New Product Sales Forecasting in the Smart Phone Business: a Comparative Study of Present Methods

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ABSTRACT
As it is new epoch of technology and every now and then technology is developing very rapidly. With the enlarged development in the technology, global competition in the market is also increasing rapidly. Thus, this development requires the new invention of various products and services in order to survive. One major impact of rapid technology development is the life time of various products is decreased. The demand of various forecasting models has been developed in order to forecast the “successfulness” of the new product. As the competition increased IT Sectors have to use those models which provide better forecasts for sales of their newly launched products. This paper is a comparative study of different models that are best suited for new product forecast on the basis of advantage and disadvantage and also it gives the knowledge about smart phone industries in India. It gives brief study about challenges occurred related to sales forecasting for product which have short life cycle and also the brief study of life cycle of new products.

Keywords— Smart Phone, sales forecasting, prediction, Life Cycle of new product, Smoothing Method, Analogy Method.

1. INTRODUCTION
At present era of hi-tech and technological evolution and global rivalry in the market, requires suppliers of products and services related to the products to bring new products or to renovate their present products in order to survive. Fast technological development in the high tech sector also makes this global competition even harder for firms in today’s market place, because technology advances have shortened the life cycle for many products in this sector (Reiner et al., 2009). Demand forecasting is important for firms operating in this environment who need to make decisions relating to future production capacity, marketing budgets, human resource planning, and research and development. In particular, forecasts of sales time series will be required to estimate the discounted future returns on the investment to assess its likely return and viability (Goodwin, Dyussekeneva and Meeran, 2012). Today’s technological development and global competition in markets, requires suppliers of products and services to introduce new products or to improve their current products in order to be survived in the market (Bose, 2002). More actual forecasts can give companies better insights during the product development stages, inform go-no-go decisions on whether to launch a developed product and also support decisions on whether a recently launched product should be withdrawn or not due to poor early stage sale (Dyussekeneva et al, forthcoming).

However, this is also an environment that creates problems for forecasters. By definition no past time series will exist for products that have yet to be launched, but time series relating to similar products that have already been launched will be short. Rapid technological development and competition also mean that these series may carry little information that is relevant for the estimation of the demand patterns of future products (Weng, 1999).

As a result, suppliers and retailers who have the aim of decreasing the risk of Product deficiency, because of the risk of losing sales to their market competitors, relies on astronomically immense inventory possessions. This large inventory possession strategy is very expansive, specifically
in the terms of IT (Information Technology) sector products because such products lose value every day due to relatively high speed of development and innovation in IT sectors or industries. It means that the products that are stored must be deeply discounted or sold through alternative channels. In extreme cases, the annual costs of holding inventory for such products could reach up to 50% of their costs (Reiner et al., 2009), which can be decreased by more accurate forecasting. According to Hofmann and Reiner (2006), today’s smart phones have been categorised as high technology products with a short life cycle, which can easily lose their value once they are launched in market after a particular period of time. In the today’s smart phones industries, the obsolescence costs are 5–15 times higher than the average of 1% of revenue for products that do not have a short life 3 cycles (Hofmann and Reiner, 2006). Although there are number of methods which have been developed, irrespectively the critical roles of new products sales forecasting, the topic has received relatively little attention in the literature (Kahn, 2006 cited by Goodwin et al., 2012). This lack of attention is also the case for smart phones in the telecommunication industry that have a short life cycle.[2]. There is also an real example which shows that if the mobile phone companies doesn’t change their strategies to sell out their new introduced products or if they don’t take a good market strategy which gives the user’s of smart phones a familiar environment to purchase a good smart phones and this companies have to provide their products which are equipped with a suitable configurations, good design and efficient cost and is in the budget of an middlemost users. This paper reviews the article to evaluate the efficiency, performance effectiveness of a range of new product sales forecasting methods in the smart phones industries. These methods include management judgment, prediction and preference markets, intention surveys; market testing and agent based modelling. It also gives some suggestions areas where future researches are likely to be most. The paper starts by reviewing the literatures on product life cycles and the challenges this poses for sales predictors. This is followed by a review of the article on the telecommunication companies, with special reference to the smart phones industries in INDIA which is representative of a saturated market with short life cycle products. Later, the paper introduces various methods of new product forecasting, followed by critical discussion of pros and cons of various methods. In the end, probability of future research will be concluded.

2. SMART PHONES INDUSTRIES IN THE INDIA

Business executives began to use mobile communication devices such as wireless cell phones in 1970’s and 80s and these evolved into an essential daily communication device for every level of end users from children to older people to business people on the go (Sek et al, 2010). Since that time, due to rapid speed of development and innovation, the industry has been under a high level of ambiguity. Periodic modification in product design, competition and the willingness of customers to substitute new products for their existing ones has all contributed to uncertainty in the goal markets. The huge number of opponents in the mobile industry changed the nature of competition from that of product or service performance to the effective use of complementary assets such as marketing, allotment, competitive manufacturing (e.g. process innovation), and after-sales maintenance (Funk, 2004). As result, exact prognosis of sales of new products play a significant role in winning customers from competitors in this industry. India's telecommunication network is the second largest in the world based on the total number of telephone users (both fixed lines and mobile phones). It has one of the minimum call tariffs in the world enabled by the mega telephone networks and much-competition among them. It has the world's third-largest Internet appropriator-base. In pursuance of the Internet And Mobile Association of India (IAMAI), the Internet consumer base in the country stood at 0.19 billion on the June, 2013. The liberation of mobile telecommunications in India began in 1980 with Prime Minister Rajiv Gandhi. He formed the dept. of telecomm. (DOT) as part of the dept. of post and telegraphs and this was his declaration to "lead India into the 21st century" (Telecom regulatory authority of India, 2009). In 1985, he liberated the industry
competition by demonopolizing mobile phone appliance, which allowed private companies to start the manufacture of phones. The government set up its first independent telecommunications regulator, Telecom Regulatory Authority of India (TRAI); the TRAI amendment Act was subsequently passed in 2000, which allowed foreign investors to enter the telecommunications sector.

When the mobile phone culture started in India, mobile phone users either very rich or use mobiles in their jobs. When IT Act is permitted in India in 2000 (known as ITA-2000, or the IT Act) before that First mobile telephone service on non-commercial basis started in India on 48th Independence Day at country’s capital Delhi. The 1st cellular call was done in India on July 31st, 1995 over Modi Telstra’s Mobile Net GSM n/w of Kolkata. Afterward mobile telephone services are divided into multiple zones known as circles. The Indian mobile phones market had total income of Rs 35,946 crores in India and shows the growth of a 14.7% from Rs 31,330 crores in FY12. The total subscribers, including wireless and wire-line, in India reached 93,834 crores in May 2014, with the per month increase of 25.4 lakhs clients. In the late 20th century, the IT sector witnessed a huge increase in the capacity of production in order to fulfil the requirements of a fast growth-able market, which caused the market satisfaction due to overcapacity among suppliers and shifted the power balance towards the mobile phone service providers. The market saturation increases the level of competition in this industry and raised the necessity of providing good service levels with reasonable prices in order to improve customer gratification, which is only plausible if supplier knows what the accurate demand is in the market.

Nowadays, the INDIA mobile market is mainly served by these main network providers Aircel Cellular Ltd, Aircel Ltd, Bharti Hexacom Ltd, BSNL, Idea Cellular Ltd, Loop Telecom Ltd, and MTNL which provide both network service and handsets market into various classes so that each class has various models with similar technological features i.e. smart phones, cordless phones, low end phones and outdoor phones. In this industry, specific models within a class and contract type usually see a pattern of declining in rates of mobiles over time, so providers practice a markdown strategy such that the price at each stage of the life cycle is perceived as ‘fair’ relative to its technological features (Reiner et al., 2009). Mobiles and service providers, who follow this neutral/fair price, cannot encourage demand through a pricing strategy and therefore the actual sale price has to be lower than this reference price in order to stimulate sales considerably. In contrast the rate higher than the fair rate leads to a sales decrease (Winer, 1986). The mobile phone selling price is normally below its constant purchasing price (seller price) after a certain period (or even right away after the product has been launched to the market). On the basis of Reiner et al. (2009), the pricing of a mobile subscription service with a handset by a service provider depends on various interdependent criteria such as levels of services provided to the customers, customer saturation, handsets price, sales forecasting accuracy and stock inventory.

3. THE LIFE CYCLE OF THE NEW PRODUCTS [16][18][22]

In 1950, the Product Life Cycle (PLC) concept was introduced by Dean as “The evolution of product attributes and market characteristics via period, the PLC concept is applied as prescriptively in selection of marketing actions and planning” (Rink and Swan, 1979). Kotler, Wong, Saunders and Armstrong (2005) define product life cycle as the course of a product’s sales and profits over its life. Even though over the life a product, an organization does not know how the sales will change in the future from one period to the next, the
sales of any one product to some extent will normally follow the PLC curve from initial stage to the termination of product life through several distinct phases as it is greatly studied and discussed in literature (1979; Day, 1981; Gardner, 1987, Cox, 1967; Rink and Swan,). A product’s life cycle includes four distinct stages such as Introduction, Growth, Majority and Decline; however some authors add an initial stage of development and other add final phase of cancellation (Tibben-Lembke, 2002) to these four stages (Kotler et al, 2005), as follows:

1. Product Development: Developing the concept of a product into physical product with the aim of ensuring that the product idea can be turned into a workable product, at this stage there are no sales at all.
2. Introduction: Once the product is launched into market, there is period of slow sales increased as the product is being introduced.
3. Growth: In this period, the product is accepted in the market and sales grow rapidly.
4. Maturity: As the product has achieved acceptance by most potential buyers at this stage, the sales growth slows down.
5. Decline: It is a period when sales fall off and profits stop.
6. Cancellation: It is a time for termination of production of a specific product.

According to Everett (1962) (cited by Rink and Swan (1979)), the theoretical rationale behind the PLC concept derives from the adoption and diffusion theory of innovations. In the introductory part, there are low sales as few consumers are aware of the new product or service. More consumer awareness and acceptance of the product or service raises the volume of sales, thereby signalling the initial growth stage. However, the elaboration rate shrinks as more competitors enter the industry and the market becomes smaller. In the maturity stage, sales become more stable as most of the mass market has already purchased the item. This is followed by decline stage as most consumers look for newer counterparts. Tellis and Golder (2004) believe that the forecasting of PLC is an essential activity in marketing for at least three reasons. Firstly, there are many orchestric pressures on managers before and after the turning point in the life cycle. In the introduction stage prior to start of development stage, managers are under escalating pressure to pull the plug on brand-new products. In the rising stage prior to retard hopefulness abounds and managers are eager to meet the apparently greedy demand with fresh capacity and more marketing. Forecasting the twisting points of levitation and slowdown are vital to avoid premature withdrawal or huge amount of investments. Second, level is enhancement of sale-out is considerably different across stages of the life cycle. Managers need to have accurate forecast of sales and the PLC in order to appropriately plan the corresponding levels of sales staff, production, stock, marketing, distribution and advertisement. Third, expenditure and prices decrease significantly on the top of PLC, considerably during the starting stages, because consumers become more sensitive to price through various stages of the PLC. Managers need to have mighty understanding of sales patterns and changes their pricing strategy accordingly. As a result, having an accurate forecast of sales is a necessity (Parker, 1994) and defect in sales can trigger serious consequences.

Although a product may go through all of the mentioned stages, not even all the products follow the product life cycle; some products never reach their intended customers and fail to reach growth phase (Tibben-Lembke, 2002) according to Gallo (1992) the failure rate of new product is approximately 85 to 90 percent in the grocery industry and here products do not follow the usual shape of the PLC graph. In the grocery market, soak growth can be followed by stable maturity and sharp decline (Jensen, 1982). There are other products that die quickly, soon after their introduction and hence they do not have all the distinct stages such as PCs, fashion wear, phones. These Products with Short Life Cycle. The PLC can be as short as a few months (a season) in fashion wear (Kurawarwala and Matsuo, 1998) and PCs (Porteus and Angelus, 2002).

4. CHALLENGES OCCURED OF SALES FORCASTING FOR PRODUCT WHICH HAVE SHORT LIFE CYCLE [18]
The fast pace of new product introduction has led to shortened life cycles for products in many IT sectors, particularly products in IT sectors. According to Decker and Gnibba-Yukawa (2010), the spell high-tech sector noted as newly launched, quickly growing markets, which are primarily driven by technological innovations. Traditional demand forecasting methods are not oriented toward forecasting of short life cycle products. Providers, who market products with a short selling season and/or a short life cycle, find the task of forecasting sales challenging due to high levels of uncertainty in the demand for these products, particularly in stand-up of a long-term sales history Subrahmanyan (2000).

In many of traditional forecasting methods, the long-term and the short-term patterns are considered distinct and treated separately according to Kurawarwala and Matuso (1998). Some of the challenges of sale forecasting for product with short life cycles with some of traditional forecasting methods are:

1. Decomposition Method and Box-Jenkins model: They are identified and separate the time series into its various components. However, they require many data points for proper identification and parameter calculation. A completely long time series is not exist for short life cycle products until the end of their life cycle; therefore applications of these methods are not feasible and useful.

2. Smoothing Method: Methods such as moving average, simple and linear exponential smoothing perform well only when there is steady trend over the short term. A change in trend usually leads to a systematic lag or lead effect. As a result, undergo rapid grow, maturity, and decline along with seasonal variations in sales forecasting of product with short life cycle, create simple smoothing methods for these inappropriate.

3. Analogy Methods: Some researcher believes that they can use the available data on prior similar products; although these data may yield valuable information that can be used to forecast forthcoming products, it has its own problem and downsides.

These traditional forecasting methods are not designed for application in new product forecasting (except when the analogy method is applied) especially for products with short life cycles. In the next section, we will discuss the specific methods that are used for the new product sales forecasting.

5. NEW PRODUCT FORECASTING METHODS [12][20]

4. Wind (1981) refers to two general types of sales forecasting models that may be useful in new product forecasting. These are:

- **Diffusion Models:** It is a process in which a new idea or new product is accepted by dint of the market. The rate of broadcasting is the speed that the new idea spread from one consumer to the next. The adoption is similar to diffusion except that it deals with the psychological process an individual goes via, rather than an aggregate market process.(http://en.wikipedia.org/wiki/diffusion_%28business%29)

- **Choice Models:** The given models are based on particular level data to unearth the consumer preferences for different characteristics of the products and how this will affect the choice of different opinions presented to the consumers (Greene, 2009).

When the states history is not presented, the forecasters, who wants to apply the above models either use the similar product sales history (Analogy method) or employ conjoint analysis based on hypothetical scenarios to collect individuals’ potential behaviours and preferences towards the new product before applying the choice model (Green et al, 2001; Gustafsson, et al, 2007). Some studies recently have been combined diffusion models and choice models to forecast new product demand (Lee, et al 2006, Kumar et al, 2002; Lee et al, 2007; Jun and Park, 1999; Lee and Cho, 2009). However, none of them have studied new product sales forecasting for products with short life cycles. Apart from the above mentioned models, there are other methods that are not based on models; however they are frequently used by forecasters in order to forecast new product sales. These are:
Individual management judgment: It is the most common method in new product sales forecasting, especially in the technical and IT sectors only because of high level of uncertainty (Lynn et al, 1999; Kahn, 2002).

Judgements by group of managers: This is a process where a firm takes different opinions and perspective with the target of having more efficient and accurate forecasting (Dyussekeneva et al, forthcoming).

Customer intention surveys method: It uses the customer’s probability and the possibility by asking them for the new product purchasing and by calculating the percentage of interest of consumers (Bass et al, 2001).

Market testing surveys method: The market testing survey method can be referred as to testing the multiple market scenarios and then selecting the most promising for distribution (Dyussekeneva et al, forthcoming).

6. ASPECT OF NEW PRODUCT FORECASTING

The impacts of the introductory methods is depends on the essentiality of the forecasting task. Dyussekeneva et al, (forthcoming), defined seven aspects of this task, of which six are applicable to the smart phone industry. These are defined at below:

1. The product’s ‘modernity’. This has been defined differently by various researchers. One Definition relates to the originality of an innovation. This can be categorized into three Types: “A: products whose innovations made a improvement over extant technology, such as reforms of camera, display resolution, screen size, and the processor in iphone 6 comparing to that of a iphone 5 (apple INDIA website, 2014); B:those products whose innovation represented a significant improvement over existing technology such as a cordless phone; C: those product innovations that represented a major or revolutionary technological advance, such as the notion of the Smartphone by Ericsson for first time in 2000 (Teardown Report, 2001). It is the Ericsson R380 Smartphone combined the functions of a mobile phone and a personal digital assistant (PDA). Other researchers consider the newness of the product through its influences on consumer behaviour: continuous innovations will not disrupt behavioural patterns, (e.g. an improved version of iphone), dynamically continuous innovation will lead to small changes in behaviour, (e.g. camera phone) whereas discontinuous innovation will lead to significant changes in consumer behaviour and substantial learning will be required on the part of consumers such as launching of ipad as new generation of PDA that generate new demands in market and taste of consumers about tablets performance by its innovation. The product’s “modernity” has been defined differently by various researchers.

2. The intrinsic nature of the product determines the frequency and amount of spent each time to buying a product, the essentiality of product and perceived associated risk of impulse purchasing; for illustration, the product might be a consumer durable (e.g. smartphone), a consumer packaged good (e.g. a new chocolate bar) or a service (e.g. internet mobile subscription).

3. The type of purchasers. various purchasers show various buying behaviour for same product; for instance, there are special subscriptions for business customers in terms of tariff and usages as business to business selling strategy differ in mobile phone industry from that of business to consumers.

4. Product Life Cycle is different among many products, which possess sales prediction for a new product as we discuss it earlier in this paper mobile phones has small life cycle. Fast growth and decline and also short maturity of mobile phones due to speed of innovation in this IT sector, makes the forecasting task much more complex.

5. Whether the aim of forecast is the size of the total market or the market share of a product. Forecasts of market share require estimates of the probability of consumers choosing a particular product (e.g. the probability of a
customer opting an Apple iPhone over the Samsung Galaxy). For a specific product in a period of time this requirement will be different when the total size of a market is required.

6. The extent to which forecasting is essential for a company may differ in different industries. It is crucial to keep the right balance between level of complexity and accuracy in the adoption of a method.

7. **COMPARISON OF DIFFERENT PRODUCT FORECASTING MODELS ON THE BASIS OF PROS AND CONS.**

There are different new products forecasting models that are widely used by the researchers to forecast the relevant success of new product related to the IT industry. The success of the new product in the market totally depends upon the marketing strategies and the underlying forecasting models used to forecast the sales of the new products. The different best suited new product forecasting methods[12] are:

- Bass diffusion model.
- Simple extrapolation model
- Market Testing Model

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<tr>
<td>Market Testing Model</td>
<td>It reduces the risk by monitoring the risks and through channel relationships.</td>
<td>It is very costly as compared to different models e.g. cost may be $1 mill+.</td>
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<td>It improves strategies by using market mix and by providing production facilities.</td>
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The models idea types and percentages can be used as a first draft to estimate target groups for comm. purposes.

The model shows figure of consumer acceptance at each of the various stages during product life cycle.

It focuses on different characteristics of each adopter categories in terms of socioeconomic status, personality and values.

The model is not prognostic. It does not provide understanding in how well a new idea or product will do before it has gone through its adoption curve.

The innovation can be modified in usage when moving from early adopters to the majority of users.

It is an overly simplified characterization of a complex reality.

2 Base Diffusion Model

It is the simplest method of forecasting.

It does not require a huge amount of data.

It is very cheap and quick model.

It can motivate staff if levels are high. Which means they are doing a great job?

It can be unreliable if there have been no changes in fluctuations with past data.

It supposes that past tendency will run-on into the future, which is unlikely in many business environments.

It ignores qualitative factors.

It can stress staff if levels are too high or too low.

3 Simple Extrapolation Model

On the basis advantages and disadvantages of different models there is a new model can be proposed for the better results of new product sales forecasting. It is understandable on the basis of above given concepts and different models that here is not any forecasting model that can give an IT sector good result for the sales of new product that today’s It companies launching day by day. The competition is also getting tough because of different It companies that provide handsets in very low and cheaper price and consist of all the latest feature that a user require at present. Since there are already different models that provide very efficient forecasting results. New products in IT sector are launched every week. So if the product is not good and if there is any strategic mistake at the time of launching the product the product will refuse to achieve the target at market level as well as the goodwill of the companies will decreased.

So, there is a huge demand of a model that can solve all the disadvantages of the existing new product forecasting models. It can be done by studying all the forecasting models choosing the best features amongst them based on the environment of the market.

7. CONCLUSION

Since, the technology punch is boosting in the business very well. In modern business environment, there exists the cut throat competition among business organisation for product. Modern methods, tools and technologies like Market Testing Model Base, Diffusion Model, and Simple Extrapolation Model and others help in the modelling and forecasting of new products of Smartphone. New product forecasting for smart phone may be predicated on the basis of available methods. More sophisticated methods and tools are still need to develop for efficient and effective forecasting of new product.

9. REFERENCES

Reflections and Prospects. Interfaces, 31(3), pp. S56-S73

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