IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 18, Issue 12. Ver. III (December. 2016), PP 74-78
www.iosrjournals.org

Prediction of Annual International Revenue (%): The Case of an Automotive Industry in India

Rolando Peña-Sánchez,
Texas A&M International University, USA

Abstract: *This article describes some summaries of Tata Motors Corporation; it includes an historical background, company's profile, corporate strategy, marketing philosophy and a few relevant operations. Moreover, a time-series ARIMA statistical model (parameter' estimate: p-value<0.1) based on information from 2006 till 2016 is proposed to predict the annual international corporate revenue; this model predicts the international revenue as a "percentage "of its total corporate revenue; where the international revenue represents the profit outside India.*

Keywords: *Tata Motors Co, revenue, corporate strategy, marketing philosophy, ARIMA model*

I. Introduction

1897 was the starting year for a car to be seen in the roads of India; then, in 1930's very few cars get a chance to be imported; after that period, the 1940's come up with automotive industry to the India market. In the year 1945, TATA motors come to India's market as a locomotive industry. In the year 1954. In a joint venture agreement with Daimler-Benz of Germany, TATA motors provided its first commercial vehicle to the Indian market in the year 1954. In 1991, Tata introduced Tata Sierra, the first passenger and multi-utility vehicle to the market. Subsequently, it introduced Tata Estate - station wagon car in 1992. During the time, Tata Estate was perceived as advanced car with fair price that has new features. In 1994, Tata launched Tata Sumo, which is known with its size, stability, strength and power for urban, rural and military use. Then in 1998, the first sport utility car - Tata Safari and the first fully indigenous Indian passenger car - Indica are produced. Starbus and Globus that is developed jointly with subsidiary Hispano Carrocera and Novus that is developed jointly with Tata Daewoo are parts of the strategies. Currently, Tata still plays a major role in India's automotive industry and in April 2016 Tata introduced Tiago and is able to get 36% of India's passenger car sales market share.

Evidence (Wikipedia, 2016-2) indicates that India is an emerging country with huge potential. According to IMF report April 2014, India is stated the seventh-largest economy in nominal GDP and the third largest by purchasing power parity. Moreover, India, the second world's populated country, with corresponding low dependency ratio, is a member of BRICS. The World Bank report has showed that India has a GDP growth percentage rate of 7.6% in the year 2015. These all show, India's potential as prospective industry zone in the coming decades. The automotive industry is one of the key sectors that plays crucial role in India's economy that contributes to 7.1% of the country's GDP. It has produced a total of 23.37 million vehicles in the year 2014-15, which also has a growth of 8.68% from previous year. In a report on performance of auto industry during year 2015-16, the society of Indian automotive manufacturers, explained that "The industry produced a total 23,960,940 vehicles including passenger vehicles, commercial vehicles, three wheelers, two wheelers and quadric-cycle in April-March 2016 as against 23,358,047 in April-March 2015, registering a marginal growth of 2.58 percent over the same period last year.
"(Source: http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=9).

This highly increases the country's trade balance by minimizing import costs and increasing exports. Out of these automotive industries, Tata motors, a member of Tata group is one of the companies that hugely contribute to the automotive industry with production of passenger cars, trucks, vans, coaches, buses, construction equipment and military vehicles.

Tata Motors is known as the largest automobile producing company in India and as well in Asia that works globally in different countries with its Design and Research & Development (R&D) centers, assembly plants and joint ventures basing its headquarter in Mumbai, India. The Design centers mainly work on innovation of new products to fulfill the demands of next generation customers. India, United Kingdom, Italy, Spain and South Korea are the places where these Design and R&D centers are located. The assembly plants are located in eastern, western, south western and northern parts of the country at Jamshedpur, Pune and Sanand, Dharwad, and Lucknow & Pantnagar respectively. In addition, Tata has a global assembly sites in Argentina, South Africa, South Korea, and Thailand with the plan to extend the global stretch to Turkey, Indonesia, and Eastern Europe. Tata also has a joint venture between the Brazil Marcopolo SA, Fiat Automobile, Hitachi and Land Rover Jaguar on its out-sourcing and joint venture services. With a capital of 39.5 billion USD, Tata motors is able to generate a revenue of 40.7 billion in the FY 2015/16 with a net profit of 1.4 billion. Further to

its local market in India, Tata vehicles are competitive in the global vehicle industry and are able to get a wider market share several countries in Europe, Africa, the Middle East, South Asia, South East Asia, South America, Australia, CIS and Russia. In the year 2015, the company was able to provide 511,931 vehicles to the global market (Sauce: http://www.tatamotors.com/investors/financials/71-ar-html/boards-report.html).

II. Tata Motors' Strategy

Disruptive innovation is the best way to summarize the present Tata Motors' strategy. With a mission that focus on innovation with passion and mobility solutions to enhance quality of life, Tata has a vision to be as a high performance organization. The company works to be among the top three global commercial vehicle and domestic passenger vehicle producers with sustainable financial performance and exciting innovations in the year 2019. Integrity, teamwork, accountability, customer focus, excellence and speed are the core values to achieve these vision.

To achieve these goals, Tata has innovation strategy that extends to next generation supported by cost leadership and differentiation strategies. Tata Ace, Winger minibus, Nexon and the ConnectNext car are the results of innovative strategy. Tata Nano, the cheapest car, Aria and the 2011 Safari are examples of cost leadership and differentiation strategies.

The company is led by board of directors and the leadership is comprised of experts for business growth with the betterment of the society, practicing social initiation and strengthening the social consciousness. Tata believes integrity, unity, pioneering and excellence as a core value of its code of conduct. The management values the interests of employees, consumers, and owners equally. The ethics of Tata promotes social responsibility that it works towards the contribution of social wellbeing. It participates in community development activities and serves the areas of its manufacturing locations. Moreover, the social responsibility activities are backed by environmental protection activities that has dual approach: reduction of pollution and resorting ecological balance.

Tata's key role in Indian domestic market, understanding and responsiveness to customer needs, diversification of its products, global presence and acquisition of foreign brands, sales accessibility and research & development activities are parts of the company's strength. On the other hand, its lower ROI, market focus on economy class than luxury ones & mainly in South East Asia and lower safety standards are claimed as weakness of the company. Production of innovative cars that are cheapest in price and fuel efficient, the different joint ventures and acquisition of high profile brands opened the opportunity to gain market share.

III. Arima Processes

In the statistical analysis of time series, an autoregressive integrated moving average (ARIMA) model is the generalization of an autoregressive moving average (ARMA) model. These models are adjusted to time series data either to better understand the data or to predict future points in the series (forecasting). They are applied in some cases where data show evidence of non-stationarity, where an initial differencing step (corresponding to the "integrated" part of the model) can be applied to remove the non-stationarity**.**

The model is generally referred to as an ARIMA (p, d, q) model where p, d, and q are non-negative integers that refer to the order of the autoregressive, integrated, and moving average parts of the model respectively. ARIMA models form an important part of the Box-Jenkins approach to time-series modeling.

When one of the terms is zero, it's usual to drop AR, I or MA. For example, an I(1) model is ARIMA(0,1,0), and a MA(1) model is ARIMA(0,0,1) (Wikipedia, 2016-1).

Many of the processes in business and economics are nonstationary but can be transformed to stationarity by differencing; this procedure is called Box-Jenkins method (Newton 1988).

ARIMA (0, 1, 1) without constant is equal to a simple exponential smoothing (SES): Another strategy for correcting autocorrelated errors in a random walk model can be implemented by the simple exponential smoothing model. Considering that for some nonstationary time series, the random walk (white noise) model does not perform as well as a moving average of past values. In other words, rather than taking the most recent observation as the prediction of the next observation, it is better to use an *average* of the last few observations in order to filter out the noise and more accurately estimate the local mean. The SES model uses an exponentially weighted moving average of past values to achieve this effect. The forecasting equation for the simple exponential smoothing model can be written in a number of mathematically equivalent ways, for example (Newton 1988)**:**

$$\hat{y}_t = y_{t-1} - \theta \bullet e_{t-1} \qquad (1)$$

Where $\mathbf{e_{t-1}}$ denotes the error at period t-1. Note that this resembles the prediction equation for the ARIMA(1, 1, 0) model, except that instead of a multiple of the lagged difference it includes *a multiple of the lagged forecast error.* (It also does not include a constant term yet.) The coefficient of the lagged forecast error is denoted by the Greek letter "theta" θ and it is conventionally written with a negative sign due to mathematical

symmetry. "Theta" in this equation corresponds to the quantity "1-minus-alpha" in the exponential smoothing formula (Newton 1988).

When a lagged forecast error is included in the prediction equation as shown above, it is referred to as a "moving average" (MA) term. The simple exponential smoothing model is therefore a first-order moving average (MA(1)) model with one order of nonseasonal differencing and no constant term, for example an ARIMA(0,1,1) model (Wikipedia, 2016-1) without constant term. This means that we can estimate a simple exponential smoothing by specifying it as an ARIMA(0,1,1) model without constant term at an appropriated software, and the estimated MA(1) coefficient corresponds to "1-minus-alpha" in the SES formula.

ARIMA(0,1,1) with constant is equivalent to a simple exponential smoothing with growth: By implementing the SES model as an ARIMA model (Wikipedia, 2016-1), we can get some flexibility; the estimated MA(1) coefficient is allowed to be *negative*: this corresponds to a smoothing factor larger than 1 in a SES model, which is usually not allowed by the SES model-fitting method. Later on we can include a constant term (**μ**) in the ARIMA model, in order to estimate an average (Mood et al. 1974) non-zero trend. The ARIMA(0,1,1) model *with* constant has the forecasting equation**:**

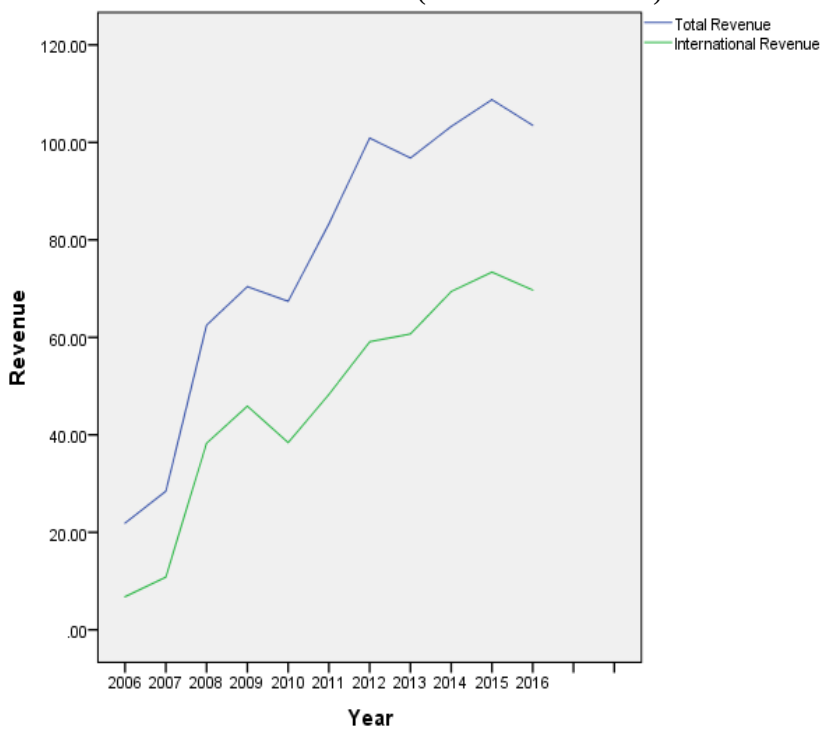
$$\hat{y}_t = \mu + y_{t-1} - \theta \bullet e_{t-1} \qquad (2)$$

The one-period-ahead forecasts from this model are qualitatively similar to those of the SES model, except that the path of the long-term forecasts is typically a sloping line (whose slope is equal to **μ**) rather than a flat line.

IV. Data, Methodology And Results

The data analysis is supported by secondary type data (FIGURE 1) from official sources**:** Wikipedia, 2016-3, Scribd.com (2016), Forbes (2016) and World Bank (2016).
The graphical representation of the annual data from 2006 to 2016 is shown in FIGURE 1.

Figure 1. Total and International Revenue (billions in US dollars) of TATA Motors Co



Research Question: What is the best fitting times-series model that represents the best adjustment to the data? Using the Box-Jenkins method we had been arriving to an estimated ARIMA model described in TABLE 1; this method provides the answer to our research question**.**

Table 1. ARIMA Model Parameters' Estimates (not transformed annual data)

ARIMA(0,1,0) Difference of order 1	Model Fit Statistics		Estimate	SE	t	*p-value*
	Stationary R^2	R^2				
Constant	**0.797**	0.831	3.615	1.979	1.827	**0.093**

Moreover, TABLE 1 Shows that the goodness of fit coefficient for the estimated model is **79.7%** at a significance level of alpha (α) less than 10% (*p-value*=**0.093**).

Table 2. ARIMA model forecast for a confidence interval width of 95%

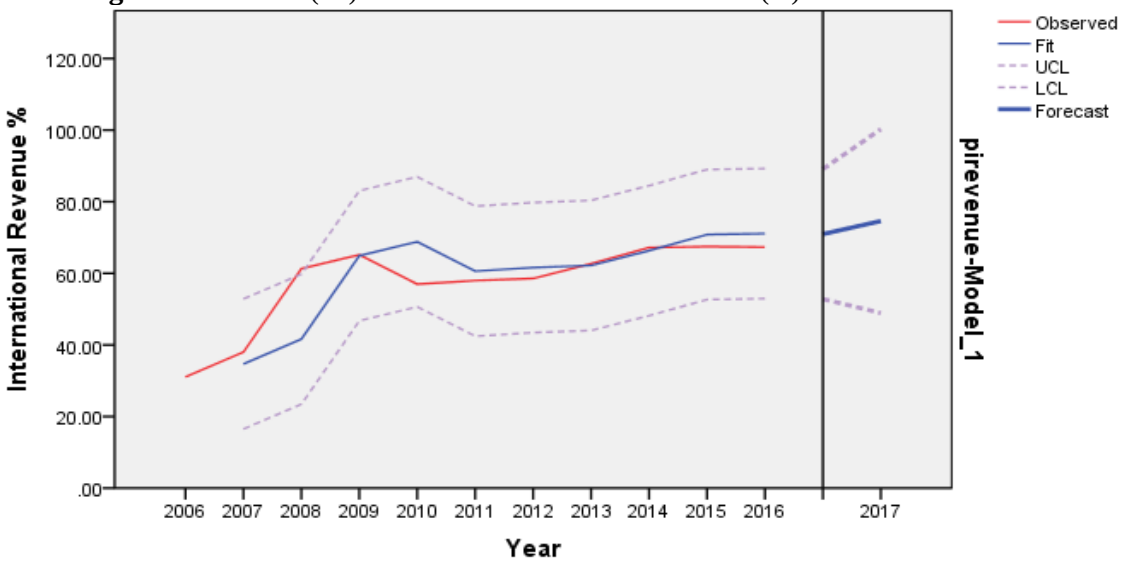
Statistic	Year: 2017
Forecast Upper Control Limit	89.13
Forecast	70.97
Forecast Lower Control Limit	52.80

The numerical figures for the % of the International Revenues were obtained calculating the ratio of values shown on FIGURE 1, where the higher curve represents the Total Revenue, meanwhile the lower curve characterizes the International revenue**:**

% International Revenue = (International Revenue / Total Revenue)*100 (3)

In other words, the dependent variable (% of the international revenue) is a percentage of the annual total corporate revenue. **The International Revenue is the revenue generated outside India.** The calculated magnitudes through the previous equation (3) are shown in FIGURE 2; this figure (DuToit et al. 1986) contains two rectangular windows, where the small window on the right side contains the statistical estimates (forecasting) indicated in TABLE 2.

Figure 2. Predicted (Fit) and Observed International Revenue (%) of TATA Motors Co



V. Conclusions And Summaries

The main conclusion is that the research question was answered satisfactorily through the Box-Jenkins methodology; a technique that can be summarized in TABLES 1 and 2, where we can review that the coefficient of determination (a measure of the goodness of fit) of the proposed model is 79.7%.

On the other hand, two primary objectives have been driven the product strategy in Tata Motors

1. Identifying the market need
2. Creating new market segments

Tata Motors Co have been creating customized vehicles with higher payload and engine capacity that are exported to different countries. The following diagram (FIGURE 3) summarizes the Tata Motors Corporation marketing philosophy:

Figure 3. Tata Motors Corporation Marketing Philosophy

Source: *https://www.ukessays.com/essays/business/report-analysing-the-strategic-planning-of-tata-motors-business-essay.php*

Tata's marketing strategy and production is led by customers' need and market expansion. The product distribution is conducted through its subsidiary company, TML Distribution Company Ltd. (TDCL). The TDCL handles Tata Motor's distribution management. Moreover, it manages the Tata's logistics - inventory and transportation. As of March 2014, Tata's sales and distribution network was 2,420 stations for its passenger car and commercial vehicles in India. The CRM/DMS is applied in all the distribution sites, including the international market sites. All in one shop is the international market strategy to be accessible for its global customers.

Tata motors works on brand image to be perceived as low price or special features. Tata Nano is a product that is already secured the low price brand image and Tata Safari is perceived with its unique feature, a weather proof camera.

Tata motors works under its parent company Tata Group. Under Tata Group Tata motors works for the achievement of common objective. However, Tata motors is led by its own board of directors. Tata group works towards the quality of life to the communities though ***leadership and competitiveness*** (Pena-Sanchez 2014). Its core values are pioneering, integrity, excellence, unity and responsibility that applies in all Tata companies. Business excellence, innovation and future thinking are the guiding principles that Tata group follows and promotes for the rest of the companies conforming the corporation. During FY 2015/16, the Tata group was able to generate a total revenue of $103.51 billion (see FIGURE 1 upper curve) providing job opportunities for more than 660,000 people.

The leadership of Tata Motors Corporation is not only because this organization has a strong competitive culture, but because this company possesses a superior knowledge development.

When measuring productivity (Maclean 1996) and quality levels in manufacturing and/or service sectors, one must pay attention to the various inputs and outputs, as tangible or intangible as they may be. One of the most important factors when it comes to the manufacturing and service sectors (Lee 2013) is "competitiveness". Thus, investing in the most competitive business sectors greatly supports the quality and productivity as it helps decrease labor intensive activities.

References

[1]. DuToit, S.H.C., Steyn, A.G.W., and Stumpf, R.H. (1986). *Graphical Exploratory Data Analysis*. *Springer-Verlag*, Berlin.
[2]. Forbes (2016). Tata Motors India: Business is heading in a positive direction. http://www.forbes.com/sites/greatspeculations /2016/09/01/tata-motors-india-business-is-heading-in-a-positive-direction/#2bad2c5e7d66
[3]. Lee, Boon L. (2013). 'Productivity, Technical and Efficiency Change in Singapore's Services Sector, 2005 to 2008'. Applied Economics 45.15.
[4]. Maclean, Dinah. (1996) 'Productivity Growth in the Commercial Service Sector'; Bank of Canada Review. 3.18.
[5]. Mood, A. M., Graybill, F.A. and Boes, D. C. (1974). *Introduction to the theory of statistics*. McGraw-Hill. Third Edition.
[6]. Newton, Joseph H. (1988). *TIMESLAB: A Time Series Analysis Laboratory*. *Wadsworth & Brooks/Cole*, Pacific Grove CA.
[7]. Pena-Sanchez, R. (2014) 'FACEBOOK: The Leader Among the Top 500 U.S.A. Companies in the most Competitive Business Sectors during 2012' International Journal of Business Research; Vol. 14, Number 3, pp 61-70.
[8]. Scribd.com (2016). Strategic Management Short Project for Tata Motors. https://www.scribd.com/doc/32558468/Strategic-Management-short-Project-for-Tata-Motors
[9]. Wikipedia (2016-1). *ARIMA model*. The free encyclopedia.http://en.wikipedia.org/wiki/Autoregressive_integrated_moving_average
[10]. Wikipedia (2016-2). Economy of India. https://en.wikipedia.org/wiki/Economy_of_India
[11]. Wikipedia (2016-3). Automotive industry in India https://en.wikipedia.org/wiki/Automotive_industry_in_India
[12]. World Bank (2016). Indicator/NY. GDP http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN

Author profile:

Dr. Rolando Pena-Sanchez is an Associate Professor of Decision Sciences in the Division of International Business and Technology Studies at Texas A&M International University. His research interests include: Multivariate parametric and nonparametric statistical methods applied to business administration and environmental risk management. His more recent research has appeared in the International Journal of Business Research, the Journal of Business & Economics Research, as well as in the Journal: Advances in Competitiveness Research.