for each subscription registered. A subscriber may have number of payment account, but only one of them will be active at a time, because a subscriber is allowed to have only one active subscription at a time.

Following are the attributes of payment account.

1. **Subscriber Identifier and subscription identifier**: So as to distinguish a payment account for each active subscription.
2. **Payment scheme identifier** associates one among the available payment schemes with every payment account. Payment account can have only one scheme associated with it in its lifecycle. Payment scheme determines payment cycles and instalment to be paid in each cycle in order to ensure continuity of the subscription.
3. **Delivery wise cost accounts**: Recall (from Subscriber domain) that a delivery is the basket created for each delivery to be made to the subscriber out of total subscription. Depending upon periodicity of deliveries expected by a subscriber each delivery has a predetermined delivery date. Each delivery carries some part of total subscription price and there can be rules around when each delivery price must be paid by subscriber. Hence it is advisable to create cost account for each delivery in a subscription. It is essential to know that since a subscription is perceived as list of deliveries aligned, and hence total subscription price is also perceived as list of delivery prices that are expected to be received from a subscriber as per intervals calculated from rules laid out in various payment schemes.

A Delivery Cost account represents the price and transactions associated with one delivery of a subscription.

* **Subscription Id and Delivery Id** are used to distinguish a delivery cost account for a delivery.
* It contains **Delivery Details**. A Delivery Details lists required attributes of each Delivery Item contained in that delivery as each **Delivery Product Detail**.
* A **Delivery Product Detail** uniquely identifies a product in a delivery by its **product id** and **price bucket id**. A Delivery may contain multiple units of same product, but if they are added at different times, then each of them may be having a different offer price associated with each of them. Hence it is not enough to distinguish each delivery item merely by product Id. A price bucket Id is also required to distinguish different offer prices associated with each of them.
  + Delivery Product Detail maintained **pricing category** of that product. As we know that pricing category play an important role in determining change in offer prices. Hence it is required for calculation (and recalculation) of due amount of each delivery/total subscription.
  + Delivery Product Detail also contains its **offer price or percent discount** (which depends on pricing category of that product). Also it will contain placeholders for **absolute old value of offer price and absolute new value of offer price**. Similarly **old and new tagged prices** are also maintained? Why two placeholders are required? Let’s see it in next paragraph.

Consider a scenario that a product added to a subscription is of ‘NONE COMMMITTED’ pricing category. It means every change in its offer price will impact total subscription cost, as no price is committed to its subscriber.

At the time of subscribing to this product it may have one offer price, but at the time of paying for it, the offer price may have changed. Subscriber should know why he /she is paying more/less offer price for it, than what was shown at the time of subscription. The old and new absolute value of offer price would satisfy his/her doubt about the price difference.

Similarly if a product added to a subscription is of ‘PERCENT DISCOUNT COMMITTED’ price category, MRP of that product undergoes changes one or more times during active lifetime of a subscription. So each time MRP changes, its absolute offer price will be calculated on latest MRP. Hence again in order to make subscriber aware of change of offer price, old and new absolute offer prices are maintained. Also **old and new MRP** are also maintained for the same reason.

1. **Total Subscription Cost Account**: This account maintains/updates current total price of a subscription. We have already seen that total price is subject to change due to changes in offer prices/tagged prices or alteration in subscription content.

Total subscription price is an arithmetic sum of the latest offer prices of total volume/number of all products in a subscription and it keeps on changing as mentioned above.

It has **subscription identifier** to uniquely identify an account.

It also contains attribute to maintain **total subscription cost**, and **subscription cost change date** attribute to maintain the latest date on which the total subscription cost has been revised.

It does not account for any adjustment in the total price due to already available reward points, if any with the subscriber OR any of the refund amount which needs to be adjusted against total price of new subscription. That is where it differentiates from ‘Total Receivable Cost’.

1. **Total Receivable Cost Account**: This account attribute maintains the latest total amount that is expected to be paid by the subscriber. Ideally it is expected to contain the same value as contained in ‘Total Subscription Cost Account’. But in case subscriber has accumulated reward points as a result of his/her previous subscriptions, which he wishes upfront to adjust against the total cost of renewed subscription, while renewing it, the amount equivalent to reward points will be deducted from ‘total subscription cost’ and remaining amount will be assigned to ‘total receivable cost account’. Thus total receivable cost may be lesser than total subscription cost.

Alternatively if there is any refund due from earlier subscription and subscriber is ok to have it adjusted against the renewed subscription price then the same gets deducted from the value in total subscription cost account and considered as total receivable cost and maintained in total receivable cost account.

There is another scenario where total receivable cost may be more that total subscription cost, but it may not be allowed by the merchants, or handled in a different way. Suppose a subscriber has not made 100% payment for earlier subscription and there is some due amount left for him/her to be paid. In case he/she renews the subscription, then the earlier due is added to total subscription cost of renewed subscription. In this case receivable amount may be more that total subscription amount. But merchants may not allow the renewal until earlier dues are paid. In such case this scenario may never occur. But the ecosystem has made a provision to handle it in ‘lenient’ way.

1. **Total Received Cost Account**: It keeps track of amount received so far through multiple instalments during active subscription and dates on which each of the instalments is received. In case subscriber wishes to know how much payment he/she has made and on what dates, this account provides required information. At the end of the subscription the total amount in this account should be EQUAL to total amount in ’Total Receivable Cost Account’, which indicates that subscriber has made full payment of the subscription. In such case payment account can be closed. Otherwise it will get ‘deactivated’ but cannot be closed until these accounts get tallied in some alternate ways.
2. **Refund Account**: There are multiple situations in which some part of total payment paid by a subscriber need to be refunded. Refund account keeps track of amount to be refunded.

In case subscriber has made significant advance payment in one or more instalments much ahead of all deliveries, and price of few products in his/her subscription consignments have lowered than the ones used for calculating total subscription amount. In such case he/she will be eligible for refund.

In case subscriber has made some advanced payment which was distributed across delivery baskets in the order of their delivery sequence, and before each of these baskets get delivered subscriber has altered contents of these deliveries OR dropped any intermediate delivery OR cancelled remaining subscription, in such cases too he/she will be eligible to gain remaining amount refunded back (based on refund rules set by merchant).

A subscriber domain handles modification to subscription content in a unique way. If a new item needs to be added, existing item needs to be removed in remaining delivery baskets, it drops these baskets and recreates new delivery baskets having modified contents. Let’s term such modification as ‘delete baskets followed by add baskets’.

If the modification related to dropping of one or more remaining delivery baskets, then these gets dropped. Let’s term this modification as ‘delete only baskets’.

We know that when subscriber makes a payment, the payment gets distributed across ‘already delivered’ as well as ‘yet to be delivered’ delivery baskets in the order of their delivery sequence.

If the delivery baskets being dropped as part of subscription content modification, contains part of payment received from subscriber, then the same should be moved to refund account before the basket gets dropped. In case the modification is of type ‘delete baskets followed by add baskets’, then the money moved to refund amount should again get assigned to newly created baskets in the order of their delivery sequence. In case the modification is of type ’delete only baskets’, then the moved money should get moved back and distributed across remaining delivery baskets in the order of their delivery sequence. If the delivery basket getting dropped is the last basket OR of all the remaining baskets are getting removed in ‘delete only baskets’ philosophy, then the amount earlier moved to refund account is the amount to be refunded back to its subscriber.

As described earlier the value in refund account influences decision related to Payment Account deactivation or closure. If the value is zero at the end of subscription, then it allows closing associated Payment account. Else it expects the amount to be refunded or adjusted against renewed subscription in order to close the account. Until then it enforces deactivation of payment account.

1. **Payment Account Status**: this flag indicates the status of a payment account. When payment account gets created along with new/renewed subscription the account status will be ‘ACTIVE’. If a subscription is completed with receipt of full subscription amount from subscriber and there is no refund to be made then account status will be ‘CLOSED’. But in case the closing of accounts in Payment account does not happen, then its status will become ‘INACTIVE’.

Consider a scenario where subscriber has not made full payment even at the end of subscription and hence there is a positive difference between total receivable amount and total received amount OR consider a scenario where there is a refund to be made to subscriber but it has not been processed even after completion of subscription. In both cases the Payment account cannot be closed. In such cases the Payment Account will be tagged with a status ’INACTIVE’ and separate process need to be adopted for closure of all accounts inside that Payment Account so as to mark it as ‘CLOSED’.

1. **Payment Processing Context:** Payment Processing Context is a tracker/pointer associated with a Payment account and responsible for tracking incoming payments against the accepted payment scheme and validating deliveries being dispatched against each of them. This it acts as a bridge betweenPayment Account and Payment Scheme.

Payment Scheme represents standard rule definition which when applied to a subscription it calculates instalment amounts and payment cycles for each of these instalments, so as to determine how/when payments are expected to be received towards total due amount for that subscription. Merchant can define one or more payment schemes and offers them to subscribers. Subscribers opt for payment scheme of their choice/payment apatite. Thus same scheme can be associated with multiple subscriptions. But since the scheme makes use of metrics of each subscription to calculate payment cycles and instalment amounts, these values come different for different subscriptions.

Payment Processing Context (let’s call it as PPC) acts as an ‘instance’ of Payment Scheme for a payment account. Responsibility of PPC is to track full receipt of total subscription amount through series of payment instalments made (as per scheme definition) by a subscriber in associated payment account. The Context has following attributes

* Payment Scheme ID
* List of deliveries BEFORE which payment is expected and payment instalment expected on each delivery.
* List of instalments Collected so far and delivery sequence before which each of these instalments are collected.
* Total Deliveries in subscription
* Total Due Amount
* Latest delivery sequence number which has just occurred.
* Status of Payment Processing Context( Active, Closed, Inactive)

A Payment Processing Context has its own lifecycle as described below.

Creation**:** When a payment scheme gets associated with a Payment Account the context gets created and the said scheme id is set in it.

Initialization: When deliveries are pre-emptively created for a subscription (Subscription Specific Deliveries Created Event), the total delivery count will be updated in the Context. The total due amount is initialized at the same time. Also the deliveries before which instalment is expected are also set at this time.

Cyclic modifications: There are number of events on which the context gets modified they are listed below.

1. At the time of each Delivery (Delivery Prepared for Dispatch Event), the delivery wise due amount and the total due amount is recalculated, in order to accommodate the changes in offer prices, tagged prices and alteration of subscription content. So instalments values associated with yet to be done deliveries are corrected at this time. Total due amount is also corrected.
2. When delivery is dispatched to subscriber (On Delivery Dispatch Event), latest delivery number is updated.
3. When any alteration is made in the deliveries which are yet to be made the modified deliveries are dropped first and then recreated in Subscriber domain (Subscription Specific Deliveries Created Event). On this trigger values of the attributes such as total deliveries count, total due amount, list of deliveries and instalments against remaining deliveries are modified as per the alteration made.
4. When an instalment is received (Payment Received Event), the attributes such as total due amount, list of deliveries and instalments against remaining deliveries are modified as per the alteration made.

Context Closure: When due payment becomes zero (after receiving all designated instalments), and when the latest delivery number cross the last delivery sequence, the context gets closed and notifies the parent payment account to get closed. For exception scenarios, such as subscriber has not made an intermediate payment, and further deliveries are stopped, there should be some fixed duration until which the contexts remains active, after which it becomes deactivated and notify the parent Payment Account to get deactivated.

## Payment Schemes

A Payment scheme is a rule defined by the merchant on how the payment can be received. There can be multiple payment schemes at the same time. A Payment scheme once defined cannot be modified. In case existing scheme is not the one desired by merchant then it should be expired/retired by setting end date for the same and a new scheme should be defined with desired behaviour. In such case, even if a payment scheme is retired it will continue serving those subscription which have opted it for payment options, until end of each of these subscriptions. But after retirement date this scheme cannot be available for new subscriptions to be used.

Let’s first go through basic attributes of a Payment Scheme.

Every scheme is expected to have a unique **scheme Id**. Also each scheme will be given a meaningful **name** by which a merchant can distinguish a payment scheme from others.

**Scheme description** provides description of the rule defined in a scheme (also example of its usage). The description provides information regarding how the payment cycles are determined, when subscriber will have to make payment also how much of the total payment he/she will have to make in each cycle. The intent of this information is, if subscriber has been given a choice to select a payment scheme among the available schemes, this information is expected to help him understand each scheme so as to make appropriate choice as per his/her appetite.

**Scheme Rule** is the Rule/formula which is used to calculate the payment cycles and part of payment in each cycle, under that scheme. In case merchant is using some simple mechanisms to determine payment cycles/payment parts, such as excel then the formula will be excel specific. For sophisticated computer based software system, it is recommended that some English like grammar should be developed using technologies such as ANTLR so that merchant should be able to define a new scheme by himself using this custom DSL. We will see in the lifecycle some examples of rule definitions which are self-intuitive and make use of very few keywords, so that even merchants themselves can define them without any development support.

**Scheme start date and end date** fix the lifespan of a scheme. The response and consequences of any newly defined payment scheme are analysed by the merchant and accordingly he/she will determine if the scheme should be continued or closed down. Start and end dates help him/her do that.

Every payment account should have single associated payment scheme.

## Lifecycle

#### Product Registration

Even before any subscriptions gets registered with the ecosystem, the products identified as suitable for subscription business are registered with product domain.

When any new product is registered with subscription business (with product domain) the same should also be registered with payment domain with information such as its tagged price (purchase price and MRP) and latest offer price. Since payment domain is responsible to calculate due payments for all subscriptions it should have the registry of product prices and periodic changes in them. It should also know if the registered products are “value committed”, “ percent discount committed” or” none committed” in order for it to know the due amount revision is required if any of their offer price/tagged price undergoes changes.

Since product registrations with the ecosystem happen at the initiation of subscription business, it is typically the first lifecycle event. New products may get registered during the ongoing subscription business but their registration with Product and Payment domains always precedes their usage in actual subscription.

#### Payment Scheme Definition

**Before initiation of subscription there has to be at least one payment scheme** defined which will dictate how payments should be processed. Then onwards merchant can introduce new payment scheme at any time as well as expire any existing ones provided so that at least one payment scheme is active at any point of time.

Payment scheme is a rule definition which determines following two things.

1. In what proportion (percentage) the total due payment should be received as first instalment.
2. On which trigger/event the instalment of payment/part of payment calculated by step 1 should be received.
3. Define the formula to calculate the payment cycles in which the remaining part payments should be received.

There can be numerous combinations of payment schemes defined. Hence it is advisable to provide a mechanism for the merchant to determine and define a payment scheme as per his choice.

Here we are providing list of keywords and an associated grammar which forms a language of limited keywords which a merchant can use to define a payment scheme. A scheme definition is a sentence formed by creating appropriate formation of the allowed keywords which states

What percentage of current/latest total payment to be made at the beginning (confirmation) of subscription

AND

In what proportion the ‘repeatedly revised’ remaining payments are to be made

When these payments are to be made (in terms of delivery number).

We will see actual definitions of some popular payment schemes in a short while but before let’s list down the keywords and then significance in the scheme definition.

**PAY** : A keyword used for starting scheme definition sentence, just for the purpose of giving sense to it, that it is defined for defining ’payment’ rule . This is a mandatory keyword and the scheme definition must start with this.

It also indicates the type of payment made as well as its value/proportion by the keyword which follows it.

For example:

PAY 100% OF CURRENT SUBSCRIPTION AMOUNT: Tells that 100% of the latest total payment is to be made.

PAY RESIDUAL DUE AMOUNT: Tells that after making advanced payment pay the latest remaining due payment in some proportion.

**%** : In case the proportion of payment or part of payment is to be defined in percentage, this sign is used. It is expected to be used to calculate percentage of the ‘amount’ variable on which it is applied in the definition.

This sign must be preceded with a number and must be followed with the word ‘OF’ followed by amount variable name among the available amount related keywords such as ‘CURRENT SUBSCRIPTION AMOUNT’ or “RESIDUAL DUE AMOUNT’.

Example:

70% OF CURRENT SUBSCRIPTION AMOUNT

50% OF RESIDUAL DUE AMOUNT

**OF**: This term must be follow % keyword or a number describing proportion of N or REMAINING-N and must precede a numeric variable such as CURRENT SUBSCRIPTION AMOUNT, N, REAMAINING-N. There should be a multiplier term before this keyword, and variable after it.

Example: 100% OF CURRENT SUBSCRIPTION AMOUNT, ½ OF N, 1/3 OF REMAINING-N etc.

**CURRENT SUBSCRIPTION AMOUNT**: It indicates the total subscription amount at the time (latest) it is being referred in scheme definition. Since subscription amount keeps varying during subscription period, the word ‘CURRENT’ is used to emphasize the same. This keyword must precede OF which connects it with percentage value to indicate proportion of its value.

Example: 40% OF CURRENT SUBSCRIPTION AMOUNT

**ON**: The keyword is to be used before the name of a trigger/ an event, on which some action is expected. There are predefined events that can be allowed in scheme definition to follow this keyword.

Example: ON SUBSCRIPTON CONFIRMATION, ON SUSBCRIPTION UPDATION

**SUBSCRIPTION CONFIRMATION, SUBSCRIPTION COMPLETION, SUBSCRIPTION UPDATION**: These three are allowed events which can follow ON.

SUBSCRIPTION CONFIRMATION indicates initiation of a new/renewed subscription (after its confirmation from subscriber);

SUBSCRIPTION COMPLETION indicates full (completion of all designated deliveries) or abrupt (cancellation) completion of subscription;

SUBSCRIPTION UPDATION indicates any modification to the active subscription except cancellation.

**AND**: This keyword is used to join two conditions in a scheme, where its predecessor is executed first and the one follows it should be considered once predecessor is completed. When the scheme is defined with a single condition, it is not required.

Example:

*PAY CURRENT SUBSCRIPTION AMOUNT FOR* **1/4 *OF N*** *DELIVERIES ON SUBSCRIPTION CONFIRMATION*

*AND*

PAY RESIDUAL DUE AMOUNT AFTER **½ OF N**, **¾ OF N** DELIVERIES IN **DEFAULT** PROPORTION*.*

Here first condition is to pay 1/4th of current total amount on subscription confirmation. After this condition is fulfilled then only the second condition (to pay residual amount after some number of deliveries) will have to be evaluated.

**PLUS**: It is used to join two conditions when two conditions have to be executed at the same time. Example:

*PAY*

*CURRENT SUBSCRIPTION AMOUNT FOR* ***1*** *DELIVERY PLUS RESIDUAL DUE AMOUNT*

*BEFORE EACH DELIVERY*

Here two conditions are to be met simultaneously. Current subscription amount of 1 delivery + residual due amount (due to price/content variation) from earlier/current delivery has to be paid BEFORE each delivery.

**RESIDUAL DUE AMOUNT**: It indicates remaining payment after some initial payment has been made. It can be full subscription amount or payment yet to be made, depending upon how much payment has already been processed in earlier cycles.

**BEFORE/AFTER**: Either of these keywords is used before some proportion of N (total number of deliveries) or REMAINING-N (number of remaining deliveries). These keywords indicate if the next payment is expected to be received before or after the calculated delivery number.

Example:

BEFORE EACH DELIVERY

AFTER **½ OF N,** **¾ OF N** DELIVERIES

BEFORE ½ OF REMAINING-N, 1/3 OF REMAINING-N DELIVERIES

**N**: N indicates number of total deliveries in a subscription. For a subscription value of N always remains constant unless subscriber changes total number of deliveries (by dropping any of them).

**REMAINING-N**: It indicates number of remaining deliveries. Its value keeps changing as deliveries keep getting completed.

Example:

PAY 0% OF CURRENT SUBSCRIPTION AMOUNT ON SUBSCRIPTION CONFIRMATION

AND PAY RESIDUAL DUE AMOUNT

BEFORE ½ OF REMAINING-N, 1/3 OF REMAINING-N DELIVERIES

In a 12 deliveries subscription, since 0 amount is expected at confirmation, all the deliveries fall under REMAINING-N. So ½ of REAMAINING-N comes out to be 6 the delivery. Hence first payment is expected BEFORE 6th delivery. Once 6th Delivery is over the REMAINING-N will be 6. So 1/3 of REMAINING –N will come out to be 6(-> the delivery that is already completed) + (1/3\*6) ( -> 1/3rd of the left deliveries) = 6+2=8th delivery. So all remaining payment is expected BEFORE 8th delivery.

**DELIVERY/DELIVERIES**: The keyword indicates deliveries before/after which next part of payment is expected. It must appear after N or REMAINING-N, as either of them are indicative of sequence of deliveries. **Calculation of number of deliveries BEFORE/AFTER which residual payment is expected to be received in defined parts are calculated ONLY when deliveries are created/altered**.

In case new subscription is created, it pre-emptively creates deliveries as per requirements specified by subscriber.

In case subscriber alters subscription content, the deliveries after this alteration is dropped and newly created in order to accommodate customer’s alteration.

In both these scenarios some event ‘Subscription Specific Deliveries Created Aggregate Event’ should be received from subscriber domain to payments domain describing creation/re-creation of deliveries. On this event payment milestones in terms of sequence number of deliveries should get calculated. Hence if there is no alteration to content of a subscription, then delivery numbers should be determined at the subscription registration.

Example: ½ OF REMAINING-N, 1/3 OF REMAINING-N DELIVERIES

**PROPORTION**: The keyword defines the proportion in which the payment should be received in each of the calculated payment cycle. It must precede either keyword ‘DEFAULT’ or numbers defined in proportion form such as 2:3. One fact must be understood that the count of numbers coming is proportion form MUST be equal to number of delivery phrases those are used before it.

Example: IN DEFAULT PROPORTION, IN 3:4 PROPORTION, IN 2:3:4 PROPORTION.

½ OF REMAINING-N, 1/3 OF REMAINING-N DELIVERIES IN 2:3 PROPORTION.

Here there are two delivery phrases ½ OF REMAINING-N, 1/3 OF REMAINING-N. Hence the proportion phrase MUST contain two numbers i.e. 2:3

½ OF REMAINING-N, 1/2 OF REMAINING-N, 1/2 OF REAMAINING-N DELIVERIES IN 2:3:4 PROPORTION.

In above phrase you should be able to understand why the proportion phrase has 3 numbers.

**DEFAULT/EQUAL**: This keyword is used before PROPORTION and indicates ‘Equal’ proportions of payment amount equally distributed across all the deliveries, which are calculated by the ‘BEFORE /AFTER XXXXXXXXX DELIVERIES’ clause.

AFTER ½ OF REMAINING-N, 1/3 OF REMAINING-N DELIVERIES IN DEFAULT PROPORTION.

In the above phrase the value of DEFAULT will come out to be 2 as there are two phrases related to DELIVERIES before/after which payment is expected. So the latest residual amount will be divided into 2 equal proportions (???).

AFTER ½ OF REMAINING-N, 1/2 OF REMAINING-N, 1/2 OF REAMAINING-N DELIVERIES IN DEFAULT PROPORTION.

In above statement value of DEFAULT is going to be 3. It means latest due amount gets divided/paid in 3 EQUAL proportions (???).

But the above examples are partially true. This is because a new due amount may get added to residual due payment during deliveries, due to price/content variation. If any of these variations occur after earlier payment cycle of this clause ( i.e. after ½ of REMAININ-N) and before the next payment cycle, then the additional due amount if any gets divided into remaining payment cycles in equal proportion. In next payment (before which residual payment is revised) cycle is the last payment cycle, then latest due amount (including the additional due amount) will have to be paid BEFORE/AFTER it, as deemed by the scheme definition.

To explain the further constraint in detail let’s consider above two examples with some hypothetical residual amount value. Let’s assume that Rs. 5000 of residual amount is due after making some advance payment on subscription confirmation. Total deliveries in this subscription are 12.

In first example the deliveries AFTER which Rs. 5000 have to be paid back are

½\*12= 6 i.e. 6th delivery

6+ ½\*6= 9 i.e. 9th delivery

Since residual amount is to be paid in DEFAULT proportion, residual amount is equally split in two proportions. This after 6th delivery Rs. 2500 have to be paid and after 9th delivery Rs. 2500 have to be paid. But after 6th delivery and before 9th delivery Rs. 300 gets added due to price variation/content alteration. IN this case after 9th delivery Rs. 2500 + 300 = Rs.2800 will have to be paid. Had there been a decrease of Rs 300 (instead of increase), after 9th delivery Rs. 2200 would have to be paid.

In second example, with same conditions Rs. 5000 will have to be paid AFTER

½\*12= 6 i.e. 6th delivery

6+ ½\*6=9 i.e. 9th delivery

9+ ½\*3=11 i.e. 11th delivery.

It means Rs. 5000 will be split into 3 parts each coming out to be Rs. 1666.67 to be paid in 6th , 9th and 11th delivery each.

After first payment, Rs. 300 gets added to residual amount making remaining amount as 3333.34 + 300= 3633.34. Due to the scheme definition demanding DEFAULT proportion, this amount will be split in equal parts. So 1816.67 will have to be paid after 9th delivery and 1816.67 will have to be paid after 11th Delivery.

Assume that Rs. 200 gets reduced from due amount due to content alteration. So after 11th delivery 1816.67 – 200 = Rs.1616.67 will be finally paid after 11th delivery.

**X:Y:Z** : X,Y,Z are numbers separated by ‘:’ which together define proportion in which the payment needs to be received. Example: 2:3:4 determines that three incoming payments should be received in the proportion of 2:3:4.

In either of DEFAULT OR X:Y:Z proportion, the amount to be paid on each milestone(BEFORE/AFTER a designated delivery),should be calculated when deliveries are getting prepared for dispatch. Hence Subscriber should notify through ‘Delivery Prepared for Dispatch Event’, where every time the total due amount is reconciled, number of remaining deliveries are taken into consideration and by referring to PROPORTION rule the latest due amount gets distributed in given proportion.

Merely understanding keyword do not give us sense of actual scheme definitions. So let’s define few payment schemes, explain the execution behind a payment scheme and discuss their pros and cons.

#### Payment Scheme I: Full ‘Tentative’ subscription amount in advance with residual payments in predefined instalments

In this scheme subscriber is expected to pay this 100 % current subscription amount in advance, as a prerequisite to initiate delivery of subscribed goods.

Also the subscriber agrees to pay due payment (if any, due to offer price, tagged price or subscription content change) in one or more instalments during subscription tenure by setting up the rule for determining delivery cycles Before/after which each instalment of due payment have to be made.

The scheme definition given below.

*PAY*

*100% OF CURRENT SUBSCRIPTION AMOUNT*

*ON*

*SUBSCRIPTION CONFIRMATION*

*AND*

PAY

RESIDUAL DUE AMOUNT

AFTER

**½ OF N,** **¾ OF N** DELIVERIES

IN

**DEFAULT** PROPORTION

The rule states that subscriber is expected to pay the 100% of latest total subscription amount, in advance at the time of subscription confirmation. Then he/she is expected to pay the due amount arising due to offer price variations and subscription content variations, after half of total deliveries and then after 3/4th of the total deliveries in EQUAL proportion.

The rule can also be altered to change the way due payment is to be received.

*PAY*

*100% OF CURRENT SUBSCRIPTION AMOUNT*

*ON*

*SUBSCRIPTION CONFIRMATION*

*AND*

PAY

RESIDUAL DUE AMOUNT

AFTER

**½ OF REMAINING-N,** **¾ OF REMAINING-N** DELIVERIES

IN

**DEFAULT** PROPORTION.

The difference here is, the use of REMAINING-N instead of N. It means subscriber is expected to pay the residual due amount after ½ of the remaining deliveries count, followed by 3/4th of the ‘then remaining’ amount.

So if total deliveries for a subscription are 12, then ‘REMAINING’ deliveries will 12 (as first payment is made on subscription confirmation when no deliveries have yet been made). So ½ of 12 will come out to be 6. Thus next instalment will be after 6th Delivery.

After 6th delivery, remaining deliveries will become 6. So 3/4th of remaining will be ¾\*6=5. Since earlier payment is expected to have been made after 6th delivery, next payment is expected after 6+5=11th delivery (before last delivery).

**Advantages:**

Main advantage of this scheme is reduction of risk associated with no payment for already delivered goods as full amount calculated during subscription is already received at the time of subscription confirmation. Also newly arising due amount is also getting received after predefined deliveries.

**Disadvantages:**

Though this scheme tries to cover risk for merchant it is not very subscriber friendly as subscriber may be reluctant to invest large amount on account of tentative payment, in advance.

If this scheme needs to be provided as one of the payment option to subscribers, it may be associated some additional benefits for making full tentative payment in advance.

#### Scheme II: Keep minimum threshold balance in payment account for satisfy one or more future deliveries.

This scheme expects a subscriber to agree to keep minimum balance equivalent to ‘tentative’ payment for one or more deliveries in his/her payment account in advance. Unlike earlier scheme expecting full payment in advance this scheme expects advance of one or few deliveries, ahead of their dispatch.

Deliveries will keep on happening for subscriber, until amount equal to tentative amount for a delivery plus the due amount arising due to variations in offer price/subscription content is available(paid in advance) in the payment account of a subscriber. When this amount falls shorter than this minimum threshold amount, deliveries are blocked.

Here subscriber is not mandated to pay a fixed amount is advance. But a minimum threshold amount is expected to be available in his/her ‘Received Cost Account’.

The scheme definition is something of following type.

*PAY*

*100% OF SUBSCRIPTION AMOUNT FOR* ***1*** *DELIVERY*

*PLUS*

*RESIDUAL DUE AMOUNT BEFORE* ***N - REMAINING-N*** *DELIVERIES*

The formula N – REMAINING-N will keep on ensuring that total balance payment accumulated before each delivery is getting paid in advance/kept in account as minimum balance.

Before 1st delivery N=12, REMAINING-N=12 so this expression evaluates to 0 DELIVERY. It means before first delivery pay the latest due amount.

Before 2nd delivery N=12, REMAINING-N=11, so this expression evaluates to 1 and so on….

Deliveries will keep on happening until this rule is getting satisfied. Else deliveries are blocked until subscriber refills his/her payment account so as to satisfy the rule.

**Advantages:**

This payment scheme is a good trade-off between subscriber friendliness and merchant risk covering. As subscribers are paying for minimum one (or more) delivery (plus some additional amount to compensate for changes) in advance, merchants have lesser risks of no payment scenario. The risk may only be associated with recovery of due amount.

As subscribers have to pay for only one or more deliveries in advance they need not have to invest large amount in advance for future deliveries.

**Disadvantages:**

As subscribers are paying for only one delivery in advance, they may use subscription business model as instantaneous business where they will subscribe for longer term thereby ensuring more benefits registered, pay for one or more deliveries in advance, receive some portion of awarded benefits and cancel subscription after one or two deliveries.

Such short term cancellations may also make the merchant sacrifice the due amount accumulated at these subscribers due to price/content variations.

#### Scheme III: Partial Advance payment with residual payments in predefined instalments

Partial advanced payments is just a variation of scheme II (keeping minimum threshold balance in payment account). Here the scheme definition is exactly the same as scheme II. The only difference is number of deliveries for which advanced payment is sought.

*PAY 100% OF SUBSCRIPTION AMOUNT FOR* **1/4 *OF N*** *DELIVERIES*

*ON SUBSCRIPTION CONFIRMATION*

*AND*

PAY RESIDUAL DUE AMOUNT AFTER **½ OF N**, **¾ OF N** DELIVERIES IN **DEFAULT** PROPORTION*.*

The scheme states that subscriber is expected to pay total subscription amount (calculated at the time of subscription registration) for 3 deliveries (if total deliveries are 12). And then pay the accumulated due after 6th delivery and later after 9th delivery.

One this that MUST be understood here that subscriber has made payment of 3 deliveries in advance does not mean, the received amount will last until 3 deliveries. Due to price variations or content variation, the paid advance may fall short of latest total amount of third delivery (calculated at the time of preparing 3rd delivery ready for dispatch). In such case third delivery will not stop from dispatching as this excess amount will be recovered in 6th and 9th deliveries.

One can use REMAINING-N instead of N while defining rule for due amount recovery.

**Advantages:**

1. As compared to scheme II it covers more risk for the merchant as subscriber is paying for more than one delivery in advance.
2. As subscribers are made to pay for more number of deliveries, the likelihood of they using subscription model as instantaneous business is lesser as they will at least tend to stick to number of deliveries for which they have made advanced payment.

**Disadvantages:**

1. Subscribers may find it obligatory to make payment for three/four deliveries (depending upon multiplier to total deliveries count ¼, ½ etc.) as it may be a handsome amount that they may need to invest.
2. It introduces a new risk. In case subscriber has paid for 3 deliveries in advance, but at the time of 3rd delivery the balance amount is falling short of the total due, still 3rd delivery will take place. After this if subscriber chooses to close subscription, it will be difficult to recover residual amount. The problem grows bigger if subscriber has paid for 3 deliveries and received 5 deliveries, and then drops off. Since the next payment (after first advance) is due after 6th delivery, subscriber is eligible to enjoy up to 6 deliveries without making any payment in addition to earlier payment of 3 deliveries. Thus some risk of merchant loosing due payment expected from subscribers, as recovery of due payment may start later than deliveries until which advance payment is made, and subscriber may cancel subscription after full consumption of advanced payment.

Of course the problem can be minimized by merchant setting next delivery sequences closer to ending of deliveries until which advance payment is made.

#### Scheme IV: Zero advanced payment with residual payments in predefined instalments

In case merchant is ready to take risk and let subscriber start receiving their deliveries without any advanced payment until certain deliveries, this scheme is to be configured.

PAY *0% OF CURRENT SUBSCRIPTION AMOUNT ON SUBSCRIPTION CONFIRMATION*

*AND*

PAY RESIDUAL DUE AMOUNT AFTER **1/4 OF N, 1/2 OF N**, **3/4 OF N** DELIVERIES IN **DEFAULT** PROPORTION*.*

In this case subscriber will start receiving deliveries regardless of any payments made in the beginning. He/she is expected to start making the payments after ¼ th of total deliveries, ½ of total deliveries and 3/4th of total deliveries in equal proportion. The payments should include equal part of the tentative payment as well as equal part of the residual due payment arising due to price/subscription content variations.

**Advantages:**

1. For subscribers this can be the best payment scheme as they don’t have to pay anything in advance and have the ability to pay for the total subscription in multiple instalments.

**Disadvantages:**

1. The riskiest payment scheme as far as merchant is concerned. In case a subscriber withdraws his/her subscription prior to first payment instalment, it may become difficult to recover the payment for the deliveries made so far.

Merchant may wish to use the same only for the subscribers who have collected large number of benefit/reward points, so that any payment missing from a subscriber can be recovered from these reward points.

## *Creation of Payment Account*

Payment Account gets created when subscription confirmation Event is received from Subscriber domain, which indicates that some new or renewed subscription is confirmed by its subscriber. It is expected that the information of payment scheme opted by that subscriber should also be received with this event, in case the ecosystem is tuned to provide multiple payment scheme options to subscribers to choose from. At the time of creation the payment account should know the subscriber Id and subscription Id to which this account is getting associated.

## *Updating the advance payment, instalment cycles and determining ‘go’/’no go’ for first delivery*

As described in description of payment processing context, when deliveries of a newly confirmed subscription are pre-emptively created by ecosystem, the deliveries created event brings in enough information to enable creation of payment processing context. For rest of the lifecycle of the context please refer to its section.

The main objective of Payment Processing Context is to bind a Payment Account with the selected Payment Scheme as there is no directly association between them.

Payment scheme is responsible for understanding the scheme definition and given the total number of deliveries in a subscription responsible to provide the delivery numbers BEFORE which instalments are expected.

So Payment Processing Context directs the associated scheme to calculate these instalment delivery sequences and stores these sequence numbers once obtained.

Payment scheme also determines how much payment is expected in advance. So the context should also receive the amount which should be expected as advance payment. Once this value is received the context is responsible for validating that with the payment received from subscriber (Payment Received Event) and determines if adequate payment is received so as to allow first delivery to be processed.

*Recycling the Due amount value*

On receiving of ‘Delivery Ready For Dispatch’ event, the calculation of latest due amount is carried by Payment Processing Context, where following are recalculated and state of context is updated.

1. changes in offer prices of none committed products, due demand dynamics
2. changes in offer prices of percent discount committed products due to tagged price changes
3. Changes in number of deliveries yet to be made and total due amount of each delivery (thereby total due amount) due to changes in subscription content.

These calculations also refresh Total Receivable Cost Account, Delivery Cost Account.

*Processing received Payment*

When payment is received from subscriber the Payment domain gets notified with ‘Payment Received Event’, which contains the subscription details and payment amount.

The payment amount gets distributed in lined up deliveries so as to fulfil payment demand of each delivery in the order of their delivery sequence. The amount equal to due amount for first delivery is deducted from it and then remaining payment is taken to next delivery in sequence and so on.

The deliveries for which due amount is getting fulfilled by incoming payment are also updated in Payment Processing Context. In case payment is received before Xth delivery, this delivery sequence is compared with expected delivery sequence to find match. In case match is found OR payment is made much ahead of Xth delivery, then the expected instalment amount is matched with received amount. In case both these criteria then it removes the next delivery instalment sequence ( from list of deliveries before which payment is expected),updates lists of instalments collected against the delivery sequence before which it is collected and notifies the Subscriber domain to allow next delivery.

In case either of criteria does not match the Context is expected to notify Subscriber domain, not to proceed with next delivery for this subscription and necessary notification to subscriber is initiated.

The incoming payment is getting validated against expected advance payment, if it is made on subscription confirmation it is used to validate the go/no go of first delivery.

The incoming gets validated against validated against the latest due instalment amount so as to decide go/no go of next delivery.

*Handling Alterations to Delivery Content*

In case subscriber decides to alter content of his (remaining) deliveries, he/she can do either of multiple of following

1. He/she may add new product or increase quantity of already subscribed product(s)
2. He/she may reduce product or decrease quantity of already subscribed product(s)
3. He/she may altogether drop one or more deliveries OR may drop all remaining deliveries if he/she is aborting current subscription.

In all the above scenarios the total due amount as well as probably the instalment delivery numbers are subject to modifications.

## Example

Let’s take a detailed example of the above payment scheme to understand how due amount and its corrections are periodically calculated and how the due is collected in instalments as per the scheme definition for collection.

Consider the following payment scheme definition for illustration.

*PAY*

*100% OF CURRENT SUBSCRIPTION AMOUNT*

*ON*

*SUBSCRIPTION CONFIRMATION*

*AND*

PAY

RESIDUAL DUE AMOUNT

AFTER

**½ OF REMAINING-N,** **¾ OF REMAINING-N** DELIVERIES

IN

**DEFAULT** PROPORTION.

A subscriber has subscribed for the ‘current’ total subscription amount of Rs. 12,000 for a yearly subscription and opted for all monthly deliveries. He has subscribed for products X1, X2, X3 each of them with a subscribed quantity/volume/weight. X1 belongs to ‘price committed category’, X2 belongs to ‘percent discount committed’ category and X3 belongs to ‘none committed category’. Let’s assume for simplicity that all deliveries are uniformly distributed in quantity and price and hence due payment for each delivery comes out to be 1000 Rs (i.e. 12,000/12)

Hence as per the scheme the **subscriber has made the ‘Current’ full payment of Rs. 12,000 at the time of subscription confirmation**.

Also when subscription gets confirmed, 12 deliveries are pre-emptively created in the Subscriber domain and ‘**deliveries creation event**’ is received by the Payments domain. On this event first part of scheme definition is executed to determine the sequence number of deliveries, before/after which payment instalments are to be expected. The execution resulted that instalments will be made after 6th and 11th deliveries. Remember that the ‘proportion’ context is not considered while determining the sequence number of deliveries. These delivery number are stored in some sort of **PaymentProcessingContext**, an agent associated with each payment account which is responsible for tracking the execution of payment receipts as per the opted scheme, until end of last payment.

As stated earlier the due payment is reconciled at event ‘Delivery Ready For Dispatch’ event being received from Subscriber domain. **At the time of dispatch of first delivery**, there is a change detected in price of X3. Since X3 belongs to ‘none committed’ category, the difference arising due price change per unit multiplied by remaining units of X3 contributed to the due amount. Assume that the **due getting calculated as 116 Rs**.

The ‘Delivery Ready For Dispatch’ event also triggers a verification to check if the current delivery number is the one (immediately) after which a payment is expected. In such case it also reconciled the total due amount as well as applies the ‘PROPORTION’ context, where it breaks the latest total due into the parts as determined by ‘IN XXX PROPROTION’ clause. Since first delivery is not the one after which payment should be expected, none of these activities will be executed.

**At dispatch of second delivery**, due to **reduction** in the offer price of X3 product, **the due amount reduction due to this price change in this delivery was - 34 Rs**. Hence the total due amount now turns out to be **116 - 34= 82** Rs.

Again, since it is not the delivery after which any payment is expected, no processing of ‘PROPROTION’ context takes place.

**At 3rd delivery** with similar calculation the **total due is increased from 82 Rs. to 100 Rs**. Again this change is due to offer price variations in the X3 (‘none committed’ products).

As you must have seen there is no change made in subscription content yet. Also there is no change in the tagged price (purchase price and MRP) of any product in the subscription registered by the subscriber. Hence the due is arising only due to offer price variations in the ‘none committed’ product(X3) in that subscription.

**After 3rd delivery, subscriber has added quantity of 1 unit ‘per delivery’ for X1**(price committed).

Since 9 deliveries are yet to be made, X1 has total additional subscription of 9 units. The new offer price committed for these 9 units is 53 Rs. as against the earlier committed offer price of 50 Rs. Hence the total due amount due to increase in subscription for X1 = 9 new units \* 53 Rs=477 Rs. It is added to the existing due of 100 Rs. on the subscription change event. So total due has become 577 Rs.

**At the same time subscriber has added quantity of 1 unit per delivery for X2**. So with similar calculation as above the total new subscriptions for remaining deliveries for X2 are 9 units. As compared to earlier discount percent of 9%, new discount of 10% has been committed to the subscriber for these 9 units. Since MRP of X2 is Rs.100 the total due amount due to new additions to X2 =9 units \* (10% of 100 per unit)=9\*90=810 Rs. **Thus total due has become 577 +810=1387 Rs.**

Alteration of 4th till 12th deliveries (for adding 1 more unit of X1), makes these deliveries get dropped and recreated in Subscriber domain. It will again make Payments domain receive ‘**deliveries creation event**’. On this trigger total number of deliveries (past and future) in this subscription are recalculated. Since they are found to be 12, they match the total deliveries maintained in PaymentProcessingContext. Hence no instalment cycle determination takes place. The instalments are still to be made after 6th and 11th deliveries respectively.

**In fourth delivery the total due is ‘corrected’ due to change in offer price of X3 by -27 Rs. So total due amount is corrected to 1387 -27=1360 Rs.**

**Before 5th delivery, MRP of X1 has changed**. But since X1 has opted for price committed category, this change will not impact on the offer price committed in this subscription.

**Also before 5th delivery MRP of X2 has also undergone change. From 100 Rs. to 110 Rs**. Since X2 has opted to be a percent discount committed category, the change in the MRP will surely influence the due amount as the percentage discount will be applicable to the new MRP in order to derive offer price. Let’s see how the calculations for X2 are made.

On the ‘**Tagged Price Change Event**’ the calculation of new due is triggered for X2 ONLY (since change of tagged price impacts to only percent discount committed products). Assume that at the time of subscription confirmation, subscriber had opted for 1 unit per delivery of X2, resulting into total 12 units for the total subscription tenure with a committed discount of 9%. Out of which, 4 deliveries have already been made, resulting into consumption of 4 units from this price bucket. It means 8 units have yet to be delivered. Subscriber has already made advance payment of 12 units with 9% discount on earlier MRP of 100 Rs. Now he will have to pay the difference as the (committed) discount percentage will be applied to revised MRP of 110 Rs.

Difference due amount= 8 remaining units \* ((9% discount on 110)-(9% discount on 100))

**Difference due amount= 8\*(100.10 -91) = 8\*9.10 = 72.80 Rs.**

**Total due amount will be 1360 + 72.80 =1432.80 Rs.**

Also we have seen that subscriber had added 1 unit each per delivery of X2 after 3rd delivery, resulting into total of 9 Units. The price bucket for these 9 units offered 10% discount on latest MRP. Out of these 9 units, 1 unit has already been delivered in 4th delivery. Since MRP has undergone change before 5th delivery, remaining 8 units will also contribute to total due amount. Referring to the same calculation as given above. The due amount contribution will be

= 8 remaining units \*((10% discount on 110) – (10% discount on 100))

= 8\*(99-90) =72 Rs.

**So total due amount will increase to 1432.80 +72 = 1504.8 Rs.**

**At 5th and 6th delivery there is no change occurred in the prices of X3** .**Also, these is not change to price of X2 as MRP remains stable** at new value. Since there is no change in the subscription content the total due amount remained stable at 1504.80 Rs.

On ‘**Delivery Prepared For Dispatch**’ event for 6th Delivery, it is identified that this is ‘THE’ delivery after which payment instalment is expected. Here the ‘PROPROTION’ context is processed to identify the split of latest due amount in number of cycles as defined in PROPORTION clause. As of now 1504.80 Rs. are due which is expected to be paid in **two instalments in equal proportion**. So after 6th delivery subscriber is expected to pay 1504.80/2 = 752.40 Rs.

**In “Delivery Prepared For Dispatch’ event for 7th delivery,** it is checked if the due instalment of 752.40 Rs has been made after 6th delivery or not. If this instalment is not received, then some kind of ‘Payment agreement violated event’ should be thrown by Payments domain. It will be received by Subscriber domain and according the 7th delivery should get stopped. Let’s assume that subscriber paid this amount.

**So after this payment the due amount (maintained in Payment Processing Context) is 752.40 Rs.**

**After 6th delivery subscriber has decided to withdraw remaining subscription of X1**.

Alteration of 7th till 12th deliveries (for adding 1 more unit of X1), makes these deliveries get dropped and recreated in Subscriber domain. It will again make Payments domain receive ‘**deliveries creation event**’. On this trigger total number of deliveries (past and future) in this subscription are recalculated. Since they are found to be 12, they match the total deliveries maintained in PaymentProcessingContext. Hence no instalment cycle determination takes place. The instalments are still to be made after 6th and 11th deliveries respectively.

**In ‘Delivery Prepared For Dispatch’ event for 7th delivery**, the impact of dropped subscription of X1 will get calculated. Remember that there are two price buckets of X1 in this subscription. 12 units subscribed with offer price of 50 Rs. As 6 deliveries have already been made, 6 units have been consumed form this bucket and 6 are left. Also 9 Units had been subscribed after 3rd delivery. 3 units from this bucket have also been consumed and 6 units are left. The day on which subscriber has withdrawn subscription, latest offer price for X1 is 51 Rs. **As per rule for withdrawal, this price is compared with latest offer price for X1 and lesserbetween them is considered for refund**.

For the first price bucket, committed offer price 50 Rs. is found to be lesser than latest offer price. Hence the 6 units belonging to this bucket have been withdrawn with debit amount of -6\*50=-300 Rs. For the second bucket, latest offer price is found to be lesser than committed offer price of 53 Rs. So 6 units belonging to this bucket have been withdrawn with debit amount=-6\*51=-306 Rs. Thus total amount to be refunded to subscriber will be (-300) + (-306) = -606 Rs. This amount is deducted from total due amount so as to arrive at new due.

**New due amount= 752.40 -606 = 146.40 Rs.**

Now subscriber has left with subscription for product X2 and X3 only.

**Assume that in 6th and 7th delivery the due amount has been increased by 101.20 Rs. resulting into total due amount = 146.40 +101.20 = 247.60 Rs.**

**After 9th delivery variation in offer price of X3 caused due amount to be decreased by 20 Rs. Hence the due amount is revised to 247.60 +20 = 267.40 Rs**.

**After 10th delivery MRP of X2 undergoes changes from 110 Rs to 115 Rs**. Calculating the due on Tagged price change event for the two price buckets of X2, in the similar manner as before.

Due amount for price bucket offering 9% discount = 2 remaining units to be delivered from this bucket \* (9% discount on 115 Rs. – 9% discount on 110 Rs.)

Due amount for price bucket offering 9% discount= 2\*(104.65 – 100.1) = 9.1 Rs.

Due amount for price bucket offering 10% discount= 2 remaining units to be delivered from this bucket \* (10% discount on 115 Rs. – 10% discount on 110 Rs.)

Due amount for price bucket offering 10% discount= 2\*(103.5 – 99) = 9 Rs.

Due amount due MRP change of X2 = 9.1 +9.0 = 18.10 Rs.

**After 10th delivery total due amount has been revised to 267.40 +18.10 = 285.50 Rs.**

Also variation in offer price of X3 after10th deliveryhas caused **reduction in offer price by 5 Rs. So due amount due to X3 for remaining 2 units will be -10 Rs.**

**Total due amount =285.50 -10 = 275.50 Rs.**

**On ’Delivery Prepared For Dispatch’ event of 11th delivery,** it is identified that this is ‘THE’ delivery after which payment instalment is expected. Here the ‘PROPROTION’ context is processed to identify the split of latest due amount in number of cycles as defined in PROPORTION clause. Since this is the LAST delivery after which complete due payment (so far) is expected. Since the latest due amount is 275.50 Rs. Subscriber is notified.

On receipt of ‘Delivery Prepared for Dispatch Event’ in Payments domain for 12th delivery, status of the due instalment is checked. If the remaining instalment of Rs. 275.50 is received from subscriber,12 the delivery is Okayed, Else an “Agreement violated event’ is sent to Subscriber domain in order to stop last delivery.

We assume that no other price change has impacted last delivery. So consider this as a safe scenario for merchant where subscriber has made a full and final payment in multiple payment cycles and there is no penny left to be paid.

But consider a scenario where ‘just before’ dispatch of last delivery some price change has made an impact on the due amount and it grows again. So there is no time to ask for this due payment or stop any delivery for the same. Or consider another scenario that subscriber (after making last payment) has subscribed for some units of new or existing subscribed products. In either of these cases how will the due amount to be recovered.

The later scenario is relatively simple to be handled. As all the payment has been received from subscriber, any change in subscription contributing to new due amount should be paid by the subscriber BEFORE receiving last delivery (which will contain these new additions).

First scenario may cause some debt to be left resulting into some loss to merchant due to this single subscription. Due to voluminous nature of this business the loss may grow manifold. The business model does not propose any solution to this issues apart from only one remedy fitting into its boundaries; i.e. Recovery through accumulated reward points.

Other remedies are more related to ‘Collections’ domain OR related to impacting subscriber’s ‘credit score’ associated with this subscription creditworthiness.

## Interactions

# Business Account

## Provision Types

## Lifecycle

## Interaction

# Business Activity Monitoring

# Processing Support