Bass Diffusion Analysis for OLED display phones

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Bass Diffusion Model Terminology

Some of the terms used in the model are:

N(t): Total or cumulative number of consumers who have already adopted the new product through period t.

N(t-1): Cumulative number of adopters for the new product through the previous time period (i.e., t – 1).

S(t): Number of new adopters for the product during the time period t and can be expressed as N(t) – N(t – 1).

Three key parameters used in the Bass Diffusion Model are:

m: Total market size, a terminal value of total adopters that will not exceed.

p: Coefficient of innovation, represents the probability that an innovator will adopt at time t.

q: Coefficient of imitation, represents the probability that an imitator will adopt at time t, through ***word of mouth*** or ***social contagion*** that result from interpersonal communications between adopters and non-adopters.

Some of the formulas used are:

$$S(t) = a + b * N(t-1) + c\,(N(t-1))^2$$

Parameters a, b, and c are estimated via Non-Linear regression or using any other statistical software package,

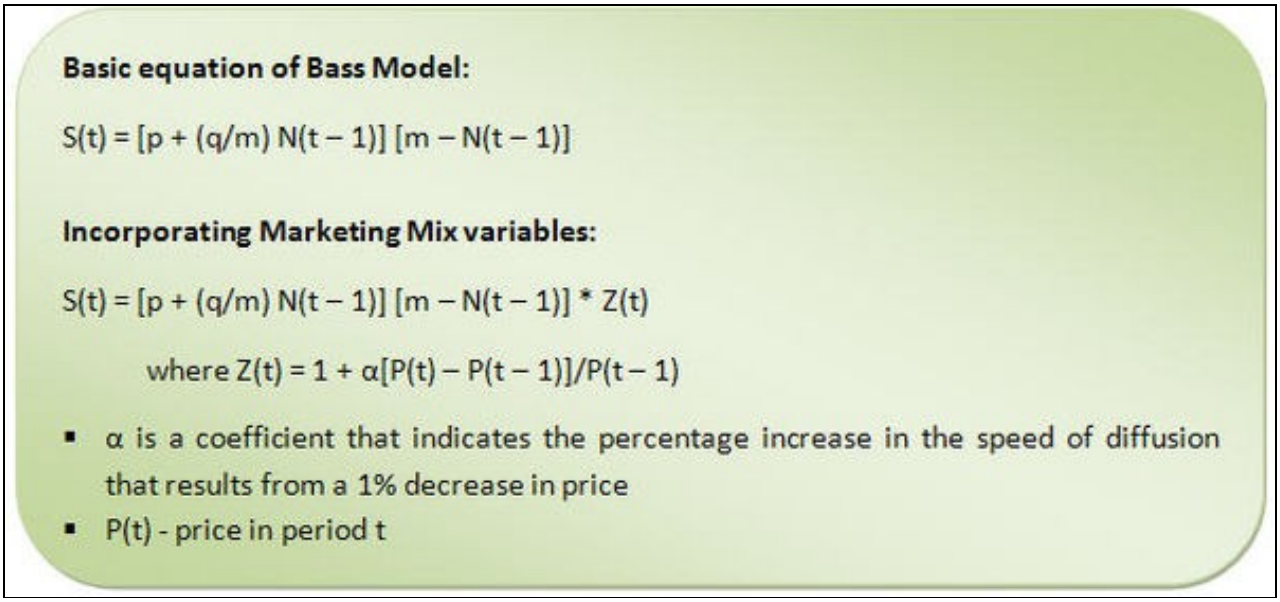
The parameters m, p, and q are then determined by:

$$m = (-b \pm (b^2 - 4ac)^{\wedge}\tfrac{1}{2})/2c$$

$$p = a/m$$

$$q = -mc$$

Bass Model Equations:



Adoption curve for new product are generally called S-curves because of their shape.

OLED Mobile Phone projections based on Analogous Products

Estimation of Parameters

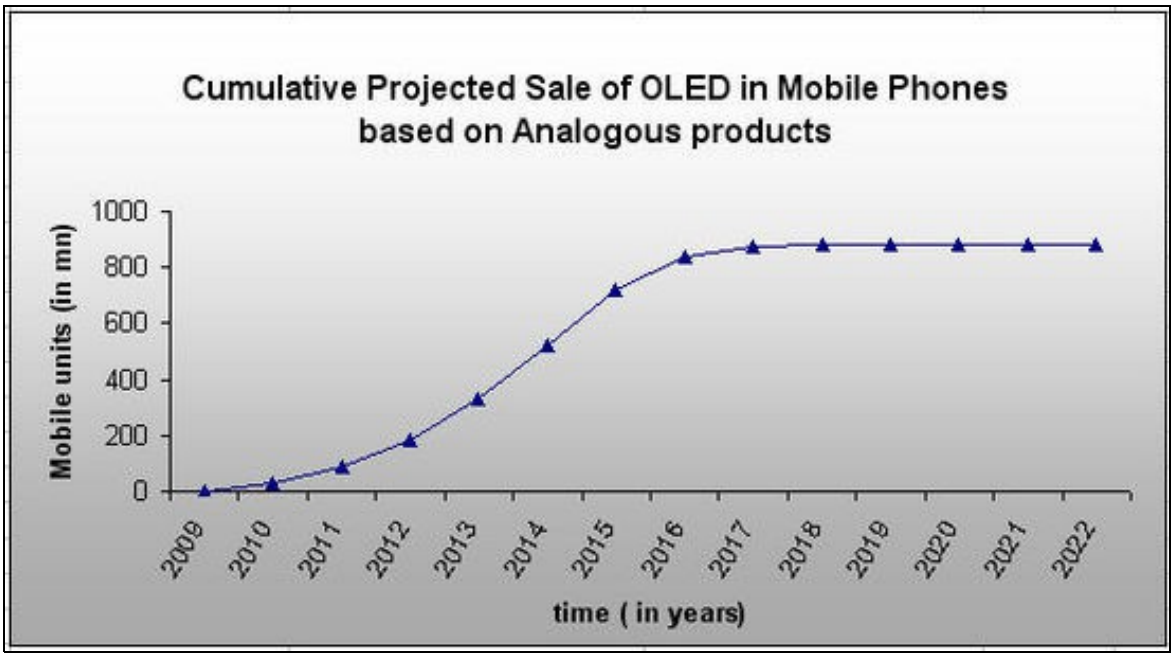
LCD TV

1. The historical sales data from 2002 to 2008 was obtained from secondary sources
2. The cumulative sales till last year for each year, **N(t-1)** was calculated
3. **Non-linear regression**was run to determine **a**, **b** and **c**
4. **m**, **p** and **q** values were calculated from the values of **a**, **b** and **c** by putting them in the aforementioned formulae

The same procedure was followed for Plasma Display TVs and LCD Monitors.

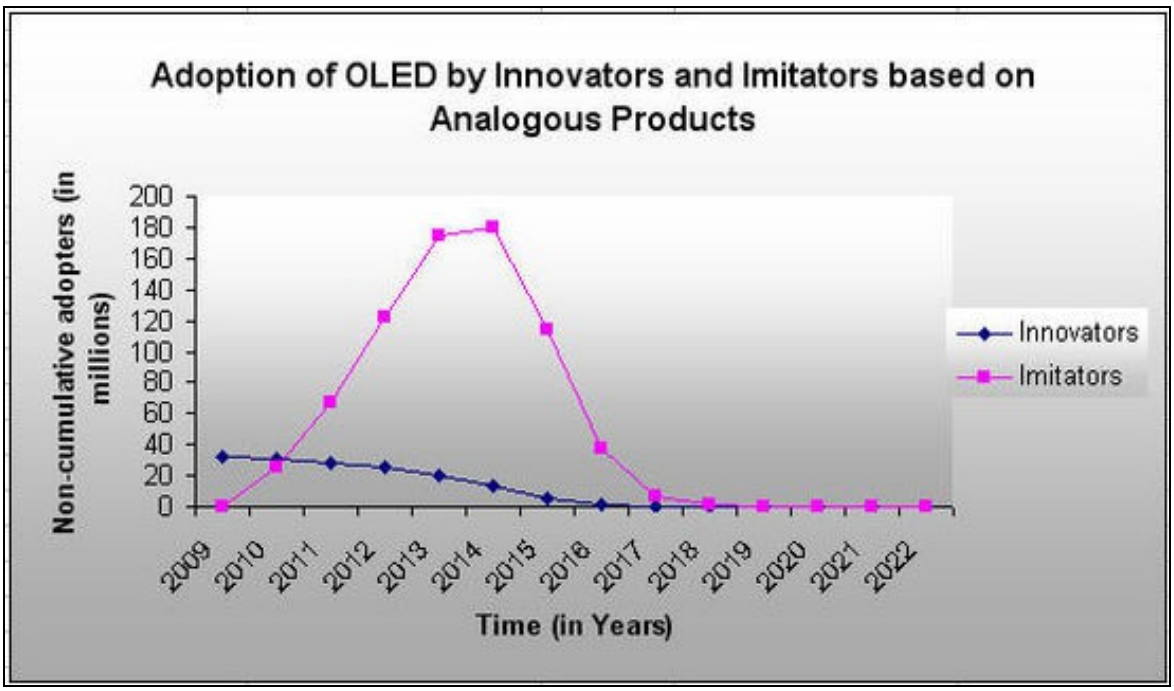
Procedure for forecasting

1. Weighted **p** and **q** were calculated based on the analogous products such as LCD TVs, Plasma Display TVs and LCD monitors.
    i. To judge the similarity of analogous products to OLED, the following two criteria were examined:
        a. Market Structure
        b. Product Characteristics
    ii. Depending on the importance of the criteria, weights were assigned: 0.4 for Market Structure and 0.6 for Product Characteristics
    iii. Based on the similarity of the analogous products numerical weights were assigned to them on a scale of 1 to 10 for each criterion.
    iv. Weighted average for **p** and **q** were calculated based on the **p** and **q** values of analogous products and the corresponding weights assigned to them *<<excel sheet with calculations>>*
2. Market potential of OLED phones was taken as the **m** value of smart-phones segment, which is 884.07 million *<<excel sheet with calculations>>*
3. Then forecasted the adoption rate of OLED display phones using the basic equation of the Bass Model *<<excel sheet with calculations>>*



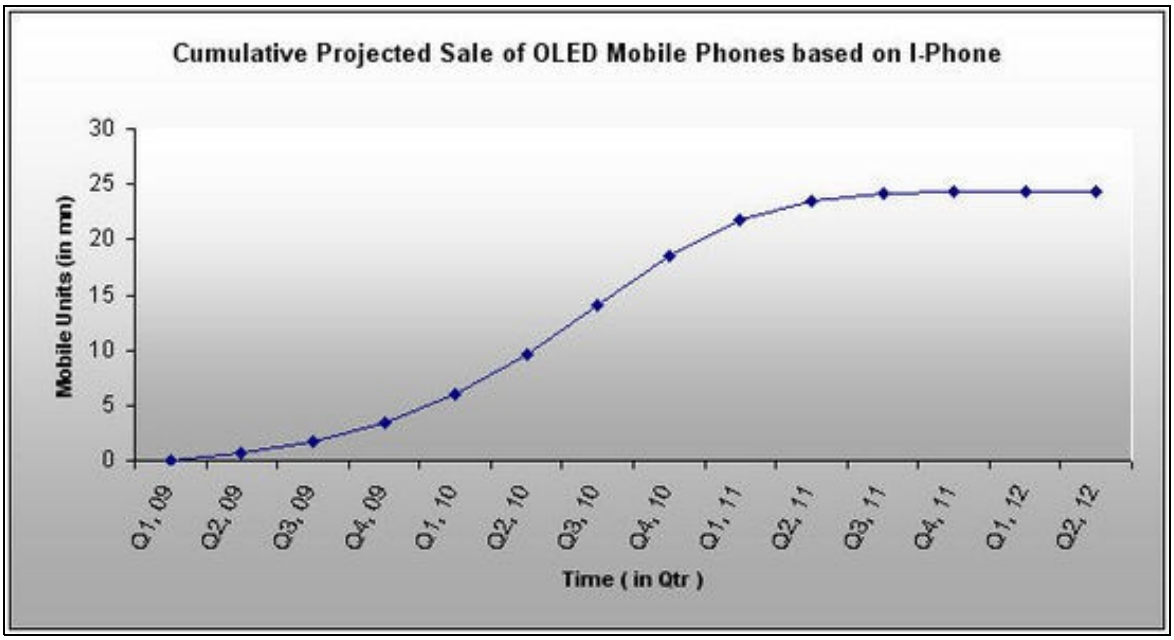
Comparison of Adoption rate of Innovators with those of Imitators

◊ Sales to innovators and imitators for each year was determied based on the values of **p**, **q** and **m**
◊ **m** for each year was taken as **m-N(t-1)** - it represents the number of consumers who have not previously adopted by the start of time *t*, this is the pool from which the new adoptions in the current period can occur *<<excel sheet with calculations>>*



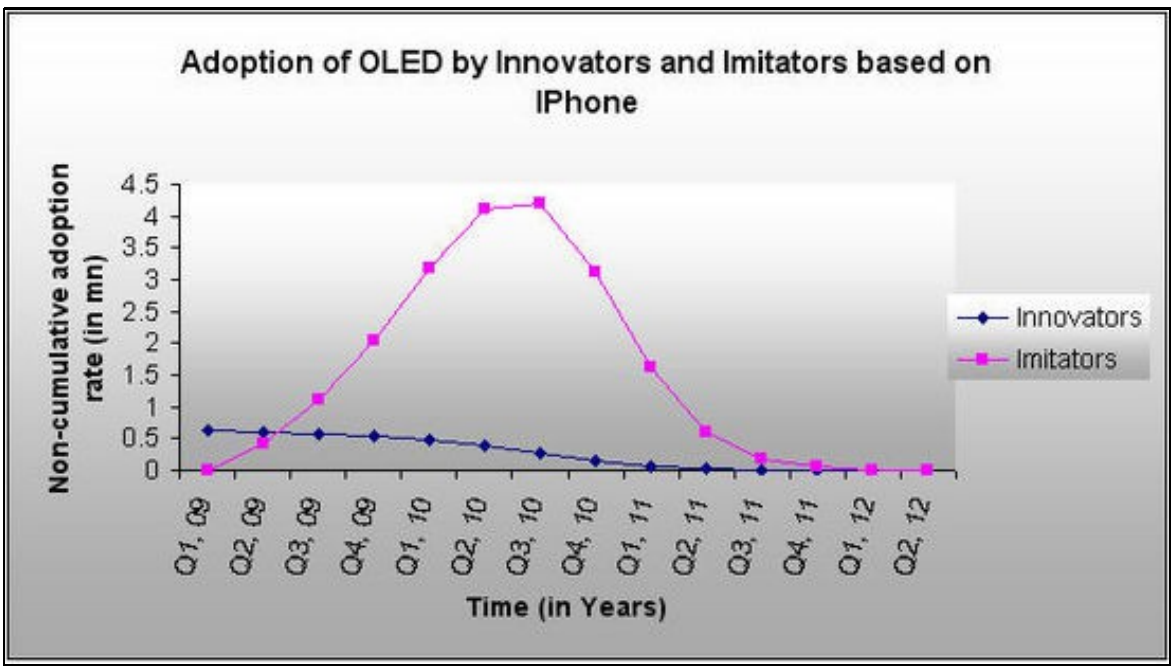
OLED Mobile Phone Projections Based on I-Phone

1. **p**, **q** and **m** values are calculated for I-Phone from historical data
2. Forecaste of the cumulative sales or adoption rate of OLED display mobile phones was done based on the **p**, **q** and **m** values *<<excel sheet with calculations>>*



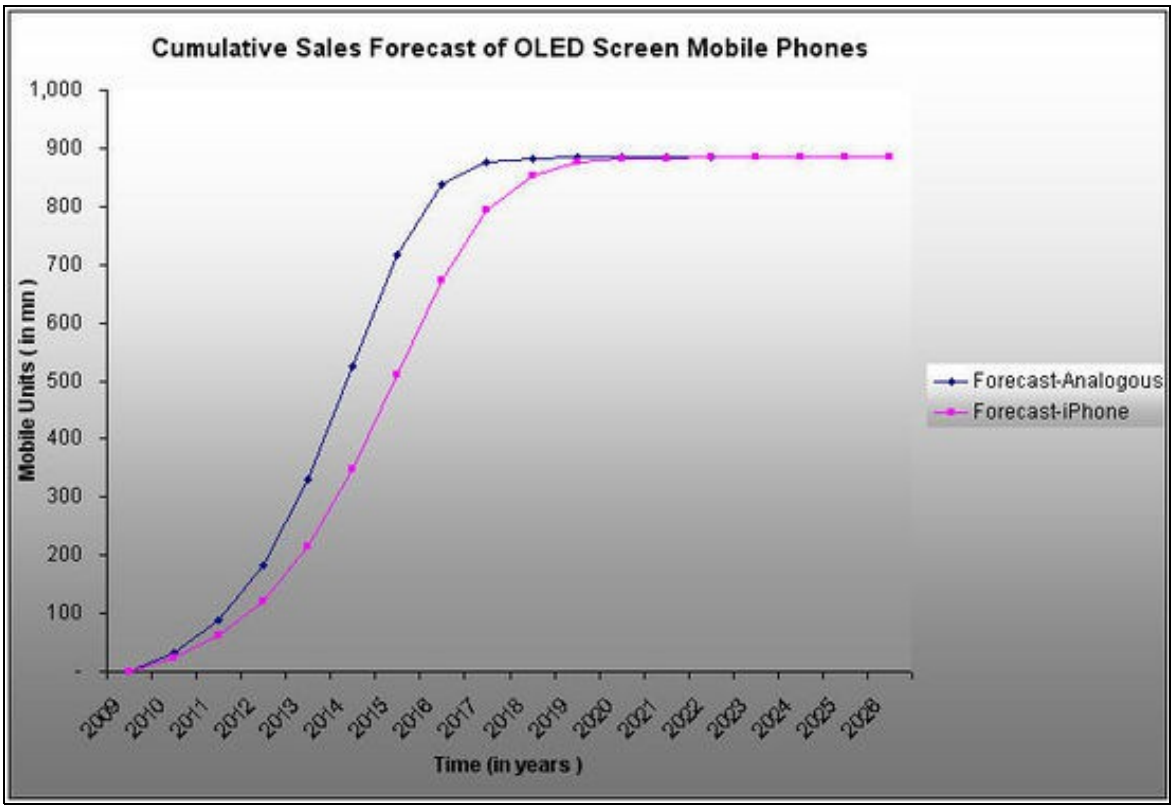
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Comparing projections

Since disparate product categories had been used for the two forecasts,the two were compared to cross validate the results *<<excel sheet with calculations>>*


Cumulative Sales Forecast of OLED Screen Mobile Phones
Mobile Units (in mn)
1,000
900
800
700
600
500
400
300
200
100
-
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Time (in years)
Forecast-Analogous
Forecast-iPhone