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Diurnal Variations of Atmospheric Total Ozone Over Kathmandu

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Abstract

This study presents the diurnal variations of atmospheric total ozone measurements over Kirtipur, Kathmandu (27.67^0N, 83.295^0E) using a Brewer Spectrophotometer during a one-year period from February 2001 to February 2002. The measurements of total ozone were made only on daytime period. Result illustrates the significant diurnal variations of total ozone with maximum at near noon and minimum in the early morning and evening hours. The observed increase in total ozone around the noontime is about 5–10% of average ozone value. The monthly averages of total ozone for corresponding times are estimated from the selective days of good data set throughout the measurement period and then the seasonal averages of ozone for corresponding times are determined. The result clearly reveals seasonal diurnal variations of the total ozone with maximum averages values of ozone in spring and summer seasons and moderate in autumn, while minimum value in winter season.

Keywords: Total ozone, stratosphere, Brewer spectrophotometer, ozone depletion, ozone hole

1. Introduction

Most important feature of the middle atmosphere of Earth is the absorption of harmful solar ultraviolet radiation (UV) in the wavelength range of 200-400 nm by ozone. Ozone is a form of triatomic oxygen (O_3) found mostly in between 10 and 50 km altitudes, which provides the major source of heating of atmosphere in this region, the so-called stratosphere. It is the primary driving force for most of the atmospheric motions in this region. Although ozone is found in only about one molecule out of every 1,00,000 air molecules, it acts as a valuable protective umbrella for the living organism on Earth [*Madronich*, 1992]. Absorption of solar UV radiation by ozone also has great significant for the biosphere since the UVB radiation (wavelength range of 280-320 nm), which is mostly absorbed by ozone, has a deleterious effects on plant and animal life on Earth [*Frederick et al.,* 1993]. This important feature has also enabled ozone to paly a significant role in the evolution of

early life forms on Earth. Because of these reasons, stratospheric chemistry is centered around ozone, which contributes for the production and destruction of ozone resulting the short- and long-term variations of total ozone on Earth's atmosphere.

The stratospheric ozone is destroying primarily by the chemical pollutants. The main culprits of this destruction are chlorofluorocarbons (CFCs). The chlorine atoms generated from CFCs destroy the ozone molecules in a series of complex reactions resulting the stratospheric ozone depletion. Therefore, the depletion of stratospheric ozone and subsequent increase in UV radiation is a problem of global proportions [*Bojkov et al.,* 1990]. Since UVB radiation can damage to biological systems, there is widespread concern that ozone depletion might be accompanied by numerous adverse impacts to both ecology and human health [WMO, 1988; *Bairs et al.,* 1994].

The concentration of ozone on Earth's atmosphere shows considerable variability, on both a seasonal and latitudinal basis. Unusually low levels of ozone, however, have been recorded during the past four decades over Antarctica during October and November of each year, and there are indications that similar chemical reactions leading to a decrease in ozone levels may also occur in both the southern and northern hemispheres, but with less severity [*Lubin and Hansen,* 1995]. It is believed that the injections of anthropogenic compounds into the stratosphere, particularly chlorofluorocarbons (CFCS), are responsible for this seasonal loss of ozone.

In the past few decades, the issue of stratospheric chemistry has been key developments. The identification in the early seventies of the possibility of long-term global ozone depletion is mainly due to catalytic reactions in the stratosphere involving chemicals released mostly by anthropogenic activities and its possible impacts on the biosphere by virtue of increased UVB radiation as well as the perturbation in the middle atmospheric radiation budget [*Brewer and Kerr,* 1973; *Basher,* 1982; *Frederick et al.,* 1993]. Consequently, the study of ozone variability becomes the great interest of Aeronomy and Atmospheric Science research over the past few decades. Furthermore, the discovery of the Antarctic Ozone Hole in mid-eighties highlighted the gravity of the problem. This was responsible not only for triggering intense scientific research but also discussions and deliberations at the government level, for example, Montreal Protocol, which has far reaching socio-economic implications [*Subbaraya and Lal,* 1999].

In Nepal, a few studies have been carried out during the past few years using the ground- and space-based observations. *Chapagain* [2003] has first reported the variability of atmospheric total ozone over Kathmandu measured by a Brewer

Spectrophotometer and compared with Total Ozone Mapping Spectrometer (TOMS) satellite data. The results reported that the total atmospheric ozone over Kathmandu existed low in winter and large in summer and spring seasons. Here total ozone signifies the columnar ozone measurements from surface of the Earth to the stratospheric region. Furthermore, *Hamal* [2011] analyzed total ozone data measured by Brewer Spectrophotometer and satellite data and illustrated the seasonal variations of columnar ozone over Kathmandu. For the long-term study of the ozone over Nepal, *Pokharel* [2013] used 9-year of ozone data from TOMS satellite and found the regional and altitudinal variations of columnar ozone. However, the detail analysis of diurnal variation of ozone over Kathmandu has not been reported. In this study, we present the diurnal variations of total ozone in day-to-day and seasonal-wise over Kathmandu using ozone data measured by the Brewer Spectrophotometer installed at Kirtipur, Kathmandu.

2. Data Measurements

Data used in this study were obtained from the ozone measurements using Brewer Spectrophotometer deployed at the Central Department of Physics, Tribhuvan University, Kirtipur, Kathmandu, Nepal (27.67^0N, 83.295^0E) since January 2000. The Brewer Spectrophotometer is an optical instrument designed to measure ground-level intensities of the attenuated solar UV radiation at five specific wavelengths in the absorption spectra of ozone and sulphur dioxide. By examining the differential absorption of selected wavelengths in the UVB portion of the spectrum, total column ozone is determined. The Brewer is automatically set to the proper observation configuration, and then follows a user-defined observation schedule and data is stored and analyzed. A right-angle zenith prism directs incoming radiation from the sun, the sky, or the test lamps onto the optical axis of the instrument. For zenith angles in the range 0° to 90° the sun, or sky, is viewed through an inclined quartz window. Variations in the amount of ozone will affect the radiance of the direct solar radiation at these wavelengths (*Wayne*, 2000). Therefore, UVB radiations as well as total ozone in a vertical column of unit cross- sections are measured systematically with a Brewer Spectrophotometer.

A special feature of the Brewer instrument is its ability for high time resolution. In principle, total ozone measurements can be made at time intervals of every 2 minutes [*Chapagain*, 2003]. This enables a study of short–term variation in total ozone, especially study of its diurnal variation. The data recorded by Brewer instrument are direct sun (DS) ozone measurements and zenith sky (ZS) ozone measurements. The measurements are in Dobson Units (DU). In this study, we use data for one-year period during February 2001 – February 2002. To study the day-to-

day diurnal variations of the total ozone, the data presented in this paper are only for a representative days selected from several observations, while for the seasonal study of diurnal variations of total ozone, we have used all data set from one-year-period to estimate the average value of ozone for the corresponding times on each season.

3. Results and Discussion

3.1. Diurnal Variations of Total Ozone

The Brewer direct sun ozone data and zenith sky ozone data over Kathmandu on March 21, 2001 are plotted with respect to Nepali Standard Time (NST) in hours as shown in Figure 1. The vertical bars show the error in the measurements of total ozone. The pattern of change of total ozone exhibits similar behavior in direct sun and zenith sky ozone measurements. The results show that amount of total ozone from both direct sun ozone and zenith sky ozone measurements over Kathmandu increase from early morning hour as day progresses and become maximum up to 295 DU around local noon. Then the total ozone values decrease gradually with time in afternoon period and fall to minimum value around 280 DU in evening hour.

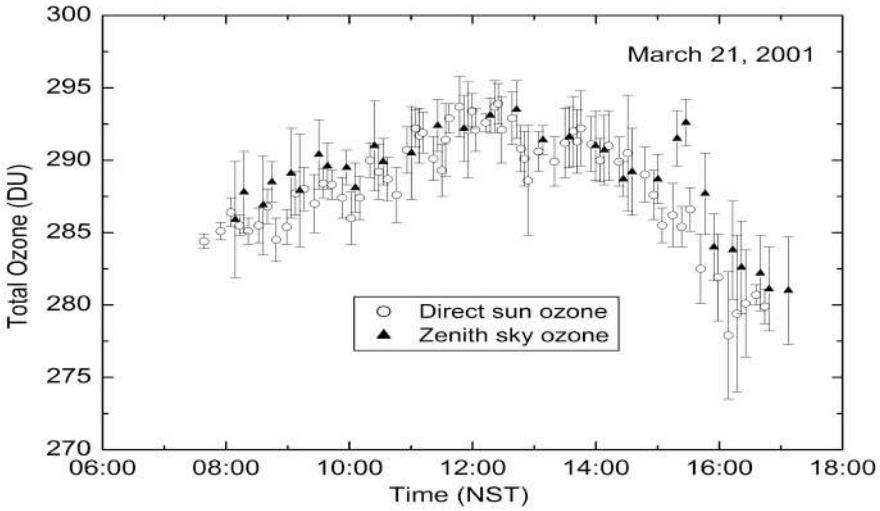

Figure 1. Diurnal variations of total ozone over Kathmandu on March 21, 2001 measured at direct sun ozone and zenith sky ozone observations.

For the comparison of these two types of measurements, we plotted the direct sun ozone data versus zenith sky ozone data on March 21, 2001 as shown in Figure 2. The result clearly shows that two data sets are significantly correlated as shown by the linear fit with the correlation coefficient of 0.90. Hence for further detail analysis of the ozone data, the direct sun ozone measurements are taken.

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Figure 3 plots the total ozone data as a function of Nepali Standard Time (NST) over Kathmandu from the typical days form February 2001 to February 2002, selected from different months. From the plot on February 22, 2001, the ozone values vary from about 255 DU to 280 DU, while on April 30, 2001, range of ozone variations exhibits from 285 to 310 DU. Similarly, plots on May 23 and June 1, 2001, illustrates that the minimum value of total ozone is 275 DU at early morning (~07:00) and early evening hours (~17:00 NST), while the maximum value exhibits about 300 DU near local noon. The amplitude of diurnal variation is up to 25 DU with average value of total ozone 290 DU. The results from other days plotted in Figure 3 also show maximum values of total ozone at near noon (~11:00 – 13:00 NST) and clear minima in the morning around ~06:00 –07:00 NST and in the early evening hour after ~15:00 NST during the measurements period in cloud free days. The amplitudes of diurnal variations are large on April 30, May 23, and June 11 (i.e. up to 25 DU), while these values exist small on February 22, November 1, and December 1, 2001 and February 23, 2002 (i.e. amplitude of about 10 DU). The study shows that the diurnal variation is significantly large in spring and summer days (e.g. April, May, June) with higher average values, while the ozone values are low with small fluctuations in winter days (December and February).

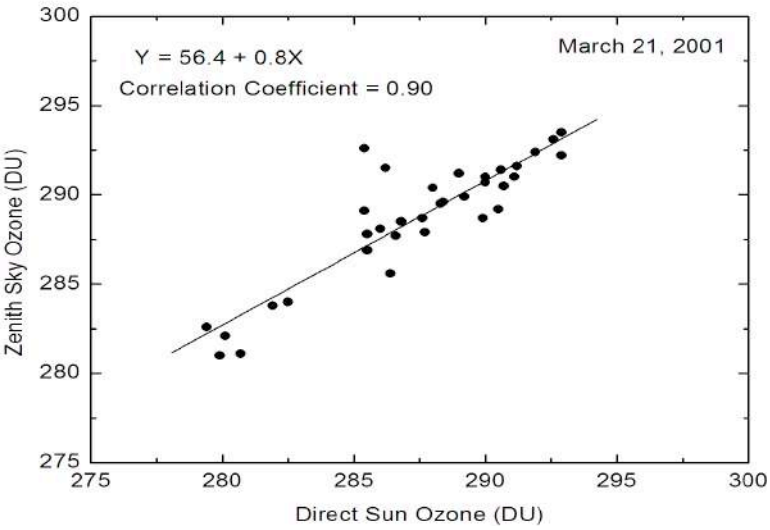

Figure 2. Comparison of direct sun ozone measurements with zenith sky measurements of total ozone over Kathmandu on March 21, 2001**.**

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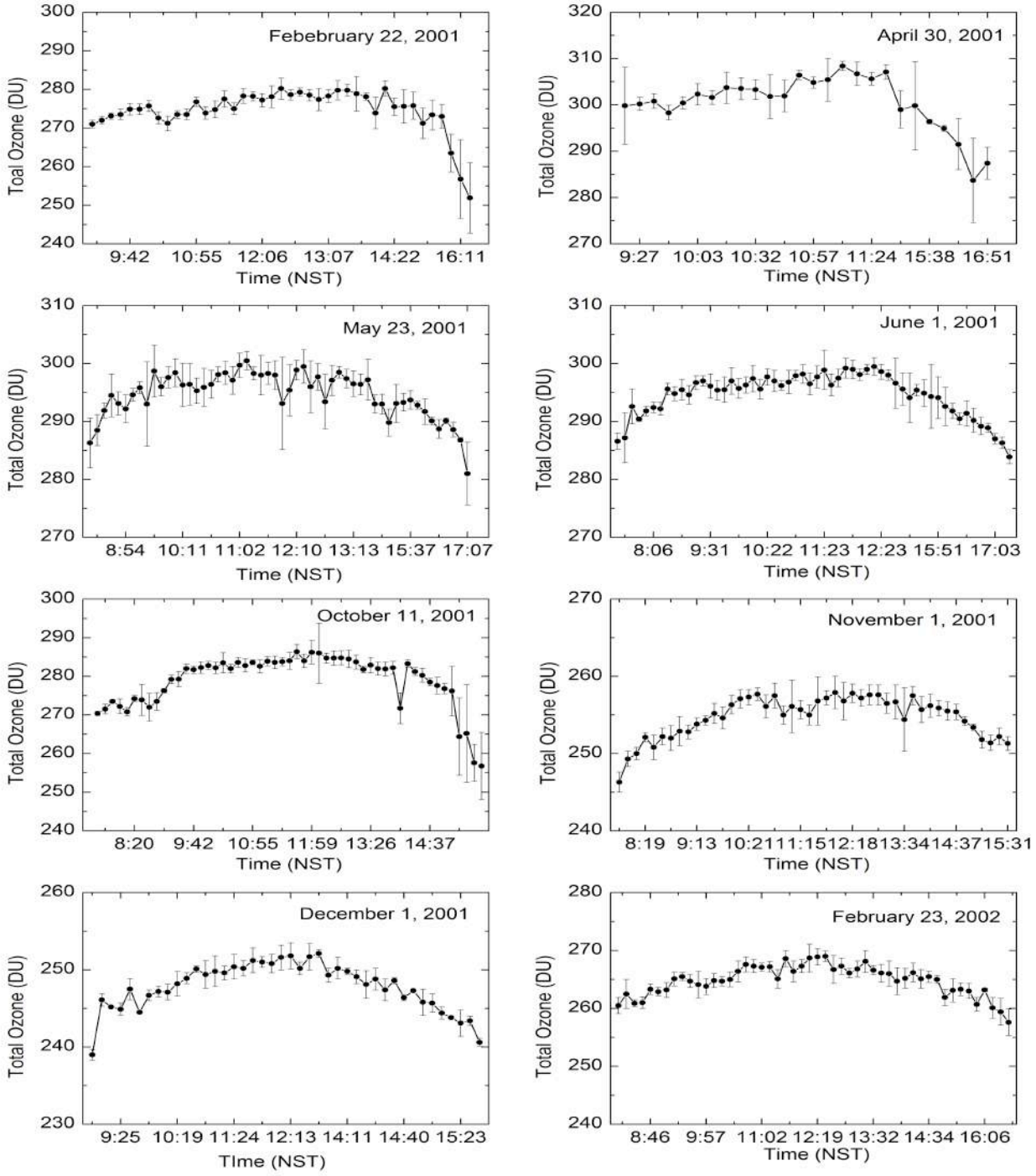

Figure 3. Diurnal variations of total ozone over Kathmandu on selected 8 days from different months. Ozone data are measured in Dobson unit (DU) while the time is plotted in Nepali Standard Time (NST). Vertical bars denote the errors in the measurements of total ozone.

The amplitude of diurnal variation is asymmetric. The result presented in this study covers only for the daytime observations, as we don't have measurements during the nighttime period. The ozone concentration increases in the noontime, as the photochemical reactions are significantly higher due to the increase in solar flux intensity in the atmosphere. As a result, the ozone production rates are relatively higher than the ozone destruction rates near noontime causing high concentration of total atmospheric ozone. On the other hand, early morning and evening hours, the solar intensity is weak, resulting the slow photochemical reactions for ozone production, consequently, the ozone concentration becomes minimum.

3.2. Average Diurnal Variations of Total Ozone

For the detail analysis of the diurnal variations of total ozone on different seasons, we have estimated average total ozone values for the corresponding times of the days from four seasons: spring (March, April and May), summer (June, July and August), autumn (September, October and November), and winter (December, January and February). Figure 4 plots the comparison of diurnal variations of total ozone in these four seasons. The variation of average total ozone in spring season is 275 to 300 DU with amplitude up to 25 DU. Similarly, the variations of average total ozone are ~270 to 290 DU in summer, ~250 to 270 DU in autumn, and ~248 to 263 DU in winter seasons respectively. The ozone values exist maximum at around noon and just right afternoon hours and minimum at early morning and evening hours as illustrated in Figure 4. The results show that the amplitude of average diurnal variations exhibits large in spring season (with amplitude of ~25 DU) and small in winter season (with amplitude of ~15 DU). The amplitude of average diurnal variation is about 5–10% in terms of the percentage of the mean. The peak values around the noon do not show the similar feature on all days. The observed peak-to-peak changes are well beyond the measurement errors and are believed to be genuine.

The other noticeable features in the data are the base value of total ozone that also changes from day-to-day and season-to-season. The ozone values are largest in spring season and lowest in winter season as illustrated in Figure 4. Hence, the studies of day-to-day as well as seasonal variations of total ozone become noteworthy.

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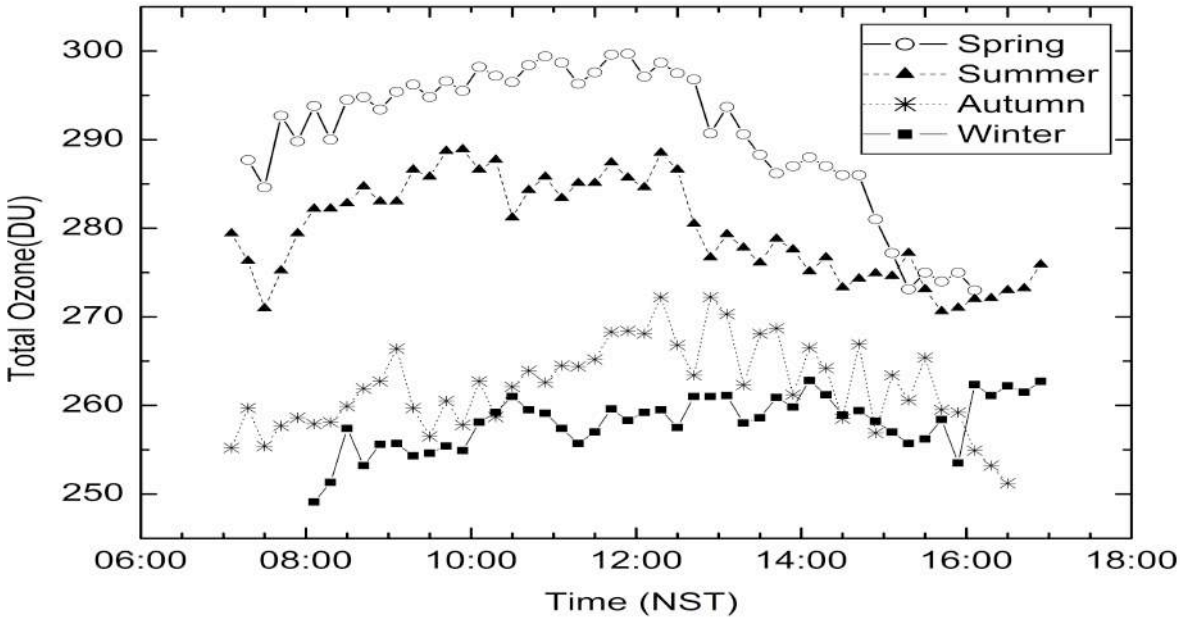

Figure 4. Diurnal variations of average total ozone over Kathmandu during the spring, summer, autumn and winter seasons estimated from one year period from February 2001 to February 2002.

As discussed above, the measurements of total ozone show that the ozone value increases around the noontime. The observed increase in total ozone around noon is much larger effect since almost 90% of the total overhead ozone is contained in the region below 40 km. At lower altitudes, photochemical life times which are large, become months and years, and one does not expect any short – term changes, except in lower troposphere where the life time of ozone again decreases with decreasing altitude. Currently available tropospheric photochemical models [*Crutzen,* 1978; *Logan et al.,* 1985] show that the photochemical reactions involving CH_4, CO and non-methane - hydrocarbons can result in a net production or destruction of ozone depending upon whether the ambient NO_x levels are high or low. Nitric oxide and volatile compounds are common products of human activities and are released in large quantities basically from vehicle engines and industries. Under suitable meteorological conditions (with almost no vertical exchange and little ventilation), these pollutants tend to accumulate in the boundary layer. Under increased sunlight, they undergo photochemical transformation. Under cloudy sky, ozone production is not as much as during a clear sky. Non-methane hydrocarbons exhausted by automobiles acts as a catalyst in the production of ozone. The critical concentration

of NO_x, which also acts as a catalyst, is about 10 pptv (parts per trillion by volume) for a typical ozone concentration of 30 ppbv (parts per billion by volume) [*Subbaraya et al.,* 1994; *Solarsky,* 1992]. Below this concentration, ozone destruction and production occur when the concentration is above the critical value. Ozone precursors (NOx, Hydrocarbons) begin to build up during morning rush hours while the abundance of ozone reaches its maximum in the early afternoon. Most measurements near the surface over most of the urban polluted areas generally show a noontime maximum in the surface ozone [*Lal and Subbaraya,* 2000; *Zou,* 1996]. Only such an effect cannot contribute to the observed noontime increase in total ozone. Since tropospheric ozone forms about 10% of total ozone and stratospheric ozone is almost 90% of total overhead ozone, a combination of the lower tropospheric chemistry with high NO_x air and upper stratospheric – mesospheric chemistry can result in a net increase of ozone around noon hours. However, there is no observational data of NO_x levels in the surface and tropospheric air over Kathmandu. The observed increase in total ozone over Kathmandu near noontime indicates that during the period of measurements, photochemical control of ozone extended well below 40 km and the day night photochemistry induced changes are much more pronounced than model predictions. Alternatively, it could be due to a combination of stratospheric and near tropospheric changes with latter characterized by polluted (high NO_x) air.

4. Conclusions

The measurements of total ozone over Kathmandu using Brewer spectrophotometer during the daytime period from February 2001 to February 2002 show that total ozone values increase in around noontime period and exhibit minimum values in early morning and evening hours. The observed increase in total ozone near noontime by ~5–10% of average value indicates that photochemical control of ozone extended well below 40 km and the day-night photochemistry induced changes are much more pronounced. The result also reveals seasonal variations of the total ozone over Kathmandu with maximum values in spring, and minimum during the winter period. As a future research work, climatological study of ozone variations over Nepal using long-term data set from both ground- and space-based measurements is highly recommended.

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Debt Tax Shield and Value of the Firms: Evidence from Nepal

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Abstract

The main purpose of this paper is to assess association of debt tax shield with market value of manufacturing companies and to estimate the value additive effect of debt tax shield. The tax advantage of debt capital due to the tax saving on interest is debt tax shield. An aggregate of closing value of common equity in secondary market and book value of total debt determines the market value of sample companies. In this study, the financial accounting data that have been collected from secondary sources have been utilized for analysis. The collected data are analyzed with the application of linear multiple regression equations. The results of analysis provide statistical evidences to conclude that there is no significant association between debt tax shield and market value in the context of Nepalese manufacturing companies. Debt tax shields do not have value additive effect to the manufacturing companies.

Keywords: Debt tax shield, market value, operating income, interest

1. Introduction

A company can finance its investment by issuing either equity or debt. Equity represents ownership in the company. An equity investor receives a proportionate share of an uncertain future stream of income from the company. Debt, on the other hand, represents a promise of a fixed payment to the lender. These two different financing options have different return characteristics. In the existence of the income tax effects, one might expect that there is an optimal mix of debt and equity that maximizes the value of the firm (Lyon, 1995).

A study conducted by Modigliani and Miller (1958) concluded that the value of the firm is independent of its financing choice. This conclusion on corporate finance was derived by ignoring the influence of corporate income tax on financing choice of the firm. In the presence of taxes, this result was not true, as Modigliani and Miller (1963) subsequently demonstrated that debt tax shield increases the firm's value with tax savings of interest payment. Subsequently, Jensen (1986) documented a positive relationship between debt tax shield and market value of the firm. In another study, Clark (1993) concluded that debt tax shield is reflected in market price of equity. Likewise, Graham (2000) found a positive relationship between debt tax shield and market value of the manufacturing firms. Later, Kimsley and Nissim (2002) found a positive relationship between debt tax shield and market value of the manufacturing firms. In contrast, Miller (1977) demonstrated that debt tax shield does not affect market value of the firm.

Subsequently, Fama and French (1998) documented that debt tax shield and market value of the firms are related negatively because of inefficiency signaling effect of debt.

The traditional view asserts that debt increases market value of the firm. A firm is able to increase its market value by the use of moderate amount of debt. Only in the absence of taxes, the market value of a firm is independent of its debt (Graham, et al., 1985). But in this modern age, the absence of taxes is beyond the realities. An increase in the level of debt reduces the firm's tax liability and thereby increases the share of earning distributable to equity owners. Thus, choosing an appropriate level of debt is of great concern to the manufacturing firms. Obviously, the appropriate amount of debt is that, which increases the market value of the firms (Pringle and Harris, 1987). In this context, where corporate income is subjected to taxation, the use of debt should result into a higher market price of outstanding securities of the firms. The importance of debt financing thus presumes that tax shield must have value in marketplace. Accordingly, the tax shield increases the market value of the firms (Martin, et al., 1991). This is how; debt tax shield and market value of the firms are related positively (Graham, 2000).

The tax advantages of debt (MM's first hypothesis in 1963) would increase firm's value and decrease the cost of using debt capital. Under the assumption, there are no bankruptcy costs and personal tax disadvantages, MM advocated that the firm's market value would be equal to the value of unlevered firm plus the value of tax advantages of debt. It was recognized that debt tax shield and market value of the firm have positive relationship. Later, this recognition was supported by several other empirical studies like: Sarma and Rao (1969), Wrightsman (1978), Bierman and Oldfield (1979), Taggart (1980), Cooper and Franks (1983), Masulis (1983), Miles (1983), Lewellen and Mauer (1987), Emery and Gehar (1988), Kopche (1989), Clark (1993), Engel et al. (1999) and Graham (2000). Likewise, Kemsley and Nissim (2002) demonstrated cross- sectional evidences supporting market value additive effect of debt tax shield using MM (1963) model. In this respect, Kemsley and Nissim (2002) documented that debt tax shield and market value of the firm have positive relationship.

Alternatively, Miller (1977) observed that there is no relationship between tax advantages of debt and firm's value. Subsequently, many other studies were conducted and they have supported the conclusion of Miller (1977) study. The findings of the studies conducted by: Myers (1977), Miller and Rock (1985), Eckbo (1986) and Fama and French (1998) have supported the conclusion of Miller (1977) study. Moreover, these studies also supported the observation of the previous studies conducted by MM (1958) and Jensen and Meckling (1976) that the tax advantages of debt and value of the firms are related insignificantly.

Literatures suggest that there is no uniformity in previous empirical results regarding the effect of debt tax shield on market value of the firms. However, the observations made by several authors can be grouped into two broad views. First view has supported the Modigliani and Miller's (1963) conclusion that debt tax shield has a positive association with firm's market value. The second view contradicts with Modigliani and Miller's (1963) conclusion and has suggested that debt tax shield has a negative association with firm's market value.

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The managers of value maximizing firms usually consider an implication of their financing choice to the market value of the firm. Thus, before choosing debt or equity capital, for financing investment, the effect of debt tax shield on market value of the firm is to be analyzed essentially. However, in Nepalese context, the association of debt tax shield with firm's market value has not been estimated adequately with reference to manufacturing companies. Thus, in this study an attempt has been made to estimate and analyze the association of debt tax shield with market value of the sample companies.

2. Methodology

In this study an attempt has been made to assess the relationship between debt tax shield and market value of manufacturing companies which are enlisted in Nepal Security Exchange Limited. Altogether eight companies were selected by considering reported profit and loss. The manufacturing companies which have reported operating loss in any year out of the last five years (2006/07 to 2011/12) have been taken as loss-making companies. And obviously, those companies which have reported profit for all last five years of study period have been taken as profit-making companies. In this study only secondary data have been utilized for analysis. The financial accounting data for the period of ten years (2001/02 to 2011/12) were collected from the annual and periodic publications of Nepal Stock Exchange Limited (NEPSE), and Securities Board, Nepal (SEBO/N). The publications of NEPSE like: *Financial Statements of Listed Companies, Trading Report,* and *Monthly Bulletin* were utilized as data sources. Similarly, the publications of SEBO/N like: *Securities Board Nepal: Annual Report, Securities Market Review,* and *Securities Board Nepal: Journal,* were essentially taken as the sources for secondary data. The data that were collected in these ways have been analyzed with regression equations. Multiple linear regressions were employed in inferential analysis of data that are related to the variables of market value and debt tax shields for each group of profit-making and loss-making companies and for total sample.

In their study, Kemsley and Nissim used interest expenses and total amount of debt as proxies for debt tax shield separately in two alternative models. In both estimations the observed results were fundamentally analogous. Eventually, they have suggested for applying those modified models to predict the influence of debt tax shield on market value of the firms (Kemsley and Nissim, 2002). In this perspective, alternative proxies for debt tax shield were employed as explanatory variables to estimate relationship between debt tax shield and market value of the firm in this present study. Additionally, in this present study, debt tax shield itself in absolute value, without proxy, was also tested in the regression model specially for exploring comparative outcomes. Thus, the linear empirical equations that have been employed in this study to observe the inherent relationship between debt tax shield and market value of firm are given below:

$$(V_L/TA)_i = a + b_1 (FOI/TA)_i + b_2 (D/TA)_i + u_I \quad \text{.....(1)}$$

$$(V_L/TA)_i = a + b_1 (FOI/TA)_i + b_2 (I/TA)_i + u_I \quad \text{..... (2)}$$

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$$(V_L/TA)_i = a + b_1 (FOI/TA)_i + b_2 (DTS/TA)_i + u_I \text{ ..... (3)}$$

FOI = operating income in following fiscal year, TA = total assets used as deflator, D = interest-bearing long and short terms debt, a = intercept of linear multiple relationship; b_1, b_2 = explanatory coefficients to be estimated, I = interest on debt, DTS = debt tax shield, u = an error term, i = states of nature of the sample companies like: profit-making, loss-making, and total sample.

Specification of Variables

In this present study, market value of the firms has been utilized as dependent variable, and value of debt tax shield and operating income have been utilized as independent variables.

Value of Debt Tax Shield

The tax shield on debt is the difference between taxes that would be paid if the firm had no debt and the taxes that are paid when the firm has debt. If earning before interest and taxes is (EBIT), interest expense is (I), and statutory corporate tax rate is (t), then debt tax shield, (S), is determined by using the following formula (Wrightsman, 1978):

$$DTS = tEBIT - t (EBIT-I) = tI \text{ …… (4)}$$

This is familiar tax shield equation. This equation has been used to measure the value of debt tax shield in this study

Market Value of Firm

While reviewing the literature, it was observed that there is no uniform method to compute firm's market value. However, the method as suggested and used in Kemsley and Nissim (2002) study has been applied to compute market value of selected companies in this study.

Market value of firm in Kemsley and Nissim (2002) study was computed by totaling the market value of common equity, book value of debt and preferred stock. The market value of equity is the product of the outstanding number of shares and price per share at the end of fiscal year. The book value of debt is the debt in current liabilities plus long-term debt. Notably, this measure of debt excludes operating liabilities, which typically do not generate explicit tax-deductible interest expense. However, in this study market value of firm for a fiscal year was computed by totaling market value of equity and book value of debt that excludes operating liabilities. That is so, because preferred stocks were not observed in the financial statements of sample companies. Thus, the following equation was employed to compute market value of firm in this study:

$$V_{Lt} = (MP_C \text{ x } NES_O)_t + (TD\text{-}OL)_t \text{ ….. ….. (5)}$$

V_L = market value of firm for a fiscal year, MP_C = closing market price per share at the end of concerning fiscal year, NES_O = number of equity share outstanding, TD = total long term and

short term debt (long and short terms liabilities), OL = operating liabilities (total liabilities that exclude interest-bearing debt), t = time = fiscal year under consideration

Operating Income

In Fama and French (1998) study, operating income has been defined as the earning before extraordinary items plus after tax interest expense. Consistently, Kemsley and Nissim (2002) have also defined operating income as profit before tax plus interest expense times (1- t_c), where t_c equals the statutory corporate tax rate. Further, they have measured operating income as the actual realized income for the year that follows the current year, because the earning of next year influence the market value of common equity of current year. In this present study, the actual realized earning before interest and tax of succeeding year has been used as operating income for the concerning fiscal year. The following formula has been employed in the present study in order to compute operating income:

$$FOI_t = \{(PBT+i)\ (1-Tc)\}_{t+1}. \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

PBT = profit before tax, i = interest, FOI = operating income in following fiscal year, Tc = statutory corporate tax rate, t =time: fiscal year under consideration.

3. Analysis

The results of regression of market value with interest-bearing debt and operating income are presented in Table: 1.

Table: 1
Regression of Firm Value on Operating Income and Interest-Bearing Debt
Dependent Variable:
VL/TA

S.N	Nature of sample companies	Constant	Explanatory Variables		R^2	F	N
			FOI/TA	D/TA			
1	Profit-making	1.233* (5.526)	0.580 (0.362)	0.123 (0.222)	0.004	0.082	42
2	Loss-making	0.212* (3.961)	0.496 (1.231)	0.835* (9.386)	0.702	51.802*	38
3	Total Sample	0.971* (7.436)	2.588*** (2.759)	0.262 (1.172)	0.113	5.848**	70

Notes: Figures in parenthesis are t-values.
** Significant at 1 percent, ** Significant at 5 percent, *** Significant at 10 percent*

For profit-making companies, the regression coefficients of interest-bearing debt (D/TA) and operating income (FOI/TA) are (0.123) and (0.580). These results indicate, with (FOI/TA) held constant, a unit increase in (D/TA) is associated with an average increase of 0.123 in (VL/TA). Similarly, with (D/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 0.580 in (VL/TA). The signs of these coefficients show the positive association of both operating income and debts with the market value of the firm. However, both the explanatory coefficients are not statistically significant. The week value of R^2 and insignificant 'F' value do not suggest the good fitness of the linear model.

For loss-making companies, Table:1 shows that the regression coefficients of interest-bearing debt (D/TA) and operating income (FOI/TA) are (0.835) and (0.496) respectively. These results indicate, with (FOI/TA) held constant, a unit increase in (D/TA) is associated with an average increase of 0.835 in (VL/TA). Similarly, with (D/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 0.496 in (VL/TA). However, the coefficient of (D/TA) is statistically significant and that of (FOI/TA) is statistically insignificant. The value of R^2 is comparatively stronger and that of 'F' is statistically significant, suggesting the better fitness of the linear model.

For total sample companies also the market value has also been regressed with operating income and debts. The computed regression coefficients of debt (D/TA) and operating income (FOI/TA) are (0.262) and (2.588) respectively. These results indicate that, with (FOI/TA) held constant, a unit increase in (D/TA) is associated with an average increase of 0.262 in (VL/TA). Similarly, with (D/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 2.588 in (VL/TA). The prefixed signs of these coefficients imply that the debt is positively associated with the market value of the firm and operating income is also positively associated with the market value of the firm. However, the regression coefficient of debt is not statistically significant. But, the regression coefficient of operating income is statistically significant. The value of R^2 is not so stronger to explain the variation of dependent variable (VL/TA). Eventually, the statistically significant 'F' value suggests the good fitness of the linear model.

Regression of Market Value on Operating Income and Interest

The market value of the firm has also been regressed with operating income and interest and the results are presented in Table: 2.

Table: 2

Regression of Firm Value on Operating Income and Interest

Dependent Variable: VL/TA

S.N	Nature of Sample Companies	Constant	Explanatory Variables		R^2	F-Ratio	N
			FOI/TA	I/TA			

1	Profit-making	1.206* (6.960)	-0.103 (-0.064)	5.514 (1.574)	0.055	1.299	42
2	Loss-making	0.301* (5.349)	0.315 (0.660)	5.346* (7.378)	0.600	32.999*	38
3	Total Sample	0.913* (8.379)	2.793** (3.065)	1.233 (0.859)	0.107	5.495***	70

Notes: Figures in parenthesis are t-values.
** Significant at 1 percent, ** Significant at 5 percent, *** Significant at 10 percent*

For profit-making companies, the regression coefficients of explanatory variables interest (I/TA) and operating income (FOI/TA) are (5.514) and (-0.103). These results indicate, with (FOI/TA) held constant, a unit increase in (I/TA) is associated with an average increase of 5.514 in (VL/TA). Similarly, with (I/TA) held constant, a unit increase in (FOI/TA) is associated with an average decrease of 0.103 in (VL/TA). The signs of these coefficients imply positive association of interest and negative association of operating income with the value of the firm. However, both the explanatory coefficients are not statistically significant. The week value of R^2 and insignificant 'F' value do not suggest the good fitness of the linear model.

For loss-making companies, Table:2 shows that the regression coefficients of interest (I/TA) and operating income (FOI/TA) are (5.346) and (0.315). These results indicate, with (FOI/TA) held constant, a unit increase in (I/TA) is associated with an average increase of 5.346 in (VL/TA). Similarly, with (I/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 0.315 in (VL/TA). However, the coefficient of (I/TA) is statistically significant and that of (FOI/TA) is statistically insignificant. The value of R^2 is comparatively stronger and that of 'F' is statistically significant, suggesting better fitness of the linear model.

For total sample, the regression results are also presented in Table:2. The computed regression coefficients of interest (I/TA) and operating income (FOI/TA) are (1.233) and (2.793). These results indicate, with (FOI/TA) held constant, a unit increase in (I/TA) is associated with an average increase of 1.233 in (VL/TA). Similarly, with (I/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 2.793 in (VL/TA). The observed signs of these coefficients imply both interest and operating income are positively associated with the market value of the firm. However, the regression coefficient of interest is not statistically significant, but that of operating income is statistically significant. The value of R^2 is not so stronger to explain the variation of dependent variable (VL/TA). About 11 percent variations in firm's market value are explained by operating income and interest. Eventually, the statistically significant 'F' value suggests the good fitness of the linear model.

Regression of Market Value on Operating Income and Debt Tax Shield

The value of the firm has also been regressed with operating income and debt tax shield and the results are presented in Table:3.

Table: 3
Regression of Market Value on Operating Income and Debt Tax Shield
Dependent Variable: VL/TA

S.N	States of Nature	Constant	Explanatory Variables		R^2	F	N
			FOI/TA	DTS/TA			
1	Profit-making	1.232* (6.809)	0.355 (0.220)	7.807 (0.606)	0.011	0.241	42
2	Loss-making	0.409** (7.195)	0.774 (1.431)	16.272* (5.369)	0.459	18.690*	38
3	Total Sample	0.920* (8.510)	2.798** (3.080)	5.623 (0.961)	0.108	5.598**	70

*Notes: Figures in parenthesis are t-values * Significant at 1 percent, ** Significant at 5 percent, *** Significant at 10 percent,*

For profit-making companies, the regression coefficients of explanatory variables interest (DTS/TA) and operating income (FOI/TA) are (7.807) and (0.355). These results indicate, with (FOI/TA) held constant, a unit increase in (DTS/TA) is associated with an average increase of 7.807 in (VL/TA). Similarly, with (DTS/TA) held constant, a unit increase in (FOI/TA) is associated with an average decrease of 0.355 in (VL/TA). The signs of these coefficients imply both the explanatory variables are positively associated with the value of firm. However, both the explanatory coefficients are not statistically significant. The week value of R^2 and insignificant 'F' value do not suggest the good fitness of the linear model.

For loss-making companies, Table:3 shows that the regression coefficients of debt tax shield (DTS/TA) and operating income (FOI/TA) are (16.272) and (0.774). These results indicate, with (FOI/TA) held constant, a unit increase in (DTS/TA) is associated with an average increase of 5.346 in (VL/TA). Similarly, with (DTS/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 0.315 in (VL/TA). However, the coefficient of (DTS/TA) is statistically significant, but that of (FOI/TA) is statistically insignificant. The value of R^2 is comparatively stronger and that of 'F' is statistically significant, suggesting the better fitness of the linear model.

For total sample, the computed regression coefficients of debt tax shield (DTS/TA) and operating income (FOI/TA) are (5.623) and (2.798). These results indicate, with (FOI/TA) held constant, a unit increase in (DTS/TA) is associated with an average increase of 5.623 in (VL/TA). Similarly, with (DTS/TA) held constant, a unit increase in (FOI/TA) is associated with an average increase of 2.798 in (VL/TA). The observed signs of these coefficients imply both debt tax shield and operating income are positively associated with the market value of the firm. However, the regression coefficient of debt tax shield is not statistically significant. The regression coefficient of operating income is statistically significant. The value of R^2 is not stronger to explain the variation of dependent variable (VL/TA). But the statistically significant 'F' value suggests the good fitness of the model.

4. Conclusions

This paper has analyzed the association of debt tax shield with the market value of the selected companies. Different profitability-wise states of nature of the companies have been considered for examining diverse associations between debt tax shield and market value of the companies. An emphasis has been given to Kemsley and Nissim (2002) regression model to estimate the association of debt tax shield with market value of the firm. In the model, market value is employed as dependent variable and debts, interest, debt tax shield, and operating income are employed as explanatory variables.

The analysis shows that the regression coefficient of interest-bearing debt is statistically significant for loss-making companies. The signs of these explanatory coefficients for both companies have signaled a positive association of interest-bearing debt with market value. On the other hand, the explanatory coefficients of interest are statistically significant for loss-making companies, but statistically insignificant for profit-making companies. Further, interest is positively associated to the market value of the loss-making companies. The regression results of total sample indicate that interest-bearing debt, interest, and debt tax shield are not associated to market value significantly. Therefore, it can be stated that debt tax shield does not have significant association with market value.

So far as the regression result of market value on debt variables is concerned, it is concluded that the debt tax shield and market value are positively associated for loss-making companies. This observation supports the findings of Modigliani and Miller (1963), Sarma and Rao (1969), Taggart (1980), Sarnat and Levy (1990), Graham (2000), and Kemsley and Nissim (2002) studies. But, this observation contradicts with the findings of Modigliani and Miller (1958), Miller (1977), Myers (1984), Myers and Majluf (1984), Miller and Rock (1985), Eckbo (1986) and Fama and French (1998) studies.

Also, the regression results for all the selected companies indicate that interest-bearing debt, interest, and debt tax shield are not associated to market value significantly. Therefore, debt tax shield does not have additive effect on market value of the companies. This observation supports the findings of Modigliani and Miller (1958), Miller (1977), Myers

(1984), Myers and Majluf (1984), Miller and Rock (1985), Eckbo (1986), and Fama and French (1998) studies. However, this observation contradicts with the findings of Modigliani and Miller (1963), Sarma and Rao (1969), Taggart (1980), Graham (2000), and Kemsley and Nissim (2002) studies.

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Market Differentiation in the Nepalese Hospitality Industry

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"Marketing success through differentiation-of anything"
Harvard Business Review, Jan-Feb, 1980

Abstract: *The purpose of this paper is to analyze hotel industry is one of the major service businesses in Nepal that has the ability to attract, satisfy and thus retain customers, and these hotels are more likely to survive than hotels that do not do so. The hotel industry attracts and retains the customer through service/product differentiation. The five star hotels of Nepal are not much concerned with focus and differentiation strategy. The five star hotels were those who practices least profitable hotel industries with moderate market differentiation strategies. Differentiation in marketing means creating specialized products that gains competitive advantages in a particular segment of the market.*

Key words: Market differentiation, strategies, customer, profitability, customer retention

1. Introduction

In most developed countries, about 80% of the workforce is employed in the service sector. Service sector industries include education, retailing, tourism and hospitality, medical and hospital services, as well as communications and construction services (McColl, Callaghan & Palmer 1998). By the early 2000s, it was estimated that services already accounted for 72% of the gross domestic product (GDP) of developed economies, and 52% of the GDP of developing economies (Hill 2007). Foreign exchange earnings from tourism in Nepal contribute about 2.0% to the GDP (Nepal Tourism Statistics 2012) and can thus help to raise the national income, the level of employment, the balance of payments and foreign exchange rates.

Organizations continually seek new ways to acquire, retain and increase business, because the cost of losing customers is rising. Service is an important factor in retaining clients. The role of service is more important than ever, and is expected to become even more critical with time (Choi & Chu 2001: 289).

The hotel industry is one of the major service businesses in Nepal that has the ability to attract, satisfy and thus retain customers, and these hotels are more likely to survive than hotels that do not do so. The hotel industry attracts and retains the customer through service/product differentiation.

Successful customer retention allows the hotel to build relationships with its customers (Reichheld & Sasser 1990: 105–108; Hoffman, Kelley & Chung 2003: 334).Kurtz and Clow (1998: 380–381 & 403) are of the opinion that, irrespective of the efforts of service organizations to introduce competitive strategies to attract customers and efficiently manage the supply of

services they offer, customers do not always purchase from the same organization – nor do they always remain loyal. It is said that organizations in the tourism industry have been slow in adopting the principles of marketing, even though these would enable them to improve their performance and customer retention (Appiah-Adu, Fyal & Singh 2000: 96 & 109). For a service organization such as a hotel to acquire customers, it is important that marketing strategies be deployed to improve its own ability to compete with other hotels, gain a competitive advantage and thus retain a greater number of customers (Anderson &Vincze 2000: 76; Chaharbaghi & Lynch 1999: 49; Hill & Jones 2002: 123; Hitt, Ireland &Hoskisson 2001: 5; Kurtz & Clow 1998: 308; Ma 1999: 259 & 261; Passemard & Kleiner 2000: 12).

This study investigates what five star hotels attach to executing competitive marketing strategies:

H1: Are there any differences in the marketing strategies of competitiveness within Nepalese five star hotels?

H2: Is there any emphasis in customer service differentiation strategies for competitivenessin Nepalese five star hotels?

The objective of this study focuses on the competitive marketing strategies that hotels can utilize in order to attract and retain customers. It also looks at the strategies that hotels can implement to manage the supply and demand for services ***"Don't forget that it (your product or service) is not differentiated until the customer understands the difference."*** *~ Tom Peters*

Marketing strategy does not believe in the planning process because the hotel market is changing so rapidly. The hotel market is showered with new products and services everyday. If the form is not innovative in products and services, and if the competitive price is insufficient enough to deal with the challenges from competitors, it can hardly survive in the market place.

Differentiation in marketing means creating specialized products that gain competitive advantages in a particular segment of the market. Companies can choose from ***two different strategies***: ***differentiation and differentiation focus***. The former adds specialized aspects with a broad appeal to its products or services, and the latter develops a product that appeals to a niche market. In either case, differentiation makes a product or service more desirable to the target market.

Empirical research on the profit impact of marketing strategy indicates that firms with a high market share were often quite profitable, but so were many firms with a low market share. The least profitable firms were those with a moderate market share. This was sometimes referred to as *the hole in the middle* problem. Porter explains that firms with a high market share were successful because they pursued a cost leadership strategy, and firms with a low market share were successful because they used market segmentation to focus on a small but profitable market niche. Firms in the middle were less profitable because they did not have a viable generic strategy.

Differentiation marketing helps business services stand out in a crowded marketplace. It can be an important strategy to implement, especially if the hotel services are very similar to those of the hotel's competition. An effective differentiation strategy gives customers a reason to use services by pointing out subtle or less obvious differences or benefits that customers may not be aware of.

There are several types of marketing differentiation strategies. Within pricing strategies, there is a low-price strategy, a high-price

strategy of prestige, a product/service strategy, and a customer service
strategy to point out the superior service of business. With a focus strategy, marketing emphasizes a unique feature such as a convenient location, or it attempts to appeal to a specific market segment.

To develop an effective marketing differentiation strategy, an organization first needs to identify the features of its products or services that set them apart. In marketing terms, this is known as a unique selling proposition (USP). USP can be a product feature, such as the fact that a product works faster or lasts longer. It can also relate to business operations, such as offering free delivery.

If a Unique Selling Proposition (USP) is not readily apparent, it may require a strong marketing campaign to create the perception of differentiation in the minds of the customers. For example, if prices are higher than those of competitors, marketing can be used to highlight the fact that its customer service is superior.

Choosing the wrong marketing differentiation strategy can have negative consequences. For example, if a business attempts to establish itself as a price leader but prices are too low, it may not be able to make a profit or may project an image of lower quality. It is important to take the time to assess what customers really want when developing your strategy.

Product differentiation is a competitive business strategy whereby firms attempt to gain a competitive advantage by increasing the perceived value of their products and services relative to the perceived value of other firm's products and services. Products sold by two different firms may be exactly the same, but if customers believe the first is more valuable than the second, then the first product has a differentiation advantage. The existence of product differentiation, in the end, is always a matter of customer perception, but firms can take a variety of actions to influence these perceptions.

2. Methodology

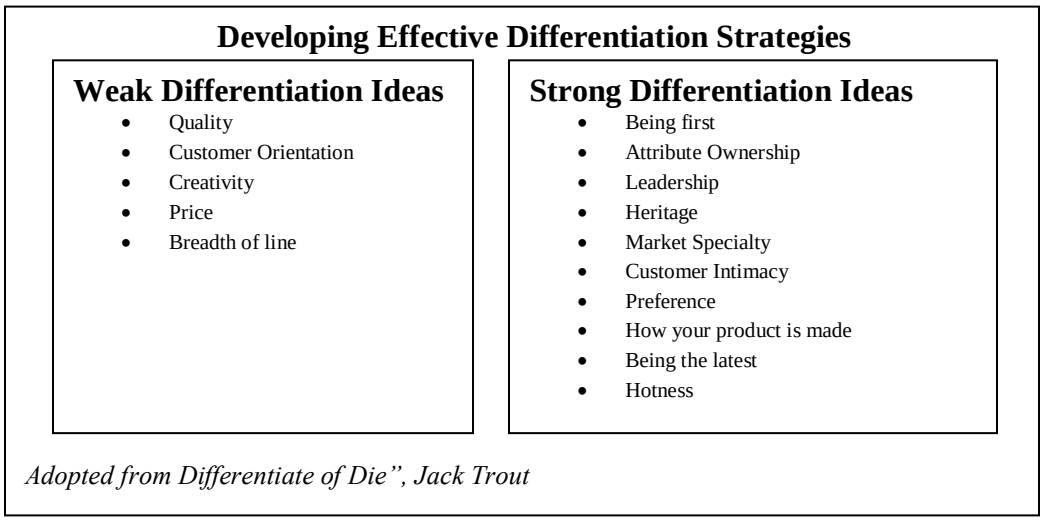
For a reliable study, this research work takes a representative sample from the study population (8 five star hotels in Nepal). The operational sample size of the study is about 50% (i.e. 4) of the whole operational population**.** Empirical data was collected through questionnaire surveys. Questionnaires were sent to the general managers and departmental chief officers of 4 of the largest five star hotels in Nepal. The total number of returned questionnaires was 20 out of 28. However, not all respondents answered all the questions, due to the fact that respondents were guaranteed full anonymity. Therefore the questionnaires did not include any information that could have made it possible to reveal who responded and who did not. In the survey, 14 market-related strategies were supplied to the respondents in order for them to express their views in a Likert Scale rating. The available data was analyzed with SPSS software. The aforementioned 14 market-related strategies are:

Provision of good quality services/quality differentiation
Advertising and promotion of the product/services differentiation
A strong influence/close relationship with the travel agency/tourguide/user experience differentiation
A major effort to ensure sources of customers
Broad promotion of services (new market)/service differentiation
Delivery of a broad service line/innovation/technology differentiation
Innovation of marketing techniques and methods/ technology differentiation
Industry analysis

Analysis of competitive position/ User experience differentiation
SWOT Analysis of competitors
Value Chain Analysis
Maintenance of the market share at minimum cost/price differentiation
New market entry
Advertising expenditure above the industry average

Differentiation

Aaker (2001: 134) considers that four factors are needed in order to create a sustainable competitive advantage: **first,** the product strategy, the positioning strategy and the production strategy with which the organization competes; **second**, the assets and capabilities of the organization that form the basis for competition; **third**, the markets in which the organization competes; and **finally**, the competition with which the organization has to contend.



Differentiation is accomplished through gaining – and sustaining – competitive advantage (Colgate 1998: 80). Branding seems to be the only sustainable differentiating strategy that hotels might use. A sustainable differentiating strategy requires the hotel to bond emotionally with its customers and focus on building long-term relationships with them. Hotels might accomplish sustainable differentiation by continually providing consistent brand messages (Cai & Hobson 2004: 206–207).

McDonald (2002: 460) states that even though an organization is able to gain a competitive advantage, it is easy for a competitor to match that organization and draw alongside it. Mazzarol and Soutar (1999: 290 & 292) propose that the organization can sustain its competitive advantage only if barriers to imitation are put in place. These barriers prohibit competitors from copying the organization. If competitors are unable to copy an organization, its competitive advantage may well become sustainable in the long run. The attributes of sustainable competitive advantages are in uniqueness of services, difficulties to replicate, superior competitive services, sustainable new technology applicable to multiple situations, and detail information.

Positioning

Positioning is an important strategy that an organization might utilize to create, and sustain its competitive advantage (Anderson & Vincze 2000: 209; Belch & Belch 2004: 51; Cravens, Lamb & Crittenden 2002: 8; Lovelock 2001: 200; Palmer 2001: 177). Once a service organization has identified its target market, the next step is to clearly position its service offering. The organization should first of all identify the basis on which it wants to compete, and then position its services in a clear and unique way (Meek, Meek & Ensor 2001: 169).

It is important to establish the different positioning criteria along with the service offerings that can be positioned.

- *Specific products or service attributes:* A hotel promotes to business travellers the fact, for example, that it is located in the heart of a financial centre.
- *Benefits or needs:* A hotel decides to focus on specific services offered to the business segment. These services might include, for example, Internet access and document delivery.
- *Usage occasions:* A hotel positions itself to conference organizers as ideally suited for hosting conferences.
- *User categories:* A hotel positions itself as meeting the needs of business customers rather than individual customers.
- *Positioning by competitor:* A hotel positions itself as having better facilities than those of all other hotels in a particular area.
- *Positioning by product class:* A hotel positions itself as a 'conference' hotel rather than as a 'leisure' hotel.
- *Positioning by price and quality:* A hotel might position its brand at the high end of the market as a premium hotel, or at a more competitive price at the lower end of the market.
- *Positioning by cultural or national symbols:* A hotel can tie itself to a cultural symbol.

4. Analysis

To sustain its competitive advantage and suitably position an offering for the duration of its existence, it is crucial for the organization to identify the phase of the service life-cycle in which the offering finds itself. The placement of the offering in the service life-cycle will determine the marketing strategies that are appropriate in addressing the challenges of the phase in question.

Are there any differences in the marketing strategies of competitiveness within Nepalese five star hotels?

Most five stars hotels in Nepal are concentrated in the central boroughs of Kathmandu (with around 88% of the total five star hotel stock) but there has been a considerable trend of dispersal over the past few years, and further dispersal is expected. Key areas of growth have been fully developed in the downtown area of Kathmandu.

The market need products and services and vice versa. This research analyzes the market strategies of hospitality businesses in Nepal. Those strategies were pre-assumed by the researcher and seek the perceptions of respondents such as the general manager and the departmental manager concerning those market-related strategy factors. Those factors were: to provide good services, to advertise and promote the product and services, strong influence over the travel agency/tour guide, a major effort to ensure sources of customers, promoting the service broadly in a potential market/new market, offering a broad service line, the innovation of marketing techniques and methods, industry analysis, analysis of competitive position, the

SWOT Analysis of the competitor, the value chain analysis, the maintenance of the market share at minimum cost, new market entry, and an advertising expenditure above the industry average.

Market strategies/differentiation strategies were rated as an average mean of 16.34 according to the perceptions of the respondents. This means a moderate emphasis in the market differentiation strategies of the respondents. In the survey, 14 market-related strategies were supplied to the respondents for expression of their views in a Likert Scale rating. Among the 14 strategies, value chain analysis was rated at the level of some emphasis by an average mean of 13.29, but other strategies were rated based on their views at the moderate emphasis level. Strong influences over the travel agencies/tour guides (mean 17.57) and broad promotion of the hotel service in a new market (mean 17.57) were rated as higher priorities among the other strategies. The innovation of marketing techniques and methods (mean 17.43) was rated as the second priority among the other strategies. The analysis of the competitive position (mean 17.29), major efforts to ensure sources of customers (mean 17.14), the delivery of a broad service line (mean 17.14), and advertising and promotion of services/products (mean 17) were ranked third, fourth, and fifth according to the respondents views. Likewise, new market entry (mean 16.57), SWOT analysis (mean 16.14), providing good services (mean 16), industry analysis (mean 15.57), maintaining market share at minimum cost (mean 15.14) and advertising expenditures above the industry average (mean 14.86) were rated as market strategies.

Alternate Hypothesis

Ha= There is a difference in the marketing strategies of competitiveness within Nepalese five star hotels.

Ha: $\mu \neq 7$

Ho: $\mu=7$

Table 6.31
One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Least consideration	14	.0000	.00000(a)	.00000
Very limited emphasis	14	.2143	.57893	.15473
Limited emphasis	14	.7857	1.05090	.28087
Some emphasis	13	2.5385	.96742	.26831
Moderate emphasis	14	3.5000	1.34450	.35933
Considerable emphasis	14	7.3571	1.64584	.43987
Major constant emphasis	14	5.7857	2.35922	.63053

a t cannot be computed because the standard deviation is

Table 6.32
One-Sample Test

	Test Value = 7					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Very limited emphasis	-43.856	13	.000	-6.78571	-7.1200	-6.4514

Limited emphasis	-22.125	13	.000	-6.21429	-6.8211	-5.6075
Some emphasis	-16.628	12	.000	-4.46154	-5.0461	-3.8769
Moderate emphasis	-9.740	13	.000	-3.50000	-4.2763	-2.7237
Considerable emphasis	.812	13	.431	.35714	-.5931	1.3074
Major constant emphasis	-1.926	13	.076	-1.21429	-2.5765	.1479

In the case of market differentiation strategies, there is major considerable emphasis in Nepalese five star hotels for competitiveness.

The p value is 0.076 for major considerable emphasis, considerable emphasis 0.431, moderate emphasis 0.00, some emphasis 0.00 and least emphasis 0.00 of management accounting.

Where P > 0.05

If p value is greater than $\sigma = 0.05$ reject alternate hypothesis and accept the null hypothesis. It means market differentiation strategies are not of major considerable emphasis nor of considerable emphasis. The analysis shows that the practices of a market differentiation strategy by Nepalese five star hotels fall into the categories of emphasis, some emphasis and least emphasis. However, the analysis shows that moderate emphasis, some emphasis and least emphasis in the market differentiation strategies in Nepalese five star hotels correspond to the competitiveness of their business activities.

Customer Service Differentiation Strategies

A winning customer service strategy provides quality service and resolves customer complaints. In the help desk industry, much effort has been placed on customer satisfaction measurement. This includes developing processes to measure satisfaction, to implement changes that increase customer satisfaction and communicate the enhancements to the customers. A critical missing element is an emphasis on customer complaints. A support organization should also develop processes for the management of complaints. Customer service employees require more than just customer service skills. They will need to understand the diversity of the customers' needs that are being used by business as well as the IT systems. This will mean training – lots of it. The actual amount of training will depend on the overall strategy for implementation of any new IT systems.

Customer service strategies are better techniques that satisfy customers regarding hotel services. This research examines the position of some customer service strategies found in five star hotels based on the research question mentioned below.

Is there any emphasis in customer service differentiation strategies for competitiveness in Nepalese five star hotels?

Ten customer service strategic factors were pre-determined by the researcher for the survey questionnaires. According to the survey question the respondents rated customer's service strategies as an average mean of 17.23, which indicates that services had considerable emphasis in the hotel, according to the respondents. Safety and security services were rated with a higher average mean of (18.14) than other customer services. In relationship to hotel employees, targeting high-income customers (mean 18), highly-trained and experienced personnel (mean17.86), accurate and timely services (mean 17.86), quick-delivery promises (mean 17.43), concern for special customers (mean 17.43) and excellence through people (mean 17.14) were

ranked second, third, fourth and fifth based on the respondents view of hotel employees. The possibility of integration of the supplier and customer's value chain (mean 16.57), customer service capability (mean 16.43) and providing after sales services (mean 15.43) were rated under moderate emphasis.

Alternate Hypothesis

Ha = There is major considerable emphasis in customer service differentiation strategies for competitiveness in Nepalese five star hotels:

Ha: $\mu \neq 7$

Ho: μ=7

Table 6.33
One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Least consideration	10	.0000	.00000(a)	.00000
Very limited emphasis	10	.0000	.00000(a)	.00000
Limited emphasis	10	.4000	.84327	.26667
Some emphasis	8	1.7500	.88641	.31339
Moderate emphasis	10	3.6000	1.42984	.45216
Considerable emphasis	10	6.4000	2.01108	.63596
Major constant emphasis	10	8.2000	2.74064	.86667

a t cannot be computed because the standard deviation is 0.

Table 6.34
One-Sample Test

	Test Value = 8					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Limited emphasis	-28.500	9	.000	-7.60000	-8.2032	-6.9968
Some emphasis	-19.943	7	.000	-6.25000	-6.9911	-5.5089
Moderate emphasis	-9.731	9	.000	-4.40000	-5.4228	-3.3772
Considerable emphasis	-2.516	9	.033	-1.60000	-3.0386	-.1614
Major constant emphasis	.231	9	.823	.20000	-1.7605	2.1605

In the case of customer service differentiation strategies, there is major considerable emphasis in Nepalese five stars hotels for competitive advantages, when the p value is 0.823 for major considerable emphasis, considerable emphasis 0.033, moderate emphasis 0.00, some emphasis 0.00 and least emphasis 0.00 in management accounting.

Where P > 0.05

If p value is greater than σ= 0.05 reject the alternate hypothesis and accept the null hypothesis. It means the customer service differentiation strategies have not had major considerable emphasis in Nepalese five star hotels. However, considerable emphasis, moderate emphasis, some emphasis and limited emphasis are the service differentiation strategies of five star hotels.

5. Conclusions and discussion

Empirical research on the profit impact in hotel business marketing strategies indicates that firms with differentiation strategies for their market share, quality, a close relationship to the travel agency, efforts to invite major customers, the promotion of services, technology innovation, marketing methods, an analysis of the competitive position, a SWOT analysis, a value chain analysis, new market entry and advertising expenditures were often quite profitable, but so were many hotels with low differentiation market strategies.

Differentiation is accomplished through gaining – and sustaining – competitive advantage (Colgate 1998: 80), however, five star hotels in Nepal are not very aware of this strategy. The five star hotels of Nepal are not much concerned with focus and differentiation strategy. The least profitable firms were those with moderate market strategies. This was sometimes referred to as *the hole in the middle problem*. Porter explains that firms with high-market share strategies were successful because they pursued a cost leadership strategy, and firms with low-market share were successful because they used market segmentation to focus on a small but profitable market niche. Firms in the middle were less profitable because they did not have a viable generic strategy. Five star hotels applied the least profitable strategy in their market competitive advantages.

A large company with a high-market share has the opportunity to provide improved products or services that appeal to a broad audience. Providing a highly-visible product or service can help a company gain attention. Some hotels improve in numerous small ways, where a company can gain competitive advantage. If market differentiation strategies (such as an eye-catching presentation) are practically differences compared to competitors, this can re-build the image of services and organizations, then the competitive advantages of the hotel industry will be more successful in the future.

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Appendix
Market Differentiation Strategies

Market	Providing good services	0	0	1	3	4	7	5	16		2.672612419
	Advertising and promoting the product	0	0	0	1	4	10	5	17		3.760699023
	Strong influence over the travel agency/tour guide	0	0	0	1	3	8	8	17.5714286		3.670993119
	Major effort to ensure sources of customers	0	0	1	2	2	6	9	17.1428571		3.38765265
	Broad promotion of the service (new market)	0	0	0		6	5	9	17.5714286		3.881580434
	Delivering a broad service line	0	0	0	2	3	8	7	17.1428571		3.38765265
	Innovation of marketing techniques and methods	0	0	0	2	3	6	9	17.4285714		3.484660262
	Industry analysis	0	0	2	3	3	8	4	15.5714286		2.734262328
	Analysis of competitive position	0	0	0	2	2	9	7	17.2857143		3.670993119
	SWOT analysis of competitors	0	0	0	3	5	8	4	16.1428571		3.078342164
	Value chain analysis	0	2	3	3	6	4	2	13.2857143		1.864454471
	Maintaining the market share at a minimum cost	0	0	2	4	3	8	3	15.1428571		2.734262328
	New market entry	0	0		3	3	9	5	16.5714286		3.386246693
	Advertising expenditure above the industry average	0	1	2	4	2	7	4	14.8571429		2.340126167
	Mean	**0**	**0.2**	**0.8**	**2.5**	**3.5**	**7**	**5.8**	**16.336735**		2.843854195

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Impact of Managerial Economics in Concerned Entities: A Theoretical Approach

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Abstract

Managerial economics is a science that deals with the application of various economic theories, principles, concepts and techniques to business management in order to solve business and management problems. It deals with the practical application of economic theory and methodology to decision-making problems faced by private, public and non-profit making organizations. Managerial economics is essentially applied economics in the field of business management. It is developed to bridge the gap between the 'economic theory' and 'managerial practice' as practiced in business enterprises. The success or failure of a business is contingent upon the decisions taken by managers. This study contains the introduction to managerial economics: scope and method, selected optimization techniques, consumer demand analysis, applied demand estimation, demand forecasting, production and cost theory and applications, cost models and estimation as well as link in concerned entities.

Keywords: Optimization techniques, demand, forecasting, decision making, managerial

1. Introduction

The discipline of managerial economics deals with aspects of economics and tools of analysis, which are employed by business enterprises for decision-making. Business and industrial enterprises have to undertake varied decisions that entail managerial issues and decisions. Decision-making can be delineated as a process where a particular course of action is chosen from a number of alternatives. This demands an unclouded perception of the technical and environmental conditions, which are integral to decision making. The decision maker must possess a thorough knowledge of aspects of economic theory and its tools of analysis. The basic concepts of decision-making theory have been culled from microeconomic theory and have been furnished with new tools of analysis. Statistical methods, for example, are pivotal in estimating current and future demand for products. The methods of operations research and programming proffer scientific criteria for maximizing profit, minimizing cost and determining a viable combination of products.

Decision-making theory and game theory, which recognize the conditions of uncertainty and imperfect knowledge under which business managers operate, have contributed to systematic methods of assessing investment opportunities. Almost any business decision can be analyzed with managerial economics techniques. However, the most frequent applications of these

techniques are as follows:

a. ***Risk analysis:*** Various models are used to quantify risk and asymmetric information and to employ them in decision rules to manage risk.
b. ***Production analysis***: Microeconomic techniques are used to analyze production efficiency, optimum factor allocation, costs and economies of scale. They are also utilized to estimate the firm's cost function.
c. ***Pricing analysis:*** Microeconomic techniques are employed to examine various pricing decisions. This involves transfer pricing, joint product pricing, price discrimination, price elasticity estimations and choice of the optimal pricing method.
d. ***Capital budgeting:*** Investment theory is used to scrutinize a firm's capital purchasing decisions.

1.1 Meaning of Managerial Economics

Managerial economics, used synonymously with business economics, is a branch of economics that deals with the application of microeconomic analysis to decision-making techniques of businesses and management units. It acts as the via media between economic theory and pragmatic economics. Managerial economics bridges the gap between 'theoria' and 'pracis'. The doctrine of managerial economics has been derived from quantitative techniques such as regression analysis, correlation and Lagrangian calculus (linear). An omniscient (knowing everything) and unifying theme found in managerial economics is the attempt to achieve optimal results from business decisions, while taking into account the firm's objectives, constraints imposed by scarcity and so on. A paradigm of such optimization is the use of operations research and programming.

Managerial economics is thereby a study of application of managerial skills in economics. It helps in anticipating, determining and resolving potential problems or obstacles. These problems may pertain to costs, prices, forecasting future market, human resource management, profits and so on.

1.2 Definition of Managerial Economics

McGutgan and Moyer*: "Managerial economics is the application of economic theory and methodology to decision-making problems faced by both public and private institutions".*

McNair and Meriam: *"Managerial economics consists of the use of economic modes of thought to analyse business situations".*

Spencer and Siegelman: "*Managerial economics is "the integration of economic theory with business practice for the purpose of facilitating decision-making and forward planning by management".*

Haynes, Mote and Paul: *"Managerial economics refers to those aspects of economics and its tools of analysis most relevant to the firm's decision-making process".*

By definition, therefore, its scope does not extend to macro- economic theory and the economics of public policy, an understanding of which is also essential for the manager.

Managerial economics studies the application of the principles, techniques and concepts of economics to managerial problems of business and industrial enterprises. The term is used interchangeably with business economics, microeconomics, economics of enterprise, applied economics, managerial analysis and so on. Managerial economics lies at the junction of economics and business management and traverses the hiatus between the two disciplines.

1.3 Characteristics of Managerial Economics

1. **Microeconomics:** It studies the problems and principles of an individual business firm or an individual industry. It aids the management in forecasting and evaluating the trends of the market.
2. **Normative economics:** It is concerned with varied corrective measures that a management undertakes under various circumstances. It deals with goal determination, goal development and achievement of these goals. Future planning, policy-making, decision-making and optimal utilization of available resources, come under the banner of managerial economics.
3. **Pragmatic*:*** Managerial economics is pragmatic. In pure micro-economic theory, analysis is performed, based on certain exceptions, which are far from reality. However, in managerial economics, managerial issues are resolved daily and difficult issues of economic theory are kept at bay.
4. **Uses theory of firm**: Managerial economics employs economic concepts and principles, which are known as the theory of Firm or 'Economics of the Firm'. Thus, its scope is narrower than that of pure economic theory.
5. **Takes the help of macroeconomics:** Managerial economics incorporates certain aspects of macroeconomic theory. These are essential to comprehending the circumstances and environments that envelop the working conditions of an individual firm or an industry. Knowledge of macroeconomic issues such as business cycles, taxation policies, industrial policy of the government, price and distribution policies, wage policies and anti-monopoly policies and so on, is integral to the successful functioning of a business enterprise.
6. **Aims at helping the management:** Managerial economics aims at supporting the management in taking corrective decisions and charting plans and policies for future.
7. **A scientific art:** Science is a system of rules and principles engendered for attaining given ends. Scientific methods have been credited as the optimal path to achieving one's goals. Managerial economics has been is also called a scientific art because it helps the management in the best and efficient utilization of scarce economic resources. It considers production costs, demand, price, profit, risk etc. It assists the management in singling out the most feasible alternative. Managerial economics facilitates good and result oriented decisions under conditions of uncertainty.

8. **Prescriptive rather than descriptive:** Managerial economics is a normative and applied discipline. It suggests the application of economic principles with regard to policy formulation, decision-making and future planning. It not only describes the goals of an organization but also prescribes the means of achieving these goals.

1.4 . Scope of Managerial Economics

The scope of managerial economics includes following subjects, which are enumerated as follows:

1. ***Theory of Demand:*** According to Spencer and Siegelman, "A business firm is an economic organization which transforms productivity sources into goods that are to be sold in a market".
   a. ***Demand analysis:*** Analysis of demand is undertaken to forecast demand, which is a fundamental component in managerial decision-making. Demand forecasting is of importance because an estimate of future sales is a primer for preparing production schedule and employing productive resources. Demand analysis helps the management in identifying factors that influence the demand for the products of a firm. Thus, demand analysis and forecasting is of prime importance to business planning.
   b. ***Demand theory:*** Demand theory relates to the study of consumer behavior. It addresses questions such as what incites (motivates) a consumer to buy a particular product, at what price does S/he purchase the product, why do consumers cease consuming a commodity and so on. It also seeks to determine the effect of the income, habit and taste of consumers on the demand of a commodity and analyses other factors that influence this demand.
2. ***Theory of Production:*** Production and cost analysis is central for the unhampered functioning of the production process and for project planning. Production is an economic activity that makes goods available for consumption. Production is also defined as a sum of all economic activities besides consumption. It is the process of creating goods or services by utilizing various available resources. Achieving a certain profit requires the production of a certain amount of goods. To obtain such production levels, some costs have to be incurred. At this point, the management is faced with the task of determining an optimal level of production where the average cost of production would be minimum. Production function shows the relationship between the quantity of a good/service produced (output) and the factors or resources (inputs) used. The inputs employed for producing these goods and services are called factors of production.
   a. ***Variable factor of production:*** The input level of a variable factor of production can be varied in the short run. Raw material inputs are deemed (considered) as variable factors. Unskilled labour is also considered in the category of variable factors.
   b. ***Fixed factor of production:*** The input level of a fixed factor cannot be varied in the short run. Capital falls under the category of a fixed factor. Capital alludes to (indirectly)

resources such as buildings, machinery etc. Production theory facilitates in determining the size of firm and the level of production. It elucidates the relationship between average and marginal costs and production. It highlights how a change in production can bring about a parallel change in average and marginal costs. Production theory also deals with other issues such as conditions leading to increase or decrease in costs, changes in total production when one factor of production is varied and others are kept constant, substitution of one factor with another while keeping all increased simultaneously and methods of achieving optimum production.

3. ***Theory of Exchange or Price Theory:*** Theory of Exchange is popularly known as Price Theory. Price determination under different types of market conditions comes under the wingspan (measurement) of this theory. It helps in determining the level to which an advertisement can be used to boost market sales of a firm. Price theory is pivotal in determining the price policy of a firm. Pricing is an important area in managerial economics. The accuracy of pricing decisions is vital in shaping the success of an enterprise. Price policy impresses upon the demand of products. It involves the determination of prices under different market conditions, pricing methods, pricing policies, differential pricing, product line pricing and price forecasting.
4. ***Theory of profit:*** Every business and industrial enterprise aims at maximizing profit. Profit is the difference between total revenue and total economic cost.
   Profitability of an organization is greatly influenced by the following factors:
   (a) Demand of the product (b) Prices of the factors of production (c) Nature and degree of competition in the market (d) Price behavior under changing conditions Hence, profit planning and profit management are important requisites for improving profit-earning efficiency of the firm. Profit management involves the use of most efficient technique for predicting the future. The probability of risks should be minimized as far as possible.
5. ***Theory of Capital and Investment:*** Theory of Capital and Investment evinces(indicate) the following important issues:
   (a) Selection of a viable investment project
   (b) Efficient allocation of capital
   (c) Minimizing the possibility of under capitalization or overcapitalization.
   Capital is the building block of a business. Like other factors of production, it is also scarce and expensive. It should be allocated in most efficient manner.
6. ***Environmental issues:*** Managerial economics also encompasses some aspects of macroeconomics. These relate to social and political environment in which a business and industrial firm has to operate. This is governed by the following factors:

(a) The type of economic system of the country (b) Business cycles (c) Industrial policy of the country (d) Trade and fiscal policy of the country (e) Taxation policy of the country (f) Price and labor policy (g) General trends in economy concerning the production, employment, income, prices, saving and investment etc. (h) General trends in the working of financial

institutions in the country (i) General trends in foreign trade of the country (j) Social factors like value system of the society (k) General attitude and significance of social organizations like trade unions, producers' unions and consumers' cooperative societies etc. (l) Social structure and class character of various social groups (m) Political system of the country.

The management of a firm cannot exercise control over these factors. Therefore, it should fashion the plans, policies and programmes of the firm according to these factors in order to offset their adverse effects on the firm.

2. Why Managers need to know economics?

The contribution of economics towards the performance of managerial duties and responsibilities is of prime importance. The contribution and importance of economics to the managerial profession is akin (similar) to the contribution of biology to the medical profession and physics to engineering. It has been observed that managers equipped with a working knowledge of economics surpass their otherwise equally qualified peers, who lack knowledge of economics. Managers are responsible for achieving the objective of the firm to the maximum possible extent with the limited resources placed at their disposal. It is important to note that maximization of objective has to be achieved by utilizing limited resources. In the event of resources being unlimited, like air or sunshine, the problem of economic utilization of resources or resource management would not have arisen. Resources like finance, workforce and material are limited. However, in the absence of unlimited resources, it is the responsibility of the management to optimize the use of these resources.

3. How economics contributes to managerial functions?

Though economics is variously defined, it is essentially the study of logic, tools and techniques, to make optimum use of the available resources to achieve the given ends. Economics affords analytical tools and techniques that managers require to accomplish the goals of the organization they manage. Therefore, a working knowledge of economics, not necessarily a formal degree, is indispensable for managers. Managers are fundamentally practicing economists.

While executing his duties, a manager has to take several decisions, which conform to the objectives of the firm. Many business decisions fall prey to conditions of uncertainty and risk. Uncertainty and risk arise chiefly due to volatile market forces, changing business environment, emerging competitors with highly competitive products, government policy, external influences on the domestic market and social and political changes in the country. The intricacy of the modern business world weaves complexity in to the decision making process of a business. However, the degree of uncertainty and risk can be greatly condensed if market conditions are calculated with a high degree of reliability. Envisaging a business environment in the future does not suffice. Appropriate business decisions and formulation of a business strategy in conformity with the goals of the firm hold similar importance.

Pertinent business decisions require an unambiguous understanding of the technical and environmental conditions under which business decisions are taken. Application of economic theories to explain and analyze technical conditions and business environment, contributes greatly to the rational decision-making process. Economic theories have many pronged applications in the analysis of practical problems of business. Keeping in view the escalating complexity of business environment, the efficacy of economic theory as a tool of analysis and its contribution to the process of decision-making has been widely recognized.

3.1 Contributions of economic theory to business economics

According to Baumol, there are three main contributions of economic theory to business economics.

1. The practice of building analytical models, which assist in recognizing the structure of managerial problems and eliminating minor details, which might obstruct decision-making has been derived from economic theory. Analytical models help in eradicating peripheral problems and help the management in retaining focus on core issues.
2. Economic theory comprises a founding pillar of business analysis- 'a set of analytical methods', which may not be applied directly to specific business problems, but they do enhance the analytical capabilities of the business analyst.
3. Economic theories offer an unequivocal perspective on the various concepts used in business analysis, which enables the manager to swerve from conceptual pitfalls.

3.2 Importance of managerial economics

Business and industrial enterprises aim at earning maximum proceeds. In order to achieve this objective, a managerial executive has to take recourse in decision-making, which is the process of selecting a specified course of action from a number of alternatives. A sound decision requires fair knowledge of the aspects of economic theory and the tools of economic analysis, which are directly involved in the process of decision-making. Since managerial economics is concerned with such aspects and tools of analysis, it is pertinent to the decision-making process.

Spencer and Siegelman have described the importance of managerial economics in a business and industrial enterprise as follows:

1. **Accommodating traditional theoretical concepts to the actual business behavior and conditions:**

Managerial economics amalgamates tools, techniques, models and theories of traditional economics with actual business practices and with the environment in which a firm has to operate. According to Edwin Mansfield, "Managerial Economics attempts to bridge the gap between purely analytical problems that intrigue many economic theories and the problems of policies that management must face".

2. **Estimating economic relationships:**

Managerial economics estimates economic relationships between different business factors

such as income, elasticity of demand, cost volume, profit analysis etc.

3. Predicting relevant economic quantities:

Managerial economics assists the management in predicting various economic quantities such as cost, profit, demand, capital, production, price etc. As a business manager has to function in an environment of uncertainty, it is imperative to anticipate the future working environment in terms of the said quantities.

4. Understanding significant external forces:

The management has to identify all the important factors that influence a firm. These factors can broadly be divided into two categories. Managerial economics plays an important role by assisting management in understanding these factors;

***(a)*External factors:**

A firm cannot exercise any control over these factors. The plans, policies and programmes of the firm should be formulated in the light of these factors. Significant external factors impinging on the decision-making process of a firm are economic system of the country, business cycles, fluctuations in national income and national production, industrial policy of the government, trade and fiscal policy of the government, taxation policy, licensing policy, trends in foreign trade of the country, general industrial relation in the country and so on.

***(b)Internal factors*:** These factors fall under the control of a firm. These factors are associated with business operation. Knowledge of these factors aids the management in making sound business decisions.

5. *Basis of business policies:*

Managerial economics is the founding principle of business policies. Business policies are prepared based on studies and findings of managerial economics, which cautions the management against potential upheavals in national as well as international economy.

Thus, managerial economics is helpful to the management in its decision-making process.

3.3 Techniques of Managerial Economics

Managerial economics draws on a wide variety of economic concepts, tools and techniques in the decision-making process. These concepts can be categorized as follows:

1. ***Theory of the firm:*** A firm can be considered an amalgamation of people, physical and financial resources and a variety of information. Firms exist because they perform useful functions in society by producing and distributing goods and services. In the process of accomplishing this, they employ society's scarce resources, provide employment and pay taxes. If economic activities of society can be simply put into two categories- production and consumption- firms are considered the most basic economic entities on the production side, while consumers form the basic economic entities on the consumption side. The behavior of firms is usually analyzed in the context of an economic model, which is an idealized version of a real-world firm. The basic economic model of a business enterprise is called the theory of the firm.

2. ***Theory of consumer behavior:*** The role of consumers in an economy is of vital importance

since consumers spend most of their incomes on goods and services produced by firms. Consumers consume what firms produce. Thus, study of the theory of consumer behavior is accorded importance. It is desirous to know the ultimate objective of a consumer. Economists have an optimization model for consumers, which is analogous to that applied to firms or producers. While it is assumed that firms attempt at maximizing profits, similarly there is an assumption that consumers attempt at maximizing their utility or satisfaction. While more goods and services provide greater utility to a consumer, however, consumers, like firms, are subject to constraints. Their consumption and choices are limited by a number of factors, including the amount of disposable income (the residual income after income taxes are paid for). A consumer's choice to consume is described by economists within a theoretical framework usually termed the theory of demand.

3. ***Theories associated with different market structures:*** A firms profit maximizing output decisions take into account the market structure under which they are operate. There are four kinds of market organizations: perfect competition, monopolistic competition, oligopoly and monopoly. All the above theories are analyzed with the help a vast and varied quantitative tool and techniques.

3.4 Application of Managerial Economics

Tools of managerial economics can be used to achieve virtually all the goals of a business organization in an efficient manner. Typical managerial decision-making may involve one of the following issues:

(a) Decisions pertaining to the price of a product and the quantity of the commodity to be produced (b) Decisions regarding manufacturing product/part/component or outsourcing to/purchasing from another manufacturer (c) Choosing the production technique to be employed in the production of a given product (d) Decisions relating to the level of inventory of a product or raw material a firm will maintain (e) Decisions regarding the medium of advertising and the intensity of the advertising campaign (f) Decisions pertinent to employment and training (g) Decisions regarding further business investment and the modes of financing the investment.

It should be noted that the application of managerial economics is not restricted to profit-seeking business organizations. Tools of managerial economics can be applied equally well to decision problems of nonprofit organizations. Mark Hirschey and James L. Pappas cite the example of a nonprofit hospital making use of the managerial economics techniques for optimization of resource use. While a nonprofit hospital is not like a typical firm seeking to maximize its profits, a hospital does strive to provide its patients the best medical care possible given its limited staff (doctors, nurses and support staff), equipment, space and other resources. The hospital administrator can employ concepts and tools of managerial economics to determine the optimal allocation of the limited resources available to the hospital. In addition to nonprofit business organizations, government agencies and other nonprofit organizations (such as cooperatives, schools and museums) can exploit the techniques of managerial decision making to

achieve goals in the most efficient manner. While managerial economics aids in making optimal decisions, one should be aware that it only describes the predictable economic consequences of a managerial decision.

3.5 Tools of Decision science and Managerial Economics

Managerial decision-making draws on economic concepts as well as tools and techniques of analysis provided by decision sciences. The major categories of these tools and techniques are optimization, statistical estimation, forecasting, numerical analysis and game theory. Most of these methodologies are technical. The first three are briefly explained below to illustrate how tools of decision sciences are used in managerial decision-making.

1. ***Optimization:*** Optimization techniques are probably the most crucial to managerial decision making. Given that alternative courses of action are available, the manager attempts to produce the most optimal decision, consistent with stated managerial objectives. Thus, an optimization problem can be stated as maximizing an objective (called the objective function by mathematicians) subject to specified constraints. In determining the output level consistent with the maximum profit, the firm maximizes profits, constrained by cost and capacity considerations. While a manager does not resolve the optimization problem, he or she may make use of the results of mathematical analysis. In the profit maximization example, the profit maximizing condition requires that the firm select the production level at which marginal revenue equals marginal cost. This condition is obtained from an optimization model/technique. The techniques of optimization employed depend on the problem a manager is trying to solve.
2. ***Statistical estimation:*** A number of statistical techniques are used to estimate economic variables of interest to a manager. In some cases, statistical estimation techniques employed are simple. In other cases, they are much more complex and advanced. Thus, a manager may want to know the average price received by his competitors in the industry, as well as the standard deviation (a measure of variation across units) of the product price under consideration. In this case, the simple statistical concepts of mean (average) and standard deviation are used. Estimating a relationship among variables requires a more advanced statistical technique. For example, a firm may desire to estimate its cost function i.e. the relationship between cost concept and the level of output. A firm may also wish to the demand function of its product that is the relationship between the demand for its product and factors that influence it. The estimates of costs and demand are usually based on data supplied by the firm. The statistical estimation technique employed is called regression analysis and is used to engender a mathematical model showing how a set of variables are related. This mathematical relationship can also be used to generate forecasts.
3. ***Forecasting:*** It is a method or a technique to predict many future aspects of a business or any other operation. For example, a retailing firm that has been in business for the last 25 years may be interested in forecasting the likely sales volume for the coming year. Numerous

forecasting techniques can be used to accomplish this goal. A forecasting technique, for example, can provide such a projection based on the experience of the firm during the last 25 years; that is, this forecasting technique bases the future forecast on the past data.

While the term 'forecasting' may appear technical, planning for the future is a critical aspect of managing any organization or a business. The long-term success of any organization has close association with the propensity of the management of the organization to foresee its future and develop appropriate strategies to deal with the likely future scenarios. Intuition, good judgment and knowledge of economic conditions enable the manager to 'feel' or perhaps anticipate the likelihood in the future. It is not easy, however, to metamorphose a feeling about the future outcome into concrete data for instance, as a projection for next year's sales volume. Forecasting methods can help predict many future aspects of a business operation, such as forthcoming years' sales volume projections.

There are many forecasting techniques available to the person assisting the business in planning its sales. Take for example a forecasting method in which a statistician forecasting future values of a variable of business interest—sales, for example, examines the cause-and-effect relationships of this variable with other relevant variables. The other pertinent variable may be the level of consumer confidence, changes in consumers' disposable incomes, the interest rate at which consumers can finance their excess spending through borrowing and the state of the economy represented by the percentage of the labour force unemployed. This category of forecasting technique utilizes time series data on many relevant variables to forecast the volume of sales in the future. Under this forecasting technique, a regression equation is estimated to generate future forecasts (based on the past relationship among variables).

4. How managerial economics is link with other academic disciplines?

1. Relationship with economics:

The relationship between managerial economics and economics theory may be viewed form the point of view of the two approaches to the subject Viz. Micro Economics and Marco Economics. Microeconomics is the study of the economic behavior of individuals, firms and other such micro organizations. Managerial economics is rooted in Micro Economic theory. Managerial Economics makes use to several Micro Economic concepts such as marginal cost, marginal revenue, elasticity of demand as well as price theory and theories of market structure to name only a few. Macro theory on the other hand is the study of the economy as a whole. It deals with the analysis of national income, the level of employment, general price level, consumption and investment in the economy and even matters related to international trade, Money, public finance, etc.

The relationship between managerial economics and economics theory is like that of engineering science to physics or of medicine to biology. Managerial economics has an applied bias and its wider scope lies in applying economic theory to solve real life problems of

enterprises. Both managerial economics and economics deal with problems of scarcity and resource allocation.

2. Management theory and accounting:

Managerial economics has been influenced by the developments in management theory and accounting techniques. Accounting refers to the recording of pecuniary transactions of the firm in certain books. A proper knowledge of accounting techniques is very essential for the success of the firm because profit maximization is the major objective of the firm. Managerial Economics requires a proper knowledge of cost and revenue information and their classification. A student of managerial economics should be familiar with the generation, interpretation and use of accounting data. The focus of accounting within the firm is fast changing from the concepts of store keeping to that if managerial decision making, this has resulted in a new specialized area of study called "Managerial Accounting".

3. Managerial Economics and mathematics:

The use of mathematics is significant for managerial economics in view of its profit maximization goal long with optional use of resources. The major problem of the firm is how to minimize cost, hoe to maximize profit or how to optimize sales. Mathematical concepts and techniques are widely used in economic logic to solve these problems. Also mathematical methods help to estimate and predict the economic factors for decision making and forward planning. Mathematical symbols are more convenient to handle and understand various concepts like incremental cost, elasticity of demand etc., Geometry, Algebra and calculus are the major branches of mathematics which are of use in managerial economics. The main concepts of mathematics like logarithms, and exponentials, vectors and determinants, input-output models etc., are widely used. Besides these usual tools, more advanced techniques designed in the recent years viz. linear programming, inventory models and game theory fine wide application in managerial economics.

4. Managerial Economics and Statistics:

Managerial Economics needs the tools of statistics in more than one way. A successful businessman must correctly estimate the demand for his product. He should be able to analyses the impact of variations in tastes. Fashion and changes in income on demand only then he can adjust his output. Statistical methods provide and sure base for decision-making. Thus statistical tools are used in collecting data and analyzing them to help in the decision making process.

Statistical tools like the theory of probability and forecasting techniques help the firm to predict the future course of events. Managerial Economics also make use of correlation and multiple regressions in related variables like price and demand to estimate the extent of dependence of one variable on the other. The theory of probability is very useful in problems involving uncertainty.

5. Managerial Economics and Operations Research:

Taking effectives decisions is the major concern of both managerial economics and

operations research. The development of techniques and concepts such as linear programming, inventory models and game theory is due to the development of this new subject of operations research in the postwar years. Operations research is concerned with the complex problems arising out of the management of men, machines, materials and money.

Operation research provides a scientific model of the system and it helps managerial economists in the field of product development, material management, and inventory control, quality control, marketing and demand analysis. The varied tools of operations Research are helpful to managerial economists in decision-making.

***6*. Managerial Economics and the theory of Decision- making:**

The Theory of decision-making is a new field of knowledge grown in the second half of this century. Most of the economic theories explain a single goal for the consumer i.e., Profit maximization for the firm. But the theory of decision-making is developed to explain multiplicity of goals and lot of uncertainty.

As such this new branch of knowledge is useful to business firms, which have to take quick decision in the case of multiple goals. Viewed this way the theory of decision making is more practical and application oriented than the economic theories.

7. Managerial Economics and Computer Science:

Computers have changes the way of the world functions and economic or business activity is no exception. Computers are used in data and accounts maintenance, inventory and stock controls and supply and demand predictions. What used to take days and months is done in a few minutes or hours by the computers. In fact computerization of business activities on a large scale has reduced the workload of managerial personnel. In most countries a basic knowledge of computer science, is a compulsory programme for managerial trainees.

To conclude, managerial economics, which is an offshoot traditional economics, has gained strength to be a separate branch of knowledge. It strength lies in its ability to integrate ideas from various specialized subjects to gain a proper perspective for decision-making.

A successful managerial economist must be a mathematician, a statistician and an economist. He must be also able to combine philosophic methods with historical methods to get the right perspective only then; he will be good at predictions. In short managerial practices with the help of other allied sciences.

5. Conclusions

The discipline of managerial economics deals with aspects of economics and tools of analysis, which are employed by business enterprises for decision-making. Business and industrial enterprises have to undertake varied decisions that entail managerial issues and decisions. Decision-making can be delineated as a process where a particular course of action is chosen from a number of alternatives. This demands an unclouded perception of the technical and environmental conditions, which are integral to decision making. The decision maker must possess a thorough knowledge of aspects of economic theory and its tools of analysis, which are

integral to decision making. The basic concepts have been culled from microeconomic theory and have been furnished with new tools of analysis. , therefore, conclude that the subject-matter of managerial economics consists of applying economic principles and concepts towards adjusting with various uncertainties faced by a business firm.

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Articulation of a Space of Liminality in Jean Rhys's *Wide Sargasso Sea*

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Abstract:

This paper seeks to analyze the identity of the European-Caribbean character as depicted in Jean Rhys's novel Wide Sargasso Sea (1966). Focusing on Antoinette, the central character of the novel, it traces the features of liminal space and analyzes her unsettled, troubled and multifaceted predicament as an outsider. Antoinette, who is of European colonial origin, lives in the Caribbean and then returns back to her place of origin. On the process, she appears as a changed person due to the knowledge gained from the experience with the 'Other' in the colonial setting. Antoinette reflects on the inner indecisive high-strung frustration caused by her involvement into the two cultural setting. Investigating the intense oscillation between these two cultural voices within the protagonist's inner dialogue, this paper delves into the consciousness of Antoinette and exposes her uncertainty of cultural identity, alienation and sense of estrangement.

Keyword: postcolonial identity, hybridity, liminal space, prequel

'Place' and 'displacement' are crucial features of post-colonial writing. Place, in post-colonial context, refers not only to landscape. It is rather "a complex interaction of language, history and environment" (Ashcroft, Griffiths and Tiffin, 391). It is characterized firstly by a sense of displacement in those who have moved to the colonies. Place is the concomitant to and associated with difference and yet of the hybrid interpenetration of the colonizer and colonized. An analysis of place therefore throws light upon subjectivity. Jean Rhys's novel *Wide Sargasso Sea* shows its concern with developing or recovering an appropriate identifying relationship between 'place' and 'self'. The novel exposes how the liminal space— the space between two (post) colonial cultures—shapes Antoinette's ambivalent identity. It articulates plural and often conflicting outsider identities of Dominican-born protagonist Antoinette. She finds herself in in-between space, in a space of liminality, lacking authentic self-hood and feeling doubleness and split of personality.

Wide Sargasso Sea is a prequel to Charlotte Bronte's *Jane Eyre*. It takes place in Jamaica, only a few years following the Emancipation Act of 1834 and seeks to recreate the true story of Bertha Mason, the Jamaican mad wife of Edward Rochester in Bronte's *Jane Eyre*. In telling Bertha's story, Rhys explores the complex relations between white and black West Indians, and between the old slaveholding West Indian families and the new English settlers in the post-emancipation Caribbean. Set mainly in Jamaica and Dominica, the country of Rhys's

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birth, the novel describes how Antoinette, the heroine of the novel, became mad. In Bronte's novel, Bertha/Antoinette has been presented as a violent, insane, and promiscuous. Rhys creates, instead a sympathetic and vulnerable young woman, Antoinette who seeks to belong but happens to be dislocated in an indeterminate space of liminality where tension occurs.

According to Victor Turner, the space of liminality is "a state of flux and the entities in this zone are neither here nor there; they are betwixt and between the positions assigned and arrayed by law, custom, convention and ceremonial" (314). Antoinette, a white Creole heiress, from the time of her youth in the Caribbean to her unhappy marriage and relocation to England, is caught up in an oppressive racial and patriarchal society in which she belongs neither to the white Europeans nor the black Jamaicans. After her marriage with Mr. Rochester, an Englishman, she has been taken away from the only place she has known--a house with a garden where "the paths were overgrown and a smell of dead flowers mixed with the fresh living smell. Underneath the tree ferns, tall as forest tree ferns, the light was green. Orchids flourished out of reach or for some reason not to be touched" (*WSS* 11). Antoinette carries within herself two opposing worlds and, her mind is suspended between those two worlds, so, ultimately, it belongs to neither. Though striving to find a place in one culture or another, she is denied her identity by both, and must accept that her residence is in a no-man's-land, a country inhabited by her alone. Bhabha's theory of mimicry describes this as "the sign of double articulation; a complex strategy of reform, regulation and discipline…" (122). This is the great chasm exposed in *Wide Sargasso Sea*, the troubles of an identity "at sea" between two continents and unable to reach either shore. The Sargasso Sea between the Caribbean and Europe is so wide for Antoinette that she is unable to cross it, so she remains trapped in the middle of it.

Antoinette, a Creole heiress, daughter of a widowed Martinique woman, descends from a slave-owning family. She and her mother Annette still reside with her invalid brother on the estate home Coulibri. The blacks, now emancipated, hate them; the island's white people reject them. As her black playmate Tia taunts, "Real white people, they got gold money.... Old time white people nothing but white nigger now, and black nigger better than white nigger" (*WSS* 14). Raised by her black nurse Christophine yet dressed in English clothes, Antoinette lives in-between two cultures. She and her mother do not belong anywhere; like the islands themselves in the period following emancipation and like the grounds of Coulibri that grow wild, they have been abandoned-beautiful, exotic, but neglected creatures.

In one of the first incidents of the novel, Annette finds her horse poisoned and despairs," Now we are marooned ... now what will become of us?" (*WSS*10). This event and the word Annette uses to define its significance not only develop plot and character, but allude to important events in the history and legends of the West Indies. During slavery, the blacks resorted most frequently to poisoning as a method of resistance. They poisoned their masters, the masters' families and animals, and even themselves in the effort to either escape the brutality of their conditions or cause economic difficulties for their owners. Later in the novel, her husband Rochester accuses Antoinette of using poison. Languishing in a meaningless identity that ties

them to no one and sets them apart from everyone, Antoinette and her mother may betray themselves and others; others certainly betray them. In this incident of the poisoned horse, the blacks clearly perceive them as enemies, yet enemies stripped of their power to retaliate. However opposed by the blacks, Annette perceives her close and complex relation to them in depicting herself, her son, and Antoinette as marooned. Both Annette and Antoinette submit to exploitative marriages, exchanging themselves and their property for the social identity they desperately need. Annette marries the English neo-colonialist, Mr. Mason. This arrangement, however, only leads to more conflict when a mob of angry blacks sets fire to Coulibri, destroying their home, killing Antoinette's brother, and driving her mother mad. Running from the fire, Antoinette encounters her own painfully split identity.

Antoinette escapes the violence only temporarily, retreating into the interior world of her convent school. There she finds sanctuary and clarity: "Everything was brightness or dark.... That was how it was, light and dark, sun and shadow, Heaven and Hell . . ." (*WSS*34). Her name and place become secure as she embroiders "in fire red, Antoinette Mason, nee Cosway, Mount Calvary Convent, Spanish Town, Jamaica, 1839" (*WSS* 31). The certainty of her identity and of these dualistic distinctions dissolves in confusion, however, as Mason leads Antoinette through the gates of the convent wall to exchange her in marriage to another Englishman, Mr. Rochester. At first attracted to Antoinette's beauty and the money he acquires through the marriage, Rochester soon grows to despise both the island with its strange intensity and his wife, who seems a stranger of another race. Her sexual passion, awakened in the marriage, disgusts him. Branding her like a slave, he renames her Bertha. In their struggle, Antoinette turns to Christophine, the obeah women, for a magic potion that Rochester believes poisons him. Their marriage, an exchange of property and sexuality, repeats master/slave relations; husband and wife enact the traditional rites of possession and revolt. Convinced that Antoinette is mad, Rochester plans to remove her to England, where he confines her in the attic of Thornfield Hall. Here Antoinette dreams the final episode in a series of dreams that began the night she first met Mr. Mason. Mason had shut away her "mad" mother as the solution to conflicts with his wife and the island's people and had married Antoinette to Rochester, who resorts to the same tactic in the names of reason, morality, and civilization.

Exiled from her country, her people, and from her marriage, Antoinette finds herself again marooned, living the half-life of a prisoner, her only crime her sexuality and cultural difference. In this final dream, Antoinette wanders through a passageway and discovers a large room with red carpets and curtains that reminds her of a church. She has returned to the inner world of her childhood convent education, but she has also discovered a room very much like the "red room" in which little Jane Eyre was cruelly locked as an orphan child. The tie between these two female characters lies not so much in their relations with Rochester as in their shared experiences of abandonment, confinement, and the need to call upon inner images and inner voices and make them part of their outer and shared world. Jane hears Rochester calling her

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name though she lives miles from him. She trusts the voice as real even though she imagines it, just as Antoinette finally trusts the reality of her dream.

Antoinette's displaced identity changes again: all at once, the colors and smells, the gardens and people of her island home appear in the sky made red now by the fire that spreads from the candles she has knocked onto the red curtains. This color red, whose flames had once destroyed her home, now becomes her personal magic, fetishized in the red dress she claims and the name she once embroidered 'in fire red'. She calls on her black friend Tia and this time they do not betray one another: "Tia was there. She beckoned to me … I heard her say, You frightened? And I heard the man's voice, Bertha! Bertha! All this I saw and heard in a fraction of a second… Someone screamed and I thought, why did I scream? I called "Tia!" and jumped and woke" (*WSS*112). The choice signifies a victory and a triumph. In the dream Antoinette creates the self that others have denied her. She returns to the island and her ties with its culture and people; she refuses Rochester's prison and finds her only real tie to the English through her shared experiences with Jane Eyre. The dream creates a story that condenses into a "fraction of a second" all the private images of her inner life and the conflicts of her social world. When she awakens and sets out through the door into the same passageway, Antoinette again crosses the gates separating outer and inner realities, but this time by her own choice and with the knowledge of her own power. She finds this power in her ability to act where she actually is-in the midst of two worlds and in a new fictional reality, in the wide Sargasso Sea that dissolves distinctions between public and private experience, madness and reason, primitive and civilized behavior, fiction and fact.

Along with a missing mother, whose presence would have allowed Antoinette to feel part of a family and therefore of a shared tradition, there is also a missing history, contributing to the sense of being uprooted that afflicts Antoinette. Annette, her mother, harshly turns down Antoinette's questions about the past and as a consequence Antoinette herself no longer wonders about it, dismissing every issue concerning it by saying, "all that is long ago" (*WSS* 34). An additional cause of confusion is, of course, her unclear position in the West Indian society, which leads to the double scorn she is constantly subjected to, both from the white population and from the black- she is a 'white cockroach' for the blacks and a 'white nigger' for the Europeans. So there is absolutely no place for her.

The search for identity that has tormented Antoinette all her life now finds its solution through the dreamlike quality of the narration at the end of the novel and the literal dream-section that closes the chapter. Here, after realising that her personality is torn into two, Antoinette is driven to the extremity of her distress, but from the bottom of her sorrow springs the willpower to solve her inner conflict. The novel ends with Antoinette walking in the corridor with a candle in her hand, replicating the beginning of the dream she has just had – but not acting it out. Antoinette's vision of symbols and images, her dream vision of her black friend and her universe is nothing but just wishful thinking. There is, then, nothing and nobody to help Antoinette in her quest for identity, but there is much against her.

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Conclusion

Featuring Antoinette, a Creole narrator/ protagonist, wandering in liminal zone, *Wide Sargasso Sea* thus illustrates the acute difficulties that can occur when a subject finds that the certainties that had been propagated for generations become volatile, replaced with anxieties and alienation. The exclusion from both white and black society defines Antoinette's outcast status and ambivalent identity, a condition that she becomes unable to escape and grieves her beyond endurance.

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An Empirical Research on Monthly Tourism Forecasting for Nepal

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Abstract

In this paper, monthly tourism forecasting in Nepal is performed with univariate Seasonal Auto Regressive Integrated Moving Average (SARIMA) modeling, using monthly tourist arrival data available from 1991 to 2011 via Nepal Tourism Statistic 2012 report. The SARIMA model was estimated based on preexisting algorithms of Athanasopoulos, Hyndman, Song, and Wu (2011), by using the R package 'forecast'. It was found, SARIMA(3,1,2)(0,1,1)[12] and SARIMA(3,1,1)(2,0,1)[12] model as the best model on level data and on logarithmic transformation data respectively. In-sample forecasting capability and out-of-Sample forecasting capability of both models were checked. SARIMA(3,1,2)(0,1,1)[12] model is used to forecast monthly tourism arrival from 2013 to 2014(on the basis of various econometric diagnoses).
Keywords: Tourism Forecasting, Forecast Accuracy, Tourism in Nepal, SARIMA

1. Introduction

Nepal - birth land of Buddha - is a landlocked country between China and India crowned with Mount Everest, and is enriched with cultural diversity, biodiversity, heavenly scenarios, heritages and pilgrimages. Nepal has enormous potentiality for tourism. Tourism comprises the activities of persons traveling to and staying in places outside, their usual environment for not more than one consecutive year for leisure, business and other purposes (Gautam & Ph, n.d.).

"The number of tourists visiting in Nepal was 6,179 in 1962 to 6,02,867 in the year 2010, with the upward trend ever since, except in the years 1965, 1981, 1984, 1989, 1993, 2000, 2001, 2002, 2005 and 2008" (Shrestha and Shrestha, 2012). The major purpose of tourist visit in Nepal are: holiday/pleasure, trekking and mountaineering, business, pilgrimage, and official. The means of arrival to Nepal is only air and land. The average length of stay is 13.12 days in 2011. The gross foreign exchange earnings from tourism was 321 million US dollars and average income per visitor per day was 38.2 US dollar in 2011 (*Nepal Tourism Statistics*, 2011). (Adhikari, 2010) reported that "the tourism development process was started in Nepal through a strategy of First Five Years' Development Plan (1956-61) in 1956".

Forecasting tourism demand or arrival on various time horizon and level of aggregation are relevant to decision making (Witt & Witt, 1995) He stated further importance as, short term forecasts are required for scheduling and staffing, medium term forecasts for planning tour operator brochures and long term forecasts for investment in aircraft, hotels and infrastructure. Governments are interested in total international inbound and outbound tourist expenditures at

country level, hotels in tourism demand by city or region and airlines in tourism demand by route.

This paper tries to model the tourist arrival in Nepal using the monthly time series data from 1991 to 2011, available from Nepal Tourism Statistics 2012. Then this paper forecasts tourist arrival for 2012 to 2014 on month basis. The article has used Seasonal Auto Regressive Integrated Moving Average (SARIMA) to explain the past behavior of tourism arrival in Nepal and to forecast ahead. This paper analyzes in-sample forecast capabilities of the SARIMA model from 1991 to 2011. Then out-of-sample forecast capabilities of SARIMA model is tested for 2012 using forecasted data against observed data from Nepal Tourism Statistics 2012.

This article is organized as brief literature review in section two, methodology in third section, analysis of the study in fourth section and final section concludes the work.

2. Literature Review

Song and Li (2008) remarked that the literatures on tourism demand modeling and forecasting methods can be broadly divided into two categories: quantitative and qualitative methods. Song and Turner (2006) stated the majority of the published studies used quantitative methods to forecast tourism demand. The quantitative forecasting literature is dominated by two sub- categories of methods: non-causal time series models and the causal econometric approaches. The difference between them is whether the forecasting model identifies any causal relationship between the tourism demand variable and its influencing factors.

De Gooijer and Hyndman (2006) reviewed the past 25 years of research into time series forecasting and found one third of all papers concerned used time series forecasting. They have classified the papers according to the models as: exponential smoothing, ARIMA, Seasonality, State space and structural models and the Kalman filter, Nonlinear models, Long memory models, ARCH/GARCH models and Count data forecasting. Song & Li (2008) reviewed the published studies on tourism demand modeling and forecasting since 2000 and found different versions of the ARIMA models have been applied in over two-thirds of the post-2000 studies that utilized the time series forecasting techniques.

Nanthakumar, Thirunaukarasu, and Mori (2012) stated the literature on modeling and forecasting tourism demand is numerous with various types of empirical analysis. Some of the researchers applied cross-sectional data, but most of tourism demand forecasting used pure time-series analytical models. Song and Li (2008) stated that the time series models have been widely used in tourism demand forecasting in the past four decades with the dominance of the integrated autoregressive moving-average models (ARIMAs) proposed by Box and Jenkins (1970). Song and Li (2008) also stated that depending on the frequency of the time series, either simple ARIMA or seasonal ARIMA (i.e. SARIMA) models could be used with the latter gaining an increasing popularity over the last few years, as seasonality is such a dominant feature of the tourism industry that decision makers are very much interested in the seasonal variation in tourism demand.

To predict ASEAN tourist arrivals to Malaysia Nanthakumar et al. (2012) used the ARIMA and SARIMA approach. The empirical forecasting method used in that study produced best fit ARIMA and SARIMA model. Witt and Witt (1995) stated that no single forecasting method performs consistently best across different situations, but autoregression, exponential smoothing and econometrics are worthy of consideration as alternatives to the no change model. (Brierley, 2011) used four base algorithms using the R package 'forecast': Seasonal Naive; Damped Holt-Winters, ARIMA; and ETS; based on Athanasopoulos, Hyndman, Song, and Wu (2011).

Based upon the literature review, this paper will model the tourism arrival with SARIMA model based on preexisting algorithms of Athanasopoulos, Hyndman, Song, and Wu (2011), by using the R package 'forecast'.

3. Methodology

3.1. Data

This paper uses the total tourist arrival data from the Nepal Tourism Statistics 2012. The data are monthly time series data from January 1991 to December 2012. This data consists the total tourist arrival from all over the world. For modeling and in-sample forecast accuracy check purpose, data from January 1991 to December 2011 is considered. For out-of-sample forecast accuracy check purpose January 2012 to December 2012 is considered.

3.2. Methodology

This paper has four parts: At first part this paper does Box-Cox transformation to stabilize variance, make the data more normal distribution-like, then finds the best fit SARIMA model by minimizing the AIC criterion by an iterative process. This process includes finding the order of difference by KPSS test. In the second part, the model has to pass the JLung-Box test (which tests simultaneously whether a set of autocorrelations are all zeros), Jeqrua Bera Normality test (which tests whether the residuals are normally distributed or not). At the third stage- in-sample and out-of-sample forecast accuracy checks are done. At fourth stage this paper proposes the tourism forecasting for 2013 and 2014.

3.2.1. Box-Cox transformation

Time series may suffer from nonstationarity in variance (heteroskedasticity). Any ARMA process, even after differencing (ARIMA) process can't realize heteroskedasticity. Box-Cox transformation can remove such. Box-Cox transformation is given as:

$Z_t(\lambda) = (X\lambda_{t-1})/\lambda \text{ if } \lambda \neq 0$

$Z_t(\lambda) = log(X_t) \text{ if } \lambda = 0$

The Box-Cox transformation allows reaching a good level of symmetry of the distribution, independence of random effects and stable variance. $\lambda = 0$ corresponds to the logarithmic transformation, $\lambda = 0.5$, square root and $\lambda = 1/3$, cubic root. λ is determined through

maximum likelihood estimates. A good value of λ to treat heteroschedasticity also makes the process more similar to a Gaussian and reduces the effects of possible outliers.

3.2.2. ARIMA (AutoRegressive Integrated Moving Average)

ARIMA (autoregressive integrated moving average) models are generalizations of the simple AutoRegressive model. ARIMA has 3 parts: the auto regression part (AR), the integration part (I) and the moving average part (MA). AR part of a time series Y_t is that the observed value depends on some linear combination of previous observed values up to a defined maximum lag (denoted p), plus a random error term ε_t. MA part of a time series Y_t is that the observed value is a random error term plus some linear combination of previous random error terms up to a defined maximum lag (denoted q). Time series are usually non stationary and in order to achieve stationary, the series has to be differenced. The process of differencing is known as an integration part (I) and the order of differencing is denoted as d. Differencing removes the signals (the trend or seasonality) from the series so that series consists only the noise or the irregular component to be modeled.

While allowing for the presence of seasonality in a series, the general seasonal ARIMA model is referred as SARIMA and denoted as SARIMA(pdq)(PDQ)s, where p, d and q refer to the orders of the nonseasonal AR, I and MA parts of the model respectively and P, D, Q and s refer to the orders of the seasonal AR, I, MA parts and s is the seasonal period or frequency (for example 4 for quarterly data or 12 for monthly data) of the model respectively. The model is given as:

$\varphi_p(B)\Phi_P(B^s)\Delta^d\Delta_s{}^D y_t = \theta_q(B)\Theta_Q(B^s)\varepsilon t$

The full algebraic description of the general ARIMA model is be given in Annex A1.

3.2.3. Selection Criteria of Integrated part of ARIMA

Athanasopoulos, Hyndman, Song, & Wu (2010) suggested to choose the order of difference (d) by applying successive KPSS unit root tests to the seasonally differenced data. KPSS test assesses the null hypothesis that a univariate time series *y* is trend stationary against the alternative that it is a nonstationary unit-root process. The KPSS test statistic is given as:

stat = $\sum_{t=1}^{T}(s(t))^2/s_{nw}^2T^2$

where $s(t) = r_1 + ... + r_t$, r is the vector of residuals from the regression, $s_{nw}^2$is the Newey-West estimator of the long-run variance, and T is the sample size (http://www.mathworks.com).

3.2.4 Selection Criteria of ARIMA Model

Athanasopoulos et al. (2010) suggested to select the values of p, q, P and Q by minimizing the Akaike's Information Criterion (AIC) . AIC is given as:

$\mathrm{AIC} = -2\log(L) + 2(p + q + P + Q)$

where L is the maximized likelihood of the model fitted to the differenced data $(1-B^s)^D(1-B)^d y_t$ or $\Delta^d\Delta_s{}^D y_t$. (Athanasopoulos et al., 2010) also remarked, that there can be too many potential ARIMA models which can be estimate at every possible combination of p, q, P and Q. Instead,

to arrive at the model with the lowest AIC value it's an iterative process. Athanasopoulos et al., (2010)cited Hyndman and Khandakar (2008) who has proposed step-wise algorithm. This paper will use auto.arima() function of forecast package developed by Hyndman in R programming language.

3.2.5. Ljung–Box test

The Ljung-Box Q-test is a quantitative way to test for autocorrelation at multiple lags jointly. The null hypothesis for this test is that the first *m* autocorrelations are jointly zero.

$H_0: \rho_1 = \rho_2 = \ldots = \rho_m = 0$ (source: http://www.mathworks.com)

$Q = n(n+2)\sum_{i=0}^{k} \frac{\mathrm{ACF}(i)^2}{N-i}$ for i= 1 to k with (k-p-q) degree of freedom

3.2.6. Jarque-Bera Normality Test

Jarque-Bera is a test statistic for testing the Null hypothesis that "the samples come from a Normal distribution" against the alternative hypothesis "the samples do not come from a Normal distribution". The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. The statistic is computed as:

$\mathrm{JB} = \frac{N-k}{6}\left(S^2 + \frac{(K-3)^2}{4}\right)$

where is the *S* is skewness, *K* is the kurtosis, and *k* represents the number of estimated coefficients used to create the series. Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as Chi-Square with 2 degrees of freedom. The reported Probability is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis—a small probability value leads to the rejection of the null hypothesis (Software, n.d.).

3.2.7. Forecast Accuracy

Accuracy is particularly important when forecasting tourism demand on account of the perishable nature of the product (Witt & Witt, 1995). The MAPE is commonly used in quantitative forecasting methods because it produces a measure of relative overall fit. The absolute values of all the percentage errors are summed up and the average is computed. Mean Absolute Percentage Error (MAPE) is defined as

$\mathrm{MAPE} = 100n - 1(\sum(|y_t - f_t|)/|y_t|)$

3.2.8. Model Selection Criteria

The model is expected to have: significant parameters, the residual should be non auto correlated and normally distributed, with smallest MAPE for in-sample and out-sample forecast accuracy.

4. Data Analysis and Result

This section presents the detail analysis using the R 2.15.1 and forecast package; Eviews 4 and Excel 2007. Data from January 1991 to December 2011 are taken to model the tourist

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arrival. At first SARIMA modeling is performed on level data and Box-Cox transformation data; at second stage the Ljung test and JB test are done and presented in Table-2; Table-3 consists result of in-sample and out-of-sample forecast accuracy checks and Table-4 consists of MAPE calculation. And finally a discussion of appropriate model selection is done and selected model is performed to provide the forecast from January 2013 to December 2014 is presented in Table-5.

A visual inspection of data is initially done which clearly shows seasonality that tourist

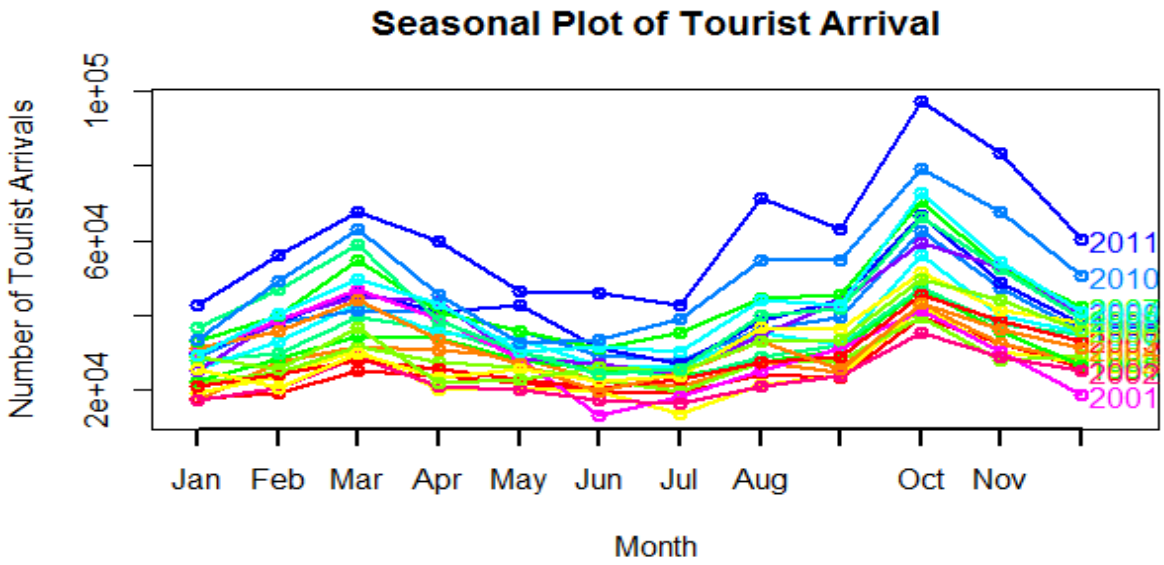

Figure 1 Seasonal Plot of Tourist Arrival from 1991 to 2011
source: (Nepal Tourism Statistics 2011, 2011)

arrival peaks at March and October and troughs at January and July in Figure 1.

The Figure 2 shows that the data seems non normally distributed and assuming the data are non-stationary in variance (heteroskedasticity), Box-Cox transformation was applied and value of lambda (λ) is found to be -0.097. This paper will consider lambda (λ) = -0.097 ≈ 0 for simplicity. λ = 0 corresponds to the logarithmic transformation. The distribution of data after logarithmic transformation is given in Figure 3.

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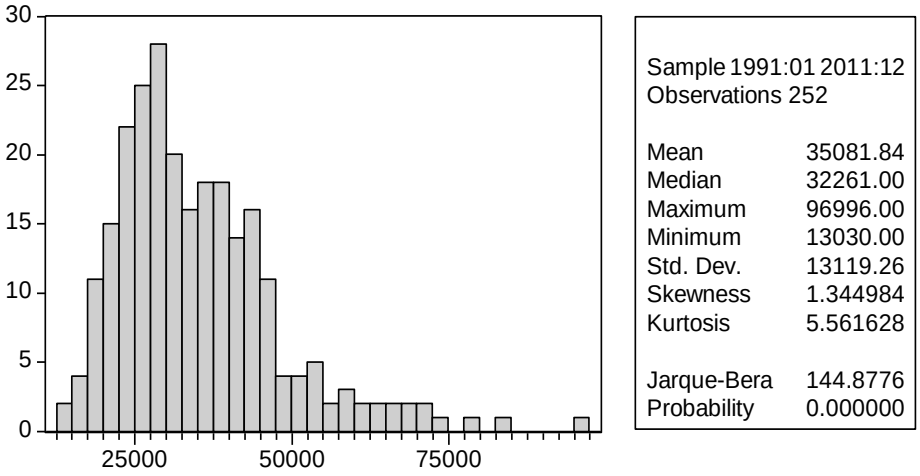

Figure2: Histogram of Tourist Arrival from 1991 to 2011 on level data.
source: (*Nepal Tourism Statistics 2011,* 2011)

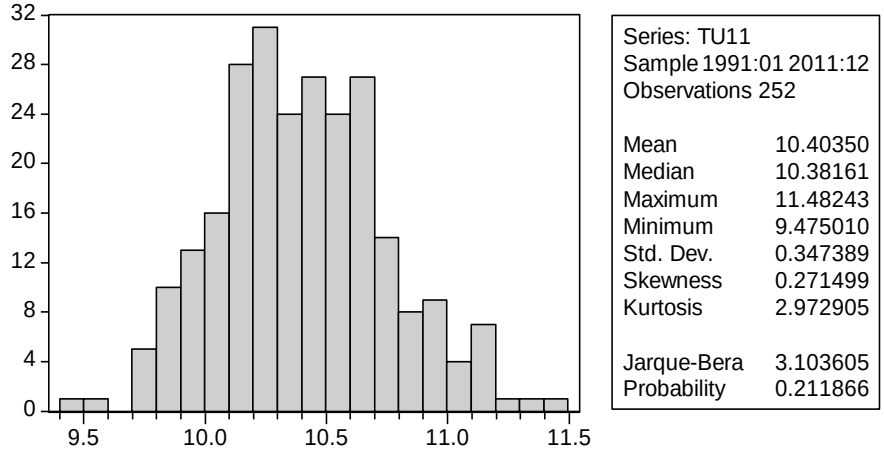

Figure3: Histogram of Tourist Arrival from 1991 to 2011 after Logarithmic Transformation (λ = 0) Source: (*Author's Calculation*)

Based on preexisting algorithms of Athanasopoulos, Hyndman, Song, and Wu (2011), by using the R package 'forecast', SARIMA modeling is done - using the KPSS test to identify the differing order & minimize the AIC value by iterative process for various values of p,q,P and Q- in the level data and logarithmic transformation data. The estimation of p,q,P and Q is given at Table-1

Table1: Model Identification and Parameter Estimation

SARIMA(3,1,2)(0,1,1)[12]	SARIMA(3,1,1)(2,0,1)[12]

Box Cox transformation: lambda= Null				Box Cox transformation: lambda= 0			
Coefficients:		*S.E*	*t*	Coefficients:		*S.E*	*t*
ar1	0.5932	0.1055	5.6227488	ar1	-0.0534	0.1416	-0.3771186
ar2	-0.5307	0.0876	-6.0582192	ar2	-0.078	0.0774	-1.0077519
ar3	-0.3352	0.0701	-4.7817404	ar3	-0.1369	0.0635	-2.1559055
ma1	-0.9687	0.094	-10.305319	ma1	-0.3312	0.1391	-2.3810208
ma2	0.7254	0.1006	7.2107356	sar1	0.9262	0.0952	9.7289916
sma1	-0.6186	0.0644	-9.6055901	sar2	0.0566	0.0888	0.6373874
				sma1	-0.6567	0.1005	-6.5343284
sigma^2 estimated as 16391882		log likelihood=-2326.96		sigma^2 estimated as 0.01582		log likelihood=164.26	
AIC=4667.92	AICc=4668.4	BIC=4692.26		AIC=-309.79	AICc=-309.2	BIC=-281.59	

In the level data SARIMA(3,1,2)(0,1,1)[12] minimizes the AIC value. The estimated parameters have higher *t* values which suggest that the parameters are significant (see *p*-value table). In logarithmic transformation data, SARIMA(3,1,1)(2,0,1)[12] minimizes the AIC value. The estimated parameters have higher t values which suggest that the parameters are significant (see *p*-value table) except than ar1, ar2 and sar2 parameter, which is not desirable.

Table-2 gives the Ljung-Box test and JB test statistics for both models. The *p*-value of Ljung-Box test is greater than 5% level of significance for both models, which leads to failure to reject the null hypothesis that the first 20 autocorrelations are jointly zero, (which is desirable). For SARIMA(3,1,2)(0,1,1)[12] the JB test statistic is 1.97, and the *p*-value is 0.37 > 0.05 level of significance, which leads to failure to reject the null hypothesis that shows in-sample forecast errors are normally distributed (which is desirable). For SARIMA(3,1,1)(2,0,1)[12], the JB test statistic is 349.39, and the *p*-value is nearly 0 < 0.05 level of significance, which leads to reject the null hypothesis that in-sample forecast errors are normally distributed, (which is not desirable).

Table-2: Ljung-Box test and JB test

SARIMA(3,1,2)(0,1,1)[12]	SARIMA(3,1,1)(2,0,1)[12]
Box Cox transformation: lambda= Null	Box Cox transformation: lambda= 0
STATISTIC: Box-Ljung test	STATISTIC: Box-Ljung test
X-squared = 12.6549, df = 20	X-squared = 13.8632, df = 20
p-value = 0.8917	*p*-value = 0.8374
STATISTIC: JB test	STATISTIC: JB test
X-squared: 1.9728	X-squared: 349.3903
Asymptotic *p* Value: 0.3729	Asymptotic *p* Value: < 2.2e-16

Source: (*Author's Calculation*)

In-sample and out-of-sample MAPE is given in the following Table-3. Lower the MAPE, better the predictive capability of the model. The MAPE of in sample and out of sample forecast

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is lower with SARIMA(3,1,1)(2,0,1)[12] which suggests that the logarithmic transformation data are better fit to the model (see Table-4 for out-of-sample MAPE comparison at ANNEX).

Table-3: In-sample and Out-of-sample MAPE

Model	Forecast Accuracy Measures	MAPE	Data taken
SARIMA(3,1,2)(0,1,1)[12]	In-sample	9.38	Monthly data from January 1991 to December 2011
Box Cox transformation: lambda= Null	Out-of-sample	8.07	Monthly data from January 2012 to December 2012
SARIMA(3,1,1)(2,0,1)[12]	In-sample	8.66	Monthly data from January 1991 to December 2011
Box Cox transformation: lambda= 0	Out-of-sample	6.86	Monthly data from January 2012 to December 2012

Source: (*Author's Calculation*)

However, SARIMA(3,1,2)(0,1,1)[12] is appropriate in term of parameter significance and residual diagnostic even thou forecasting capability of this model is slightly poor compare to SARIMA(3,1,1)(2,0,1)[12]. Finally SARIMA(3,1,2)(0,1,1)[12] is used for forecasting monthly tourist arrival from January 2013 to December 2014. The monthly forecasted data is given in Table-5 at ANNEX, while the monthly plot with 95% confidence interval band is in Figure 4 below.

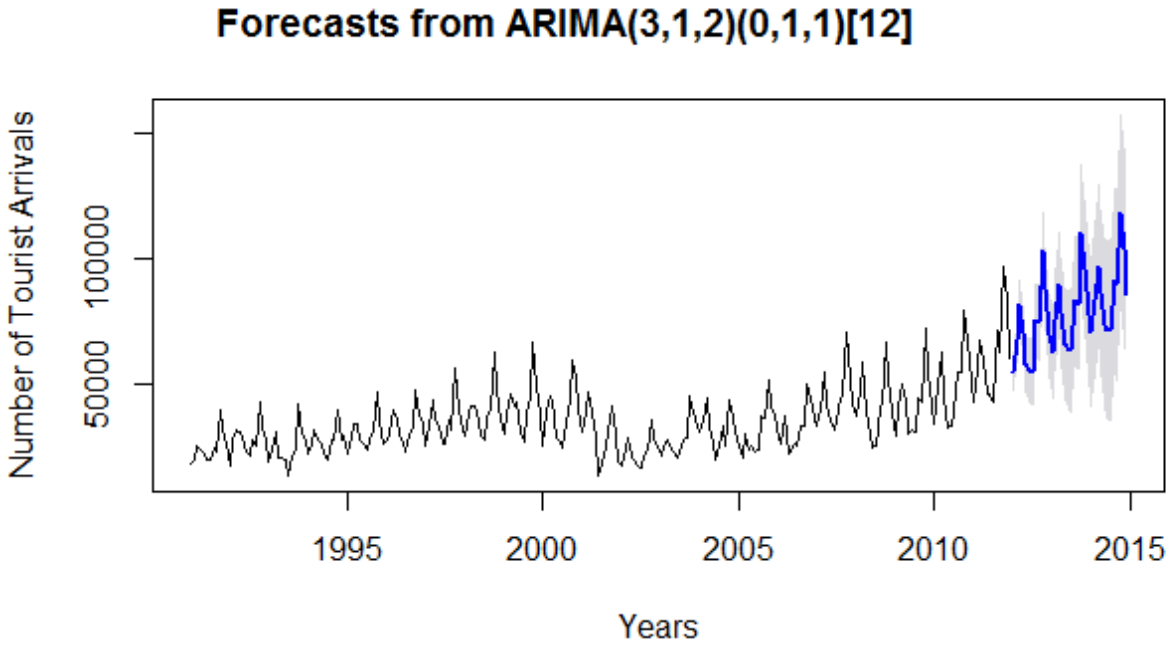

Figure4: Forecasting using ARIMA SARIMA (3,1,2)(0,1,1)[12] from 2012 to 2013 monthly

Source: (*Author's Calculation*)

5. Conclusions

The paper is based on the monthly data available from 1991 to 2012 from Nepal Tourism Statistic 2012 report. The paper modeled the monthly tourism arrival using SARIMA(3,1,2)(0,1,1)[12] and SARIMA(3,1,1)(2,0,1)[12]. SARIMA(3,1,2)(0,1,1)[12] model is selected in term of parameter significance and residual diagnostic even thou forecasting capability of the model is slightly poor compare to SARIMA(3,1,1)(2,0,1)[12]. The tourist arrival in Nepal is currently in uptrend (see Figure-8). However there exists a strong seasonality. The arrival of tourist peaks most at October and at March and the trough are usually seen on June-July and December-January (see Figure-2). SARIMA(3,1,2)(0,1,1)[12] seems to be appropriate to model and forecast the monthly tourism in Nepal. The forecast from 2013 to 2015 suggested there is strong uptrend ahead (see Table-5). Hence this paper ventured to provide a three year long vision for monthly tourism arrival from 2012 to 2014. This paper can provide the bird eye view for concerned policy makers to grab the possible opportunities and mitigate the possible threats.

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ANNEX-1

ARIMA (autoregressive integrated moving average)

ARIMA (autoregressive integrated moving average) models are generalizations of the simple AR model. ARIMA has 3 parts: the auto regression part (AR), the integration part (I) and the moving average part (MA).

A lagged dependent variable, i.e. an autoregressive term, can be justified on the grounds of habit persistence. Once people have been on holiday to a particular country and liked it, they tend to return to that destination (Witt and Witt, 1995). AR part of a time series Y_t is that the observed value depends on some linear combination of previous observed values up to a defined maximum lag (denoted p), plus a random error term εt and given as:

$y_t = \varphi_1 y_{t-1} + \varphi_2 y_{t-2} + \ldots\ldots + \varphi_p y_{t-p} + \varepsilon_t$

where the parameters φ_t are constants.

MA part of a time series Y_t is that the observed value is a random error term plus some linear combination of previous random error terms up to a defined maximum lag (denoted q).

$y_t = \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \ldots\ldots + \theta_q \varepsilon_{t-q}$

where the parameters θ_t are constants.

The mixed model would then be known as ARMA(p q) model and can be expressed as:

$y_t = \varphi_1 y_{t-1} + \varphi_2 y_{t-2} + \ldots\ldots + \varphi_p y_{t-p} + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \ldots\ldots + \theta_q \varepsilon_{t-q}$

$y_t - \varphi_1 y_{t-1} - \varphi_2 y_{t-2} - \ldots\ldots - \varphi_p y_{t-p} = \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \ldots\ldots + \theta_q \varepsilon_{t-q}$

Using backshift operator B (where $By_t = y_{t-1}$, $B^2 y_t = y_{t-2}$, and so on) in equation

$y_t - \varphi_1 B y_t - \varphi_2 B^2 y_t - \ldots - \varphi_p B^p y_t = \varepsilon_t + \theta_1 B \varepsilon_t + \theta_2 B^2 \varepsilon_t + \ldots + \theta_q B^q \varepsilon_t$ [17]

Equation [17] can be re-written as:

$(1 - \varphi_1 B - \varphi_2 B^2 - \ldots\ldots - \varphi_p B^p) yt = (1 - \theta_1 B - \theta_2 B^2 - \ldots\ldots - \theta_p B^p) \varepsilon t$

[18] Equation [18] can be re-written as:

$\varphi_p(B) y_t = \theta_q(B) \varepsilon_t$

where $\varphi_p(B)$ is the non seasonal AR operator and $\theta_q(B)$ is the non seasonal MA operator. This is known as the general non seasonal ARMA(pq) model.

Time series are usually non stationary and in order to achieve stationary the series has to be differenced. The process of differencing is known as integration part (I) and the order of differencing is denoted as d. Differencing removes the signals (the trend or seasonality) from the series so that series consists only the noise or the irregular component to be modeled. This can be expressed algebraically as:

$\Delta^1 y_t = y_t - y_{t-1}$

or, $\Delta^1 y_t = (1-B) y_t$

Above expression is a first difference. A second difference refers taking differences of the observations and then taking differences of the differences and analyzing these second differences. Incorporating this in to the ARMA(pq) model leads to the following expression:

$\varphi_p(B)\Delta^d y_t = \theta_q(B)\varepsilon_t$

where Δ^d is the non seasonal difference operator and d is the order of differencing required to produce a stationary series. This Equation is known as the general, or pure, non seasonal ARIMA(p d q) model.

SARIMA allows for the presence of seasonality in a series. This leads to the general seasonal ARIMA(p d q) (P D Q) model, where P, D and Q refer to the orders of the seasonal AR, I and MA parts of the model respectively. This can be expressed algebraically as:

$\varphi_p(B)\Phi_P(B^s)\Delta^d\Delta_s{}^D y_t = \theta_q(B)\Theta_Q(B^s)\varepsilon t$

where $\Phi_P(B^s)$ is the seasonal AR operator, $\Delta_s{}^D$ is the seasonal I operator, $\Theta_Q(B^s)$ is the seasonal MA operator and s is the seasonal period (for example 4 for quarterly data or 12 for monthly data).

Table4: Out-of Sample MAPE Calculations

Months	Observed data	SARIMA(3,1,1)(2,0,1)[12] Point Forecast	Lo 95	Hi 95	MAPE calculation	SARIMA(3,1,2)(0,1,1)[12] Point Forecast	Lo 95	Hi 95	MAPE Calculation
12-Jan	52501	51289.6	40084.7	65626.6	0.02	54686.24	46750.95	62621.52	0.04
12-Feb	66459	65612.19	49123.25	87635.88	0.01	67549.17	58193.82	76904.53	0.02
12-Mar	89151	82474.45	59862.54	113627.57	0.07	82053.39	71569.16	92537.62	0.08
12-Apr	69796	65221.56	46449.75	91579.66	0.07	71049.48	59989.4	82109.55	0.02
12-May	50317	51188.57	35622.8	73555.98	0.02	58153.17	46418.48	69887.86	0.16
12-Jun	53630	49634.43	33763.72	72965.19	0.07	55392.61	42685.51	68099.72	0.03
12-Jul	49995	51084.01	33987.38	76780.75	0.02	55016.36	41115.98	68916.74	0.1
12-Aug	71964	74317.51	48452.58	113989.65	0.03	75642.03	60713.15	90570.91	0.05
12-Sep	66383	71838.61	45944.55	112326.4	0.08	74297.42	58672.94	89921.9	0.12
12-Oct	86379	108311.9	68007.38	172502.75	0.25	103021.76	86903.1	119140.42	0.19
12-Nov	83173	89777.03	55374.46	145552.94	0.08	88433.71	71806.15	105061.26	0.06
12-Dec	63344	68762.56	41689.85	113415.86	0.09	69576.25	52275.58	86876.93	0.1
		$\sum(\lvert y_t - f_t \rvert)$			0.82	$\sum(\lvert y_t - f_t \rvert)$			0.97
		$(\sum(\lvert y_t - f_t \rvert) / \lvert y_t \rvert)$			0.07	$(\sum(\lvert y_t - f_t \rvert) / \lvert y_t \rvert)$			0.08
		$100n^{-1}(\sum(\lvert y_t - f_t \rvert) / \lvert y_t \rvert)$			6.86	$100n^{-1}(\sum(\lvert y_t - f_t \rvert) / \lvert y_t \rvert)$			8.08

Source: (*Author's Calculation*)

Table-5 Monthly Forecasting from 2013 to 2014

Months	SARIMA(3,1,2)(0,1,1)[12] Point Forecast	Lo 95	Hi 95
13-Jan	62417.9	43198	81637.83
13-Feb	75481	54970.4	95991.63

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13-Mar	89526	68010.8	111041.2
13-Apr	78737.3	56519.6	100954.9
13-May	66145.2	43199.5	89090.89
13-Jun	63604.9	39735.2	87474.51
13-Jul	63125.6	38166	88085.24
13-Aug	83471.4	57491.3	109451.5
13-Sep	81941.6	55161.8	108721.3
13-Oct	110739	83322.2	138156
13-Nov	96386.6	68338.5	124434.7
13-Dec	77692.1	48898.7	106485.5
14-Jan	70480.9	39976.3	100985.4
14-Feb	83347.2	51563.2	115131.1
14-Mar	97248.9	64385.6	130112.1
14-Apr	86497.3	52805.4	120189.2
14-May	74069.3	39538.6	108600.1
14-Jun	71654.6	36132.9	107176.3
14-Jul	71150.3	34500.4	107800.2
14-Aug	91359.6	53625.4	129093.7
14-Sep	89719.9	51077.1	128362.7
14-Oct	118533	79123.6	157942.8
14-Nov	104294	64131	144457.1
14-Dec	85695.3	44687.5	126703

Source: (*Author's Calculation*)