


Forecasting the Diffusion of Smart Speakers in the Indian Market Using Bass, Gompertz, and Logistic Models

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ABSTRACT

Due to a lack of historical data, forecasting the diffusion of new products in an emerging market is important yet challenging. Managers often resort to inefficient forecasting practices to understand diffusion and to stay ahead of the competition. This study aims to forecast sales for smart speakers in India, which have been introduced recently. Due to the lack of adequate sales data, the research has used sales data of analogous products using look-alike analysis to estimate the parameters of diffusion models. The authors forecasted future sales using three relevant diffusion models—the Bass, the Gompertz, and the Logistic—to determine the model to forecast sales for smart speakers. The analysis revealed that the Bass model gave better predictions as compared to the other two models. The results were validated using parameter estimates from secondary literature. This study predicts that the aggregate sales of smart speakers in India will peak around 2023–27.

KEYWORDS:

analogous products, Bass model, Diffusion, emerging markets, Forecasting, Gompertz model, Logistic model, look-alike analysis, New product diffusion, parameter estimation, smart speakers

1. INTRODUCTION

Emerging economies are potential target markets for new product launches as they have a young population with rising disposable incomes and quick technology adoption (Kardes 2016). With internet penetration increasing at a rapid pace in these economies, companies have been quick to launch products based on IoT (Internet of Things), smart devices, e-commerce platforms, and digital technologies. In December 2018, India had 566 million internet users, which was expected to increase

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to 627 million users by December 2019 (ET 2019). This has resulted in the launch of several innovative and technology-based products, such as SSs. In 2017–18, Amazon and Google introduced Alexa and Google Home, the SSs for the Indian market. Effective ways are required by organizations to predict the penetration rate of innovative products to estimate their viability and to generate techniques to enhance their promotion along with augmenting their take rates. Conversely, in the diffusion process, the market potential should be established earlier by the organizations. According to a report, 74.2 million users in the USA had SSs (26% of internet users) in 2019 (eMarketer 2019). In comparison, 753,000 units of SSs were imported to India in 2018, which represents 20.7% of English-speaking households having internet access (IDC and Forbes, 2018). It was estimated that the SS market worldwide was \$4.3 billion in 2017 and was expected to grow by 23.5% CAGR to reach \$23.3 billion by 2025 (Allied Market research 2019). In India, Amazon's Alexa is the market leader with a 51% market share, followed by Google Home at 36%, and the remaining players constitute the remaining 13% of the market.

A Smart Speaker is a smart virtual assistant comprising speakers and microphones, along with interfaces, which are enabled by voice command. SS takes advantage of Artificial Intelligence (AI) together with Natural Language Processing (NLP) to recognize voice commands and process them with correctness. SSs are emerging with the incorporation of extra skills and options to attract innovators and early adopters in the coming years. Given the expected rise in product sales in the coming years, an estimation of SS diffusion in India is required to predict the purchase. A correct analysis of sales volume is also essential as it permits the firms to appropriate resources accordingly (Tseng 2008). It becomes very crucial to determine the sales accurately since many products are imported from foreign countries to local markets; thus, the window of opportunity to gain the first-mover advantage could be limited (Frynas et al., 2006). Therefore, organizations heavily depend on understanding technology diffusion in a particular market and employ forecasting techniques to predict demand and deploy suitable marketing strategies. A new product sales forecast depends upon the product's speed of diffusion and the potential of the target market. The return on investments can be estimated using these two variables, thereby helping the company design a pricing and investment strategy. Several well-known models exist that have become popular for assessing diffusion, viz., BM (1969) and Logistic Model (1961). However, there is a significant challenge in adopting these models; the demand forecast for the new products is based on historical sales. To estimate the parameters in diffusion models, at least 6–10 years of data is required, which is difficult to get in the case of new products (Tseng, 2008). To overcome this problem, the authors suggest that sales data of analogous products can be used to estimate the sales (Lee et al., 2008; Jun et al., 2000; Bayus, 1993).

The objective of this study is to estimate the demand for SSs in India using various diffusion models and to compare the results thereof. The idea was to use models that would fit the S-shaped growth pattern as observed in the diffusion of innovative products. In technology forecasting, S-shaped curves are utilized in general. Corresponding to time or investment, the paths of product performance are shown by them in R&D. The inflection points along with the limit of enhancement of technology are described by this tool. The penetration of technological diffusion is investigated by numerous studies via the determination of S-shaped growth curves like the Logistic, along with the Gompertz curves, and also the present estimates of the market's speed of diffusion and saturation level (or maximum size). The three models, viz. the BM, GM, and logistic models, have been utilized for this study. Though the use of multiple models to predict sales has been indeterministic, authors have recommended the use of more than one model in order to compare the results of these models forecasting to make useful predictions (Naseri, 2013; Ayyadi and Maaroufi, 2018). Besides, the choice of these three models is driven by the rationale that not only endogenous factors but also exogenous factors affect the diffusion of innovative products (Kijek and Kijek, 2010). The best model fit is chosen regarding Akaike Information Criterion (AIC), root mean square error (RMSE), and mean absolute percentage error (MAPE). Based on the superiority of the model, implications for the companies are drawn.

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