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# Economics and Commerce

Effects of Exchange Rate

Interest Rate on Producer Prices

Highlights

Impacts of Peso Depreciation

India's Agro Processed Food Products

**Discovering Thoughts, Inventing Future**

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# Contents of the Issue


i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Contents of the Issue

1. Impacts of Peso Depreciation and Changes in Other Business and Economic Variables on Aggregate Output in Argentina. *1-5*
2. Export of India's Agro Processed Food Products: A Study of Tea. *7-13*
3. The Effects of Exchange Rate and Interest Rate on Producer Prices in Turkey. *15-25*
4. Dairy Farmers' Welfare Losses from Farm-To-Retail Milk Price Adjustments: Highlight on Market Integration and Price Transmission. *27-37*
5. Contribution De La Consommation Finale Des Ménages A La Croissance Et A La Création D'emploi Au Maroc: Simulation A L'aide D'un Modèle Input-Output. *39-45*
6. Consumerism – Consequence of the Absence of Ethics. *47-52*

v. Fellows
vi. Auxiliary Memberships
vii. Process of Submission of Research Paper
viii. Preferred Author Guidelines
ix. Index

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# Impacts of Peso Depreciation and Changes in Other Business and Economic Variables on Aggregate Output in Argentina

By Yu Hsing & Matthew Alford

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*Abstract-* This paper examines the effects of real depreciation of the Argentine peso and changes in other relevant macroeconomic variables on real GDP in Argentina. The results show that real GDP is negatively influenced by real depreciation of the peso, the real interest rate and the expected inflation rate and positively affected by the ratio of government spending or government deficit to GDP, the real stock price, the real oil price and U.S. real GDP. Therefore, recent depreciation of the peso hurts real GDP whereas recent rise in the stock price helps real GDP. Relatively high interest rates reduce real GDP through personal consumption spending, investment spending and net exports.

*Keywords: real depreciation, interest rates, stock prices, oil prices, expected inflation rate.*

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# Impacts of Peso Depreciation and Changes in Other Business and Economic Variables on Aggregate Output in Argentina

Yu Hsing[α] & Matthew Alford[σ]

*Abstract-* This paper examines the effects of real depreciation of the Argentine peso and changes in other relevant macroeconomic variables on real GDP in Argentina. The results show that real GDP is negatively influenced by real depreciation of the peso, the real interest rate and the expected inflation rate and positively affected by the ratio of government spending or government deficit to GDP, the real stock price, the real oil price and U.S. real GDP. Therefore, recent depreciation of the peso hurts real GDP whereas recent rise in the stock price helps real GDP. Relatively high interest rates reduce real GDP through personal consumption spending, investment spending and net exports.

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## I. Introduction

Argentina went through several financial crises. According to Kronfelt (2015), the crisis in the early 1930s was due to external factors. Large government deficit and debt were part of the reasons in 3 out of the 4 crises. A real appreciation of the peso and a rigid exchange rate policy were part of the contributing factors in 2 out of the 4 crises. Deregulation of the financial sector, if not managed properly, was another contributing factor. Political turmoil led to uncertainty and dampened economic growth. The 2001/2002 crisis led to bank runs, freeze on bank deposits, default on the $93 billion sovereign debt, the end of the peso-dollar convertibility system, and social unrest.

Argentina continued to display macroeconomic problems including slow economic growth, high interest rates, high inflation, currency depreciation, large amount of government debt, financial account deficits, etc. Real GDP grew only 0.5% in 2014. Monetary policy was unable to provide moderate interest rates and stable prices as evidenced by the relatively high lending rate of 24.01% and inflation rate of 23.9% in 2014 partly due to an increase in M2 by 28% (Ferrandino and Sgro, 2015; Ojede, 2015; Patton, 2015). The value of the peso versus the U.S. dollar declined 47.99% from 5.46 pesos per U.S. dollar in 2013 to 8.08 in 2014 (Pan, 2015). Government debt as a percent of GDP rose from 35.76% in 2011 to 45.28% in 2014 (Edwards, 2015; Georgescu, 2015; Alfaro, 2015). Its financial account showed a huge deficit in 2014 mainly because liabilities were much greater than assets in both foreign portfolio investment and foreign direct investment. International Monetary Fund (2005, 2015) provides a review of the Argentine fiscal, monetary and exchange rate policies and presents the issues that need to be improved by the Argentine government.

This paper examines potential impacts of peso depreciation and changes in other relevant business and economic variables on real GDP based on an equilibrium model of aggregate demand and aggregate supply and has several different aspects. First, financial assets are considered in order to take into account the wealth effect. Second, oil prices are considered to determine whether a positive or negative oil price shock would help or hurt the economy. Third, an advanced methodology is employed in empirical work.

## II. The Model

Suppose that aggregate demand is a function of real disposable income (real GDP minus the government tax), the real interest rate, financial wealth, the real exchange rate, foreign real income or GDP, the real oil price and the inflation rate and that in the augmented aggregate supply function, the inflation rate is determined by the expected inflation rate, the output gap or the difference between actual real GDP and potential real GDP, and the real oil price. Solving for the equilibrium real GDP and the inflation rate simultaneously and assuming that potential real GDP is a constant in the short run, we have:

$$Y^* = f(E, R, G-T, S, O, Y_f, \pi e) \qquad (1)$$
$$\quad ? \quad - \quad ? \quad + \quad ? \quad + \quad -$$

where

$Y^*$ = the equilibrium real GDP,
E = the real exchange rate defined as units of the peso per U.S. dollar times relative prices in the U.S. and Argentina.
R = the real interest rate,
G = government spending,
T = government tax revenues,
S = real financial wealth,
O = real oil price per barrel,

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Yf = foreign real income or GDP, and
$\pi e$ = the expected inflation rate.

Note that G and T are combined into one variable of G – T in order to examine the impact of government deficit spending on the economy. We expect that the equilibrium real GDP has a positive relationship with real financial wealth and foreign real income, a negative relationship with the real interest rate and the expected inflation rate, and an unclear relationship with the real exchange rate, the government deficit, and the real oil price.

Possible impacts of real depreciation of the peso on the equilibrium real GDP can be expressed as:

$$\frac{\partial Y^*}{\partial E} = \left(\frac{\partial Y^*}{\partial X} \times \frac{\partial X}{\partial E}\right) + \left(\frac{\partial Y^*}{\partial \pi} \times \frac{\partial \pi}{\partial E}\right) + \left(\frac{\partial Y^*}{\partial IP} \times \frac{\partial IP}{\partial E}\right) + \left(\frac{\partial Y^*}{\partial CO} \times \frac{\partial CO}{\partial E}\right) \quad (2)$$

where X, IP, and CO stand for net exports, the inflation rate, the import price, and the capital outflow, respectively. The J-curve hypothesis suggests that after currency depreciation, next exports may deteriorate first and then improve later. After currency depreciation, the quantity effect on exports may be greater or less than the value effect on imports. Hence, the sign of the first term is unclear whereas the remaining terms are expected to be negative (Edwards, 1986; Mejía-Reyes, Osborn and Sensier, 2010; Tover, 2006; Salvatore, 2013).

Deficit- or debt-financed government spending may or may not have any impact or real GDP as the Ricardian equivalence hypothesis suggests (Barro, 1989). The positive effect of government deficit spending may be partially or completely canceled out by a decrease in private spending due to the crowding-out effect.

Hamilton (1983, 1996) finds that oil prices and U.S. real gross national product have a strong negative correlation and that there is consistent correlation between negative oil shocks and recessions. Mork (1989) reveals that the negative relationship becomes marginally significant. Moreover, the relationship is found to be asymmetric, indicating that real GDP and oil prices exist a significant positive relationship with an increased oil price and an insignificant relationship with a decreased oil price.

Jiménez-Rodríguez and Sanchez (2005) find evidence of a nonlinear effect of oil price changes on GDP growth. For oil importing countries except for Japan, increased oil prices have a larger negative effect on GDP growth than decreased oil prices. For oil-exporting nations, increased oil prices reduce GDP growth in the U.K. but is beneficial to GDP growth in Norway.

## III. Empirical Results

The data were collected from the International Financial Statistics published by the International Monetary Fund. Real GDP is measured in millions at the 2010 price. Because of lack of complete and consistent data for the consumer price index, the GDP deflator is used to calculate the inflation rate or derive real values. The nominal exchange rate measures units of the peso per U.S. dollar. The real exchange rate equals the nominal exchange rate times the relative prices in the U.S. and Argentina. The real interest rate is represented by the lending rate minus the inflation rate. Due to lack of complete quarterly data for government tax revenues, this variable is dropped from the estimated equation. To reduce multicollinearity, government spending as a percent of GDP is used. The real stock price is chosen to represent real financial wealth. Real GDP in the U.S. measured in billions at the 2009 price is chosen to represent foreign real income. Except for the real lending rate and the expected inflation rate with negative values, other variables are measured in the log scale. The expected inflation rate is represented by the current and three lagged inflation rates. The sample ranges from 1996.Q4 to 2014.Q2 and has 71 observations. The data for the stock index are not available before 1996.Q4. The data for real GDP are not available after 2014.Q2.

Graph 1 presents scatter diagrams between real GDP and selected right-hand side variables. Real GDP and the real exchange rate exhibit a negative relationship except for the time period when the Argentine government adopted a fixed exchange rate regime. It seems that a relatively high real lending rate tends to hurt real GDP. A higher real oil price tends to correlate with a higher real output. A higher government spending as a percent of nominal GDP tends to associate with a higher real output especially after real GDP reached certain threshold.

According to the DF-GLS unit root test for each of the variables, the critical values are – 2.5979, −1.9455 and −1.6138 at the 1%, 5% and 10% levels. Comparing with the value of the test statistic, we find that real GDP, the real exchange rate, the real oil price and U.S. real GDP have unit roots whereas the real lending rate, the ratio of government spending to nominal GDP, the real stock price, the current inflation rate, and the lagged inflation rates do not have unit roots. The DF-GLS test on the regression residuals shows that the test statistic of −2.6148 is greater than the critical value of −2.6005 in absolute values at the 1% level, Hence, these time series variables are cointegrated and have a long-term stable relationship.



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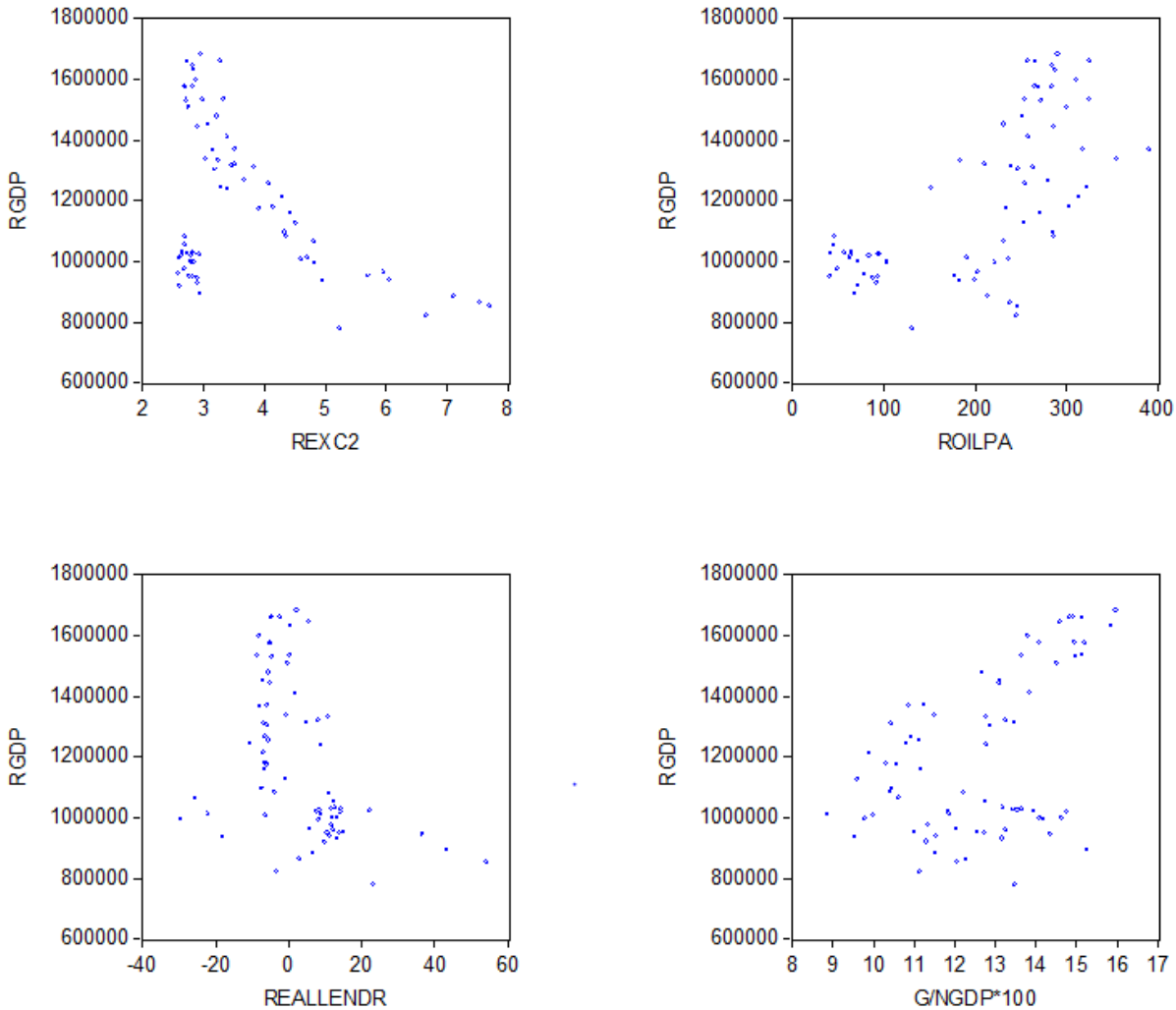


*Graph 1:* Relationships between Real GDP and Selected Variables

Notes:
RGDP is real GDP.
REXC2 is the real exchange rate.
REALLENDR is the real lending rate.
ROILPA is the real average oil price.
G/NGDP*100 is government spending as a percent of nominal GDP.

Table 1 presents the estimated regression and related statistics. The GARCH model is applied in empirical work. The explanatory power of the regression is relatively high as the value of R-squared is estimated to be 0.8571. The F-statistic of 23.9985 suggests that the whole regression is significant at the 1% level. All the coefficients are significant at the 1% or 2.5% level. Real GDP is negatively affected by the real exchange rate, the real lending rate and the expected inflation rate and is positively affected by the ratio of government spending to GDP, the real stock price, the real oil price and U.S. real GDP.



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*Table 1:* Estimated Regression of log(Real GDP) for Argentina

| Variable | Coefficient | z-Statistic |
|---|---|---|
| Intercept | 2.4618 | 39.9073 |
| Log(real Peso/USD exchange rate) | -0.3399 | -20.0187 |
| Real lending rate | -0.0009 | -2.4228 |
| Log(government spending/GDP) | 0.3785 | 13.2851 |
| Log(real stock index) | 0.0548 | 5.8000 |
| Log(real oil price) | 0.0368 | 7.2853 |
| Log(U.S. real GDP) | 1.1118 | 217.0860 |
| Current Inflation rate | -0.0036 | -6.6018 |
| Inflation rate (-1) | 0.0024 | 4.9546 |
| Inflation rate (-2) | -0.0024 | -4.4653 |
| Inflation rate (-3) | 0.0001 | 0.1972 |
| R-squared | 0.8571 | |
| F-statistic | 23.9985 | |
| Akaike information criterion | -2.8959 | |
| Sample period | 1996.Q4 - 2014.Q2 | |
| Number of observations | 71 | |
| MAPE | 5.6298% | |

*Notes: MAPE is the mean absolute percent error.*

An increase in the real exchange rate indicates that the peso depreciates versus the U.S. dollar. In the short run, a 1% increase in U.S. real GDP is expected to raise the Argentine real GDP by 1.1118%. A 1% real deprecation of the peso versus the U.S. dollar is expected to reduce real GDP by 0.3399%. The wealth effect is confirmed as a 1% increase in the real stock price index would lead to a 0.0548% increase in real GDP through an increase in personal consumption spending and the induced expenditures. The positive significant coefficient of the real oil price suggests that recent declining oil prices have hurt Argentine economic activities. According to the Wald test, the combined coefficients of the current and lagged inflation rates are negative and significant at the 5% level.

To test the impact of fiscal policy, annual data during 1995-2013 for deficit spending and other variables are collected. In Table 2, except for the significant negative coefficient of the expected inflation rate at the 10% level, other coefficients are significant at the 1% level. Regression results show that real GDP has a positive relationship with the ratio of government deficit to GDP, the real stock index, the real oil price, U.S. real GDP and a negative relationship with real depreciation, the real lending rate, and the expected inflation rate. Due to limited number of observations, these results should be interpreted with caution.

*Table 2:* Estimated Regression of log (Real GDP) for Argentina

| Variable | Coefficient | z-Statistic |
|---|---|---|
| Intercept | 4.9331 | 20.5989 |
| Log(real peso/USD exchange rate) | -0.3193 | -7.3826 |
| Real lending rate | -0.0025 | -2.6267 |
| Log(government deficit/GDP) | 1.7998 | 5.7071 |
| Log(real stock index) | 0.0758 | 2.9460 |
| Log(real oil price) | 0.1504 | 4.1020 |
| Log(U.S. real GDP) | 0.8762 | 23.4471 |
| Expected inflation rate | -0.0011 | -1.8557 |
| R-squared | 0.9237 | |
| F-statistic | 9.6821 | |
| Akaike information criterion | -2.1930 | |
| Sample period | 1995 – 2013 | |
| Number of observations | 19 | |
| MAPE | 4.4602% | |

## IV. Summary and Conclusions

This paper has examined the effects of changes in the Argentine peso exchange rate and other relevant business and economic variables on real GDP. Real depreciation of the peso versus the U.S. dollar is expected to reduce real GDP. Furthermore, a higher real interest rate or expected inflation rate hurts real GDP whereas more government spending or deficit as a percent of GDP, a higher real stock price, a higher real oil price or a higher U.S. real GDP would raise real GDP.



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There are several policy implications. The Argentine government may need to reassess its exchange rate policy in order to avoid continual peso depreciation as it is harmful to the economy. Argentine authorities may need to consider lowering the interest rate to stimulate consumption spending, investment spending and net exports. As its inflation rate is one of the highest in the world, the monetary authority needs to take measures to reduce inflation expectations in order to stimulate economic activities and protect the wellbeing of the Argentine people. Maintaining a healthy stock market is expected to raise real GDP through the wealth effect.

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# Export of India's Agro Processed Food Products: A Study of Tea

By Anuj Gupta

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*Abstract-* Tea is one of such product whose trade balance is always positive for India, revealing huge advantage for the nation. The study is related with the export of agro processed foods especially tea, its trend, direction, world's export & measures to enhance export. The study reveals the position of India's tea export in world market. It has been found that Iran, Russia, UK, USA & UAE are the major importers of tea from India; hence they must be focused more. China is the largest seller of tea at global market, while Iran is the largest purchaser of India's black tea. Government policies & institution plays an important role in enhancing the export of tea. Meanwhile, domestic demand of this product is also increasing due to increase in population & other related factors. The production of tea must also be increased by adopting various methods.

*Keywords:* *export, focused, black tea, domestic production, green tea.*

*GJMBR-B Classification:* *JEL Code: A10*

EXPORTOFINDIAS AGROPROCESSEDFOODPRODUCTSASTUDYOFTEA

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# Export of India's Agro Processed Food Products: A Study of Tea

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*Abstract-* Tea is one of such product whose trade balance is always positive for India, revealing huge advantage for the nation. The study is related with the export of agro processed foods especially tea, its trend, direction, world's export & measures to enhance export. The study reveals the position of India's tea export in world market. It has been found that Iran, Russia, UK, USA & UAE are the major importers of tea from India; hence they must be focused more. China is the largest seller of tea at global market, while Iran is the largest purchaser of India's black tea. Government policies & institution plays an important role in enhancing the export of tea. Meanwhile, domestic demand of this product is also increasing due to increase in population & other related factors. The production of tea must also be increased by adopting various methods. The requirement of green tea is more in western countries; hence this product line must be targeted. There is a huge difference in export of tea from India & other top nations. This gap could only be reduced by ways of government intervention & target market analysis. Due to individual researcher's constraint & resource limitation some parts like domestic production & sales, state-wise trend, etc. is not mentioned & opened for next research.

*Keywords: export, focused, black tea, domestic production, green tea.*

## I. Introduction

India is one of the largest black tea producing country of the world. The major states which account for 95% of total production are West Bengal, Assam, Tamil Nadu & Kerala; remaining 5% is covered by 12 states. For managing the future prospect & export of this commodity Tea Board was formed which traces its existence from year 1903 when Indian Tea Cess Bill was passed to access the tea export. The present tea board is an autonomous body working under the control of Ministry of Commerce & Industry, Government of India set up as a statutory body on 1stApril, 1954 as per provision under Section (4) of Tea Act 1953. It is an apex body which looks after the overall interests of the tea industry. It has succeeded the Central Tea Board (CTB) & the Indian Tea Licensing Committee (ITLC) which functioned under the Central Tea Board Act, 1949 & Indian Tea Control Act 1938, respectively.

The present study encompasses various areas including the export-import of tea from the year 2005-06 to 2015-16 & direction of export of tea. The destination of export of tea from India to top 5 countries in the studied period is also ascertained. It has been seen that India is among the top tea exporting country. The import of the country is also increasing at a decreasing rate. The requisite of different type of tea & brand demand is also a main problem that has led an increase in import demand of tea also. China is the largest seller of tea at global market, while Iran is the largest purchaser of India's black tea. Government policies & institution plays an important role in enhancing the export of tea.

## II. Objective of Study

Following are the objective of the present study:

1. To study the trend of export of agro-processed food products in India.
2. To study the trend of export-import of tea in the given time period in India.
3. To analyze the direction of India's tea export.
4. To ascertain the top tea exporting country of the world.
5. To provide some suggestive measures for improvement of India's tea export.

## III. Literature Review

*Shinoj P et al (2008)* examine the comparative advantage of India in agricultural export vis-a-vis Asia in the post reform era. From 1991 to 2004, ten major agricultural commodities group are studied. India has been able to maintain comparative advantage in commodities like cashew and oil meals, but tea, coffee, spices, marine products have been negatively affected. *Govindasamy (1993)* in his study revealed the effect of drought on tea in the recent years. It was found that tea is highly water-consuming product & drought has effected its production negatively.

Another study done by *M. R. Chaudhary (1978)* had found the concentration of tea production in specific area in the country. It has also shown that the area in which tea s sown is hilly & prone to good monsoon. North-east is huge producer of tea in India & south-India is producing coffee. *Banerjee (2008)* given a road map for the prospects of tea industry in India. The demand is unending & supply is somehow proportionately decreasing. Therefore more concentration is to be made over production that will boost export too.

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## IV. Research Methodology

The study is highly based on secondary data. The information is taken from the websites of ministry of commerce, tea board, International trade centre & DGCI&S Kolkata. Data of 10 years is taken for trend & 5 year is taken for direction, top exporting nations, etc. These data are compiled in the form of table, line graph, area charts, bar graphs, etc. Statistical tools like AGR, mean, Karl Pearson's coefficient correlation, standard deviation, percentage, etc. are used for analyzing the data. The study is done in the year 2016 hence data up to that year is mentioned.

### a) *Export of Agro processed food products*

The population of the country & problems related to food had led a huge controversy over the topic of export of food products. But it is found that the products which are exported were either excess or different in variety which is demanded within the country. The export of marine products, buffalo meats basmati rice, tea, etc. was the main among them. Table 1 is showing clearly the trend of such agro-processed products from the recent past:

*Table 1:* Trend of exports of Agro processed food products

| Exports of Agro processed food products* | | | | | | |
|---|---|---|---|---|---|---|
| (US $ Million) | | | | | | |
| Commodity | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 |
| Marine Products | 2,095.28 | 2,622.72 | 3,443.63 | 3,464.08 | 5,016.63 | 5,510.24 |
| Buffalo Meat | 1,163.54 | 1,895.07 | 2,842.83 | 3,201.14 | 4,350.38 | 4,781.18 |
| Rice –Basmoti | 2,289.35 | 2,493.89 | 3,216.99 | 3,564.04 | 4,864.89 | 4,518.11 |
| Rice(Other Than Basmoti) | 76.38 | 50.86 | 1,723.38 | 2,651.97 | 2,925.16 | 3,335.09 |
| Spices | 1,257.86 | 1,733.59 | 2,725.66 | 2,786.12 | 2,497.30 | 2,430.35 |
| Guergam Meal | 240.70 | 646.08 | 3,354.82 | 3,919.23 | 1,979.70 | 1,552.15 |
| Oil Meals | 1,658.83 | 2,437.90 | 2,420.46 | 3,038.60 | 2,796.44 | 1,324.17 |
| Cashew | 591.35 | 619.23 | 915.13 | 746.97 | 842.32 | 909.26 |
| Sugar | 23.20 | 1,211.00 | 1,838.55 | 1,574.62 | 1,177.11 | 871.41 |
| Other Cereals | 625.71 | 803.61 | 1,127.95 | 1,505.16 | 1,204.16 | 869.06 |
| Wheat | 0.01 | 0.15 | 202.06 | 1,934.24 | 1,569.08 | 828.76 |
| Coffee | 429.74 | 661.77 | 952.87 | 866.13 | 798.83 | 814.02 |
| Sesame Seeds | 316.51 | 507.25 | 553.13 | 528.08 | 592.17 | 772.27 |
| Castor Oil | 461.63 | 654.00 | 971.85 | 792.75 | 725.70 | 770.49 |
| Fresh Vegetables | 637.16 | 575.92 | 624.88 | 627.08 | 886.14 | 763.02 |
| Groundnut | 302.42 | 480.45 | 1,093.05 | 747.39 | 525.68 | 760.37 |
| Tea | 623.29 | 736.46 | 847.63 | 865.97 | 798.79 | 681.36 |
| Processed Fruits And Juices | 401.87 | 408.16 | 472.84 | 473.42 | 547.14 | 592.26 |
| Fresh Fruits | 322.72 | 299.09 | 399.31 | 496.06 | 608.99 | 516.20 |
| Cereal Preparations | 217.39 | 277.85 | 393.23 | 411.79 | 471.32 | 496.76 |
| Misc Processed Items | 176.84 | 233.93 | 298.58 | 340.62 | 418.04 | 455.05 |
| Alcoholic Beverages | 124.08 | 180.27 | 303.16 | 355.19 | 401.53 | 369.59 |
| Dairy Products | 170.47 | 267.70 | 135.99 | 427.53 | 727.54 | 355.83 |
| Processed Vegetables | 156.74 | 164.34 | 218.64 | 202.66 | 213.05 | 281.81 |
| Pulses | 86.95 | 191.47 | 228.03 | 236.39 | 290.28 | 199.86 |
| Other Oil Seeds | 29.08 | 24.92 | 41.32 | 76.28 | 155.18 | 185.03 |
| Milled Products | 32.50 | 43.35 | 72.70 | 111.07 | 166.15 | 166.87 |
| Cocoa Products | 20.59 | 27.87 | 36.51 | 54.03 | 93.97 | 138.87 |
| Sheep/Goat Meat | 156.56 | 56.70 | 53.80 | 78.35 | 115.37 | 135.71 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| Poultry Products | 78.73 | 69.10 | 94.98 | 91.22 | 93.03 | 106.38 |
| Vegetable Oils | - | - | - | - | 53.38 | 94.57 |
| Fruits / Vegetable Seeds | 30.57 | 40.51 | 60.03 | 63.70 | 68.80 | 69.96 |
| Shellac | 15.12 | 30.81 | 53.09 | 73.84 | 84.95 | 43.80 |
| Molasses | 4.12 | 47.01 | 42.78 | 40.83 | 24.53 | 28.09 |
| Niger Seeds | 5.10 | 9.85 | 24.83 | 16.55 | 18.69 | 17.71 |
| Cashew Nut Shell Liquid | 5.85 | 7.45 | 12.40 | 5.50 | 6.35 | 9.10 |
| Processed Meat | 1.85 | 3.03 | 2.02 | 1.73 | 1.29 | 2.29 |
| Other Meat | 2.29 | 2.09 | 0.77 | 0.43 | 0.55 | 0.44 |
| Edible Vegetable Oils | 38.18 | 25.23 | 54.06 | 85.92 | - | - |
| FPI-Exports | 14,871 | 20,541 | 31,854 | 36,457 | 38,111 | 35,757 |

*: All agricultural produce when exported undergo an element of processing. Hence all edible agricultural commodities exported are included in the export data.

Source: DGCI&S, Kolkata

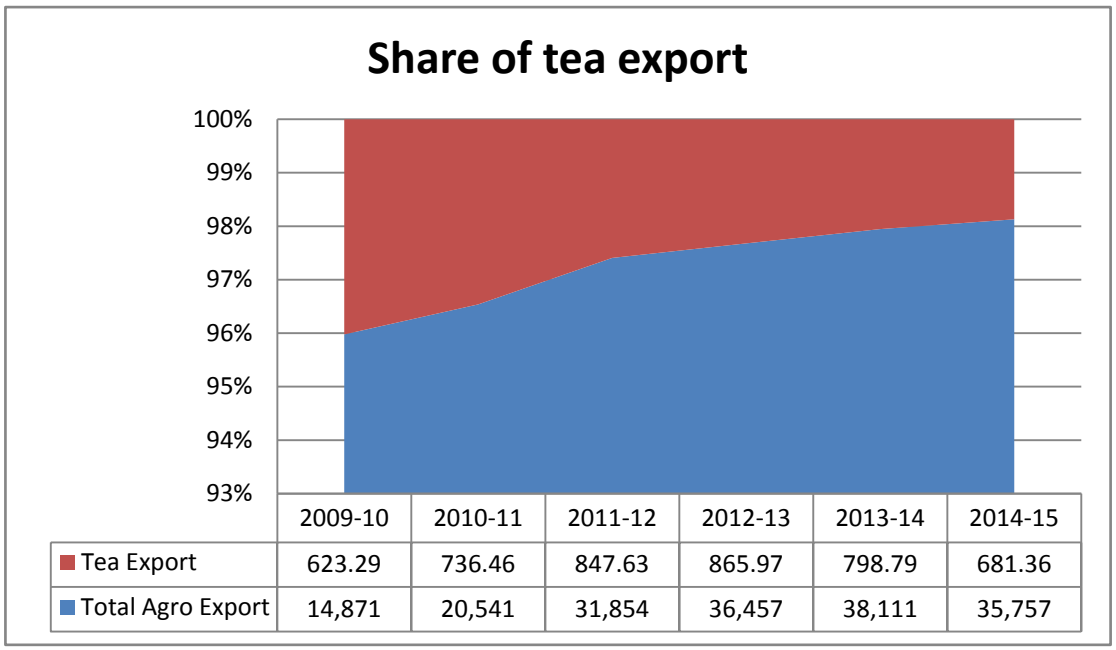


*Figure 1:* Export share of tea in total agro-processed food products

*Source: Table 1*

*Table 2:* Comparison of tea & total agro-food processed export (in US $)

| Commodity / Year | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 |
|---|---|---|---|---|---|---|
| Tea | 623.29 | 736.46 | 847.63 | 865.97 | 798.79 | 681.36 |
| FPI-Exports | 14,871 | 20,541 | 31,854 | 36,457 | 38,111 | 35,757 |
| Share% | 4.19 | 3.59 | 2.66 | 2.38 | 2.10 | 1.91 |

*Source: Table 1 & author's calculation*

It has been seen from the table 2 that the share of export of tea in total agro export is decreasing at a slow rate. This share was 4.19% in 2009-10 while it decreased to 1.91% in 2014-15. In figure 1 the same thing is shown in the form of graph. It also shows very less coverage of that product in total agro export.



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*b) Recent trends in Tea's foreign trade*

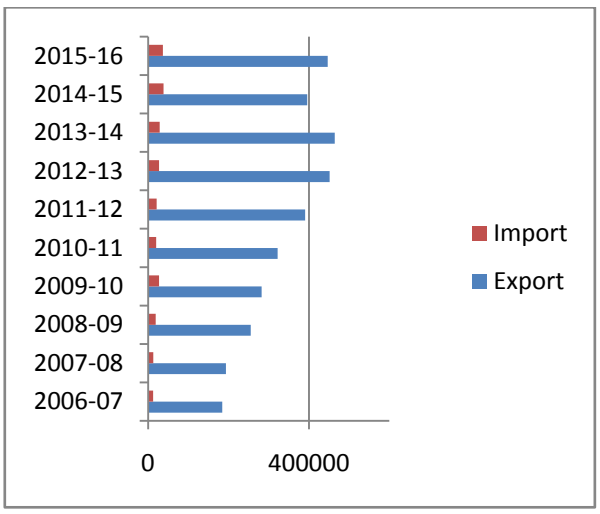
*Table 3:* Export-Import of Tea in last 10 years

| Year | Export (in Rs. lacs) | Indices* 2005-06=100 | Growth % | Import (in Rs. lacs) | Indices** 2005-06=100 | Growth% | Trade balance |
|---|---|---|---|---|---|---|---|
| 2006-07 | 184499.36 | 100.00 | 12.31 | 12505.56 | 100 | 16.75 | 171993.8 |
| 2007-08 | 193674.68 | 104.97 | 4.97 | 12652.86 | 101.18 | 1.18 | 181021.8 |
| 2008-09 | 255177.55 | 138.31 | 31.76 | 18812.37 | 150.43 | 48.68 | 236365.2 |
| 2009-10 | 282439.72 | 153.08 | 10.68 | 27135.14 | 216.98 | 44.24 | 255304.6 |
| 2010-11 | 322292.24 | 174.68 | 14.11 | 19858.34 | 158.79 | -26.82 | 302433.9 |
| 2011-12 | 390715.51 | 211.77 | 21.23 | 20989.17 | 167.84 | 5.69 | 369726.3 |
| 2012-13 | 451368.11 | 244.64 | 15.52 | 26961.47 | 215.59 | 28.45 | 424406.6 |
| 2013-14 | 464215.27 | 251.61 | 2.85 | 28496.71 | 227.87 | 5.69 | 435718.6 |
| 2014-15 | 395766.48 | 214.51 | -14.75 | 38158.70 | 305.13 | 33.91 | 357607.8 |
| 2015-16 | 446696.08 | 242.11 | 12.87 | 36584.04 | 292.54 | -4.13 | 410112 |

*Source: Ministry of Commerce*

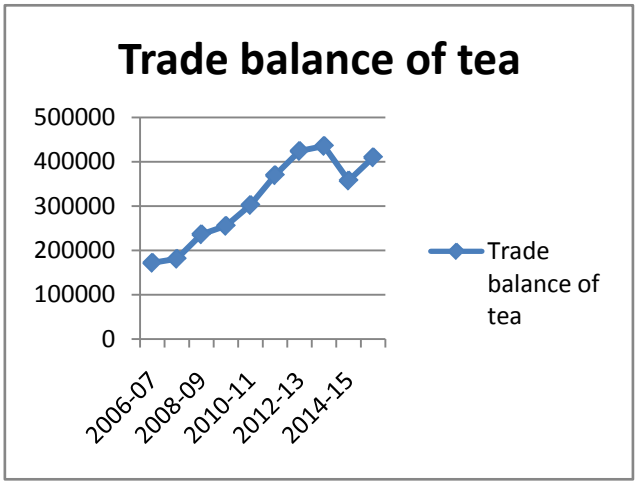
*Note: *Export indices taking 2005-06 as base year **Import indices taking 2005-06 as base year*

Karl Pearson's coefficient correlation=0.7836, Standard deviation (SD) for export=106089.14 Standard deviation for import=177179.56. Table 3 shows trend of export-import of tea in India. It has been seen that growth in import of tea is increased (2015-16 indices=292.54) as compared to the growth in year 2005-06. But the growth when compared to previous year is negative (-4.13%). Biggest hike in import growth shows in 2008-09 with 48.68% while negative growth was biggest in 2010-11 (-26.82%). Export growth was highest in the year 2008-09 (31.76%) while lowest in 2014-15 (-14.75%). Highest amount of tea exported from India was in year 2013-14. The Karl Pearson's coefficient correlation was 0.78 which shows a high degree of positive correlation, signifying growth of one with the growth of another. The SD of export & import is quite high that shows huge deviation in the data.




*Source: Table 3*

*Figure 2:* Export-Import of Tea in last 10 years




*Source: Table 3*

*Figure 3:* Trade balance of tea in India

Table 3 shows the export-import trend of tea in India in last 10 years. It has been seen that the import of tea is irregular in nature due to demand of certain quality of tea. There is huge difference between the export & import of tea in every year. The trade balance of tea is always favorable i.e. the export is always higher than import of tea.



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*Table 4:* Year-wise trend of India's tea export with top 5 countries* (Values in Lac Rupees)

| Country | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Iran | 10,062.86 | 17,174.70 | 20,777.70 | 21,260.76 | 30,679.95 | 23,006.34 | 40,158.80 | 60,838.03 | 54,141.16 | 68900.80 |
| Russia | 27,764.89 | 28,121.61 | 36,037.63 | 46,960.01 | 51,511.81 | 57,824.02 | 69,213.36 | 65,811.59 | 59,115.19 | 67403.87 |
| UK | 24,682.33 | 22,791.75 | 31,598.12 | 32,057.29 | 35,923.52 | 50,512.02 | 55,396.17 | 35,600.64 | 34,673.96 | 41,571.61 |
| USA | 10,518.89 | 11,869.21 | 16,370.39 | 19,360.25 | 23,354.33 | 27,837.92 | 30,843.31 | 37,371.17 | 35,806.98 | 34,294.77 |
| UAE | 17,547.97 | 29,036.74 | 31,792.76 | 33,863.21 | 34,432.27 | 42,736.34 | 51,865.46 | 46,362.77 | 24,215.67 | 30,014.12 |

*Source: Ministry of Commerce*
**Top 5 countries is decided on the basis of 2015-16 data*

*Table 5:* Mean & standard deviation of exports to top 5 countries

| Country | Mean | Std. Deviation | CAGR |
|---|---|---|---|
| Iran | 34700.11 | 20281.68 | 0.238322 |
| Russia | 50976.40 | 15763.40 | 0.103567 |
| UK | 36480.74 | 10300.67 | 0.059636 |
| USA | 24762.72 | 9938.53 | 0.140325 |
| UAE | 34186.73 | 10327.9 | 0.061451 |

*Source: Author' calculation from table 4*

Table 4 shows the top five India's tea importing countries. Among them Iran rose at top with Rs.68900.80 lakh in the year 2015-16, while UAE is at fifth position with Rs.30014.12 lakh in the same year. The galloping growth in Iran's import of tea has led huge prospects for India in that country as compared to other countries. While in Russia, UK, USA & UAE this growth is irregular & creeping in nature.

Table 5 shows the mean, CAGR & SD of top five countries in terms of tea imports from India. It may be noted that the mean of Russia is much higher than all the countries but its position is 2nd in the table. The SD of USA is lowest & Iran's is highest which shows normal growth & abnormal growth in imports, respectively.

*Table 6:* Top Tea exporting countries of the world (Values in US $ thousands)

| Major Exporters | 2011 | 2012 | 2013 | 2014 | 2015 | CAGR |
|---|---|---|---|---|---|---|
| China | 965,080 | 1,042,116 | 1,246,308 | 1,272,663 | 1,383,062 | 0.094132 |
| Sri Lanka | 1,475,038 | 1,403,154 | 1,528,519 | 1,609,339 | 1,321,899 | -0.02703 |
| Kenya | 1,176,308 | N/A | 1,218,162 | 1,158,746 | 830,921 | -0.10941 |
| India | 865,427 | 685,456 | 816,055 | 656,214 | 677,933 | -0.05922 |
| United Arab Emirates | N/A | 177,788 | 309,139 | 312,642 | 325,891 | 0.223836 |
| Germany | 227,114 | 222,871 | 250,827 | 252,089 | 212,085 | -0.01697 |
| Poland | 141,864 | 172,177 | 208,849 | 237,007 | 180,799 | 0.062505 |
| UK | 262,052 | 194,881 | 186,460 | 153,556 | 147,681 | -0.13357 |
| Indonesia | 166,717 | 156,741 | 157,501 | 134,584 | 126,051 | -0.06752 |
| United States of America | 73,737 | 86,934 | 97,262 | 107,799 | 110,245 | 0.105779 |
| World | 7,124,583 | 7,175,894 | 8,024,858 | 7,875,480 | 6,638,334 | -0.01752 |

*Source: International Trade Centre*



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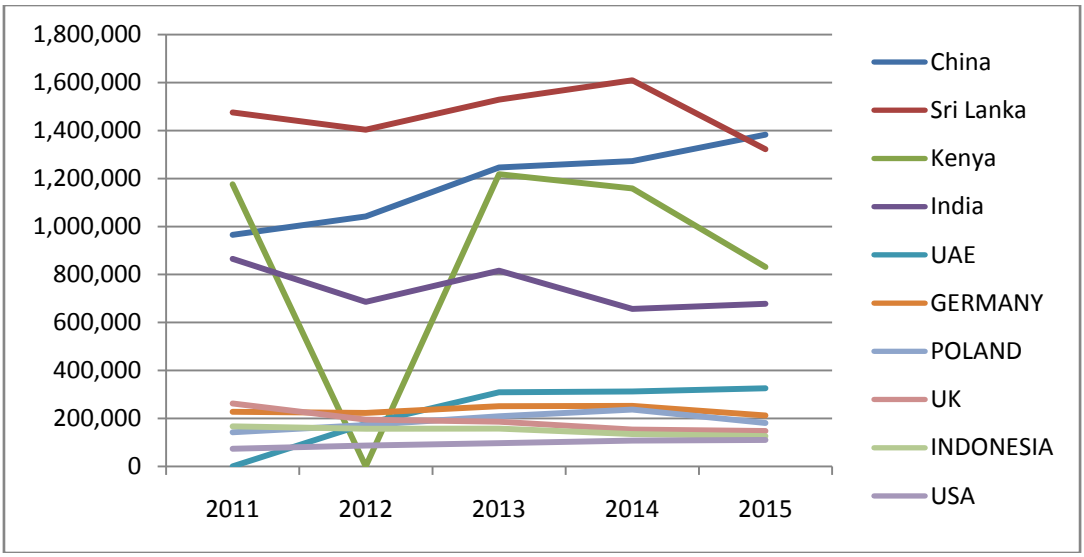


*Source: Table 6*

*Figure 4:* Diagrammatical representation of top tea exporting countries of the world

Table 6 shows the top 10 tea exporting nations of the world. Figure 4 is a graphical representation of the same in various years. It has been analyzed that the growth of export in China was steady, while in India it was irregular, sometimes negative too. Sri Lanka headed this table till 2014 with more than 20% of world's total export. In the year 2015 this crown was taken by China with 4.62% more than Sri Lanka. Only 4 (China, Sri Lanka, Kenya & India) out of ten are sharing 63.48% of the world's total export in 2015. India is sharing nearly 10.21% of world's export itself in 2015. Some countries are showing negative CAGR including India (-0.059) while China (0.09), UAE (0.22), Poland (0.06) & USA (0.1) are showing positive growth rate.

*c) Measures to increase the India's export of tea*

Following measures must be taken by the policy makers & exporters to increase the export of tea:

1. Using more land for cultivation of tea & advanced technique for reduction in wastage.
2. Government must support exporters by providing them subsidies to enhance the export of tea.
3. Cultivation of green tea must be promoted which has huge demand in world market.
4. Tea tasters must be appropriately appointed & standardized grading & packaging system be adopted.
5. Tea boards must perform seminars, conferences, conclaves, workshops, etc. for the owners of farms, exporters, workers, farmers & processors of tea.

## V. Conclusion

The study is related with the export of agro processed foods especially tea, its trend, direction, world's export & measures to enhance export. The study reveals the position of India's tea export in world market. It has been found that Iran, Russia, UK, USA & UAE are the major importers of tea from India; hence they must be focused more. Meanwhile, domestic demand of this product is also increasing due to increase in population & other related factors. The production of tea must also be increased by adopting various methods. The requirement of green tea is more in western countries; hence this product line must be targeted. There is a huge difference in export of tea from India & other top nations. This gap could only be reduced by way of government intervention & market analysis. Due to individual researcher's constraint & resource limitation some parts like domestic production & sales, state-wise trend, etc. is not mentioned & opened for next research.

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# The Effects of Exchange Rate and Interest Rate on Producer Prices in Turkey

By Dr. Dilek Sürekçi Yamaçli

*Nuh Naci Yazgan Universitiy*

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*Keywords: inflation, relative sensitivity analysis, johansen co-integration, VECM, granger causality.*

*GJMBR-B Classification: JEL Code: D51*

THEEFFECTSOFEXCHANGERATEANDINTERESTRATEONPRODUCERPRICESINTURKEY

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*Abstract-* The aim of this study is to investigate the relations between exchange rate, interest rate and producer prices for 2004-2013 periods in Turkey. To the determine relationships between variables Johansen Co-Integration, Vector Error Correction, Granger Causality and Relative Sensitivity Analysis are used. According to results of the study; there are short and long-term relationships between exchange rate, interest rate and producer prices. Beside this, relationship between inflation and the exchange rate is higher than the interest rate. On the other hand, effect of the interest rate on the exchange rate is weak. These results can be interpreted as the interest rate has a low contribution in the production costs compared to that of the exchange rate for Turkey. Therefore, economic policies for stability in the exchange rate can be recommended such as increase in the exchange rate earnings and reducing expenses.

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## I. Introduction

Since 2002, there has been improvement substantial price for both producers and consumers in Turkey. For example, average producer inflation was 64% in the period of 1980-2002 and 8% in the period of 2002-2013 (Central Bank Republic of Turkey, Electronical Data Distribution System, EDDS). On the other hand, the producer inflation increased again in recent years. According to the economic and political arguments exchange rate is one of the causes of this situation. The increase in the exchange rate has negative impact on production costs, which means the increment of the prices of imported inputs. According to the economic theory in this area, the increase in the real exchange rate raises the cost of domestic production of import-dependent industries, which limits the industrial production and also leads to increased prices in the domestic market. This is the so-called pass-through effect of the exchange rate on the general prices level.

Central banks use several policy tools in order to avoid the impact exchange rates on general price levels. The most powerful of these tools is the interest rate. The relationship between interest rate and inflation may differ according to the source of inflation. When there is demand-side inflation, the high interest rate policy will be successful for decrease consumer inflation. However, when there is supply-side inflation, higher interest rates may lead to higher producer prices. This is because of the rise in payments of production factors such as wage, interest rate and energy prices.

In this study's time period, for 2004-2013 periods in Turkey, the Central Bank raised the interest rates, in order to compensate the negative impact of inflation for the exchange rate. However, due to the continued increment in the exchange rate, the expected improvement in inflation has not been achieved. This situation has also affected the reliability of the monetary authority negatively. As considered by politicians, high interest rate is a main negative effect for the investment environment and this situation may lead the cost inflation.

Our study is seeking answers to the following questions: In the analyzed period in Turkey, did producer prices affect the exchange rate? When the interest rate rises, how do the producer prices change? As the free capital flows in emerging economies under a flexible exchange rate regime, is the effectiveness monetary policy weak in Turkey as a developing country. The contributions of the study to the literature are as follows; in the literature, effect of the exchange rate to the inflation rate or the relationship between interest rates and inflation are generally separately discussed. This study examines the relations between three variables specified. However, as the dependent variable, consumer price index (CPI) is oftenly used in previous studies. The purpose of the study is determined the impacts interest rate and exchange rate on producer prices. Secondly, for the period covered by the study successful balanced budget policy was applied in Turkey. In the literature positive correlation relations between public spending and inflation rate are determined for developing countries. However, producer inflation environment on the balance budget in Turkey is discussed in this study. Thirdly, the Relative Sensitivity Analysis (RSA) is not used before in this area. This method is widely used in engineering and health care. In the social sciences, it is utilized in some studies about investment and finance. Besides RSA, the methods used in the study are as follows; Johansen Co-integration, Vector Error Correction (VECM) and developed depending on the VECM, Granger Causality tests.

In the introduction section the economic relations between the variables are studied. The second part of the study is a review of the literature. Variables and economic expectations are defined in the third

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section, application methods are explained in the fourth section and fifth section covers evaluated application results. The study is completed with the conclusion section.

## II. Literature

Studies about relationship among interest rate, foreign exchange and inflation rate studies in the literature can be classified in three groups. The first group of these studies analyzes the effects of exchange rate fluctuations on the inflation rate. In these studies different conclusions are reached according to the development of the country and applied exchange rate regime (Frankel, Parsley and Wei, 2005; Ito and Sato, 2006; Mc. Carty, 1999; Mihaljek and Klau, 2001; Sekine, 2006; Stulz, 2000). In Frankel, Parsley and Wei (2005) exchange rate pass-through effect to the consumer price is high and speed, but in parallel with the global decline in inflation in these countries period of 1990-2001, these effect is determined low on the prices. Sekine (2006) have found that the exchange rate pass-through effect on prices is low relationship on the import and consumer prices for developed countries. In Ito and Sato (2006) strong between prices of imports and the exchange rate are found but consumer prices is less affected by the exchange rate. Mc. Carty (1999) found a positive relationship between exchange rate and import prices, but the impact on the exchange rate of domestic inflation are weak. Mihaljek and Klau (2001) have examined the relationship between foreign exchange rates, import prices and domestic inflation for 13 countries including Turkey for the period 1995-2000. As a result, the relationship between exchange rate and inflation are more powerful than the relationship between exchange rate and import prices, besides this, the exchange rate impact on the inflation is high for the first of four periods and countries more than a year. On the other hand, consumer price is more effected exchange rate than producer prices. Stulz (2007) examined the impact of the transition to the exchange rate in Switzerland for the period from 1976 to 2004 and stated that the exchange rate decreases gradually from the pass-through effect on consumer prices. Bayraktutan and Arslan (2003) found bidirectional causality between producer prices, exchange rate and import volume for the 1980-2000 periods in Turkey. Isık, Acer and Isık (2004) have reached the conclusion that the co-integration of inflation and exchange rate for the 1982-2003 period. Kara et al. (2005) determined the reduced impact from exchange rate on consumer prices for the 1995-2005 periods in Turkey, according to the anti-inflationary policy with a floating exchange rate applied since 2001. Gül and Ekinci (2006) determined unidirectional causality between exchange rate and inflation for the 1984-2003 periods in Turkey. Güven and Uysal (2013), the consumer price index has found a bidirectional relationship with the real effective exchange rate for the 1983-2012 periods.

In the second group studies the relationship between inflation and interest rates are researched Fisher Effect (Atkins and Coe 2002; Bajo-Rubio et al., 2005; Dutt ve Ghosh, 1995; Fisher, 1930; Granville ve Mallick, 2004; Güneş ve Tunçal, 2002; Junttila, 2001; Mishkin, 1992; Şimşek and Kadılar 2006; Yamak and Tanrıöver 2007). From these studies, Mishkin (1992) and Junttila's (2001) studies show that relationship between inflation and interest rates is long-term and positive way. However, Atkins and Coe (2002), for the period from 1953 to 1999, Canada and the United States, they concluded supports of Fisher Effect. Similarly, Granville and Mallick (2004) for the 1900-2000 periods, England; Bajo-Rubio, Diaz-Roldan and Esteve (2005), for the 1963-2002 period, Spain, where they reached the the Fisher effect. Şimşek and Kadılar (2006) for the 1987-2004 period, Bolatoğlu (2006) for 1990-2005, identifies long-term relationship between inflation and nominal interest rates and have reached those results for Turkey of the Fisher effect. Yamak and Tanrıöver (2007), determined as unidirectional and positive relationship in the long term, to the general price level from the interest rate for the 1990-2006 period.

In the studies of the third group, which is also subject of this study, relations between inflation rate, interest rate and exchange rate are investigated. Precursors of these studies are Taylor (1993) and King and Wolman's (1996). Taylor (1993) examined these variables in the United States for the 1987-1992 periods. His study results shows that, the effect of exchange rate on inflation is very low, the main monetary policy tool affecting inflation that the interest rate. King and Wolman (1996) have determined interest rate and money supply effective on inflation, in the United States for the 1915-1992 period, but the exchange rate is not effective. Similar to these studies, in Turkey, Fisunoğlu and Çabuk (1997) for the 1987-1997 period, Dibooglu and Kibritçioğlu (2004) for the 1980-2002 period, Sever and Mızrak (2009) for the 1987-2006 period, Karagöz and Ergün (2010) for the 1987-2007 period, Yapraklı and Kaplan (2012) for the 2006-2011 period, Bal (2012) for the 1994-2008 period, have determined relationship between interest rate, exchange rates and inflation rate. For example, Yapraklı and Kaplan (2012) found the two-way causal relationship between these indicators, according to the co-integration and error correction model results, beside this interest rates effect to the inflation rate in the short and long term and smaller than even if the exchange rate had determined that negatively affected.

## III. Material and Methods

In this study, Johansen Co-integration, Vector Error Correction, Granger Causality and Relative



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Sensitivity Analysis (RSA) are used. Firstly, the structure of stability variables were examined (Gujarati, 1995: 750). For this purpose, ADF (Augmented Dickey-Fuller) and KPSS (Kwiatkowski, Phillips, Schmidt, Shin) unit root tests are used. ADF test, delay values of the series involves regressing over the delay difference (Gujarati, 1995: 720). Equation of the test is seen in equation (1).

$$\Delta Y_t = \beta_0 + \beta_{1t} + \delta Y_t + \alpha_1 \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_t \qquad (1)$$

According to equation (1), Yt is the first difference of the variable being tested; t is the trend variable, δYt-1 is the difference term, εt is the error term which is stationary. Model, the error term, to ensure that successive independent until lagged difference terms are added (Gujarati, 1995: 720). According to the ADF test, H0 is a unit root, HA is stationarity. H0 is statistically tested whether the coefficient δ is equal to the zero. In the literature, because ADF test is sensitive to the length of delay, the KPSS tests are also used. KPSS test was developed by, Kwiatkowski, Phillips, Schmidt and Shin (1992). KPSS with ADF test's null hypothesis are the opposite of each other. According to the ADF test's null hypothesis, there is the existence of the unit root (series is nonstationary), but the null hypothesis of the KPSS test, H0 is stationary, HA is a unit root. KPSS test statistic is given with equation (2) (Kwiatkowski et al., 1992: 54).

$$\eta_u = T^2 - \sum_{t-1}^{T} S_T{}^2 / s^2(l) \qquad (2)$$

Where t = 1, 2, ..., determined for consistency for $s^2(l)$, $l \to \infty$. $S_T$ shows the total process of partial remains. The H0 is compared calculated value with the critical value. KPSS test is the effect caused by the presence of a unit root problem deterministic trend which was revealed on adjusted by means of lifting the middle deterministic trend. In this respect, it differs from other conventional unit root tests. Another important aspect of the KPSS test is specify the reason for stagnation of the H0 hypothesis is that the variance of the random walk hypothesis zero (Kwiatkowski et al., 1992: 159-178).

If the first difference of variables is stationary, it can be a long-term relationship between these variables. Beside, error terms should not be contain unit root, mentioned long-term relationship between the variables (Engle-Granger, 1987: 271-272). In this study, long-term relationship between the variables using Johansen Co-integration Test (1988) is analyzed. This Co-integration analysis uses the maximum likelihood method for estimating Co-integration vector and parameters (Kadılar, 2000: 119). Johansen Co-integration equation is described as in equation (3) (Üçdoğruk, 1996) where Xt, N×1 is a vector time series:

$$A(L)x_t = c + \phi Q_t + v_t \qquad (3)$$

In equation (3), c is the fixed term, $Q_t$ is the deterministic dummy variables, $v_t$ is the error terms whose average is zero, variance is constant and normally distributed.

$$A(L) = I_N + A_1 L + A_1 L^2 + \ldots + A_1 L^N \qquad (4)$$

According to the equation (4), numbered delay processor is a L's matrix polynomial. Vector auto regression (VAR) model using all variables, their delay values and by conditioning it can be stated on the deterministic variables.

$$D(x_t \mid X_{t-1}, Q, \mu),\ X_{t-1} = (x_1, x_2, \ldots, x_t) \qquad (5)$$

After equation (5), Johansen model is described in equation (6).

$$Dx_t = -\sum_{i=1}^{P-1} \pi i Dx_{t-1} + \pi x_{t-1} + c + t + dQ + \varepsilon_t$$
$$\pi_i = \left( I_N + \sum_{j=1}^{i} A_j \right),\ \pi = -\left( I_N + \sum_{j=1}^{i} A_j \right) \qquad (6)$$

Firstly, for Johansen Co-integration analysis, optimal lag length without autocorrelation between the error term is calculated. There are a number of lag selection criteria in the literature (Johansen, 1995; Enders, 1995). From them, Akaike and Schwarz information criterion were used in the study. Based on these two criteria, the optimum lag length is four delays. There is no autocorrelation and heteroscedasticity in this delay. Johansen Co-integration lag length is also four delay.

$\pi = \alpha\beta'$ is long-term response matrix. α and β matrices are (Nx) sized and N is the shows number of variables r the number of Co-integration vectors.

$$| \mu S_{kk} - S_{k0} S^{-1}{}_{00} S_{0k} | = 0 \qquad (7)$$

Equation (7), S00 is the residual moment matrix obtained from regression on the ΔXt -1, ….., $\Delta X_{t-k-1}$ and $S_{kk}$ is the residual moment matrix is obtained regresion on $X_{t-k}$'nın $\Delta X_{t-k-1}$. $S_{0k,}$ is the cross product moment matrix. Using these eigenvalues Co-integration vectors number of similarities test statistic is tested using the following equation. Trace test is described as- $T\sum_{r+1}^{p} ln(1 - \mu' i)$. According to this description; μ'r+1, ….., at μ'p, p-r number, smallest eigenvalues. However, the maximum eigenvalue test describes as (-*Tln(1*-μ'). The critical values of these tests are tabulated by Johansen and Juselius (1990). In maximum eigenvalues test is analysis the presence of co-integration vector maximum number of r; to the



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alternative hypothesis which is claims the presence of co-integration vector maximum number r + 1 (Kasman ve Kasman, 2004, s. 127).

After determining the long-term relationship between the variables, error correction model (VECM: Vector Error Correction Model) is applied. VECM producing accurate parameters, if all variables are I(1) and there is a nonzero vector co-integrated (Üçdogruk, 1996). Estimated regression error term is called the error correction term and then Least Squares Method is applied. The causality relationship between variables can be examined depending on the VECM (Granger, 1988). This is because, if Co-integration relationship between variables, there should be at least one-way causality. The equations used to depend on the VECM Granger causality analysis in this study:

$$\Delta PPE = \alpha_1 + \sum_{i=1}^{n} \beta_{1i} \Delta PPE_{t-1} + \sum_{i=0}^{n} \mu_{1i} \Delta EXC_{t-1} + \sum_{i=0}^{n} \delta_{1i} \Delta INT_{t-1} + \varepsilon_{1i} EC_{t-1} + \mu_t \quad (8)$$

$$EC_{t-1} = PPE_t - \alpha_0 - \alpha_1 EXC - \alpha_2 INT$$

$$\Delta EXC = \alpha_1 + \sum_{i=1}^{n} \beta_{2i} \Delta EXC_{t-1} + \sum_{i=0}^{n} \mu_{2i} \Delta PPE_{t-1} + \sum_{i=0}^{n} \delta_{2i} \Delta INT_{t-1} + \varepsilon_{2i} EC_{t-1} + \mu_t \quad (9)$$

$$EC_{t-1} = EXC_t - \alpha_0 - \alpha_1 PPE - \alpha_2 INT$$

$$\Delta INT = \alpha_1 + \sum_{i=1}^{n} \beta_{3i} \Delta INT_{t-1} + \sum_{i=0}^{n} \mu_{3i} \Delta PPE_{t-1} + \sum_{i=0}^{n} \delta_{3i} \Delta EXC_{t-1} + \varepsilon_{3i} EC_{t-1} + \mu_t \quad (10)$$

$$EC_{t-1} = INT_t - \alpha_0 - \alpha_1 PPE - \alpha_2 EXC$$

In this analysis; delay values of the independent variables are indicates short-term causal effects. The error correction term is explaining long-term causal effects (Love and Chandra, 2005: 136). Another method used in this study is RSA which is just used in the literature in this area. RSA exposes comprehensive relationship between the variables and it possible for interpretation. It is capable to show the relations, depending on the coefficient values calculated for each period. In this study, the relative sensitivity coefficients of each variable were calculated on a monthly basis. In the years that the high value of the relative sensitivity coefficients between variables high, low relationship between variables is lower in recent months, it said that the value of the coefficient is zero and no relationship between the variables in the year. In some months the relative sensitivity coefficients could not be calculated. The reason for this is as a zero value of the denominator in the calculation steps.

RSA is widely used especially in health and engineering science (Isenring, Banks and Gaskill, 2009). In the literature, many local and global sensitivity analyses of the microeconomic and macroeconomic problems also exist for application. For example Borgonovo and Peccati (2004) in their work, they apply the absolute sensitivity on investment decisions and sustainability risk assessment investigated in this way. Similarly, in theirs another study, they use this analysis to evaluate investment decisions in the energy sector (Borgonovo and Peccati, 2006).

In comparative statistical analysis, changes in endogenous variables are investigated in connection with the change in exogenous variables. In other words, changes in an economic outcome are investigated and then the influences on the other economic parameters are determined. The research on the changes of economic inputs and outputs can be viewed as a branch of a more general statistics area called sensitivity analysis. Elasticity is also a subset of sensitivity analysis, which is given as the sensitivity measurement of an economic variable such as the demanded quantity to one of its determinants such as income.

In statistics, basically three types of sensitivities can be calculated in order to provide insight to the analysts, namely absolute sensitivity, semi-normalized sensitivity and the normalized (relative) sensitivity. Let the outcome of a model be y, which is a function of input variables such *x1, x2,...., xn* as shown in equation 11.

$$y = f(x_1, x_2, ..., x_n) \quad (11)$$

Absolute sensitivity is defined as the absolute change in the output y with respect to the change in one of the input variables, x.

$$S_{abs} = \frac{\Delta y}{\Delta x_n} \quad (12)$$

Semi-normalized sensitivity includes the change in the output variable with the ratio of the changes of output and input variables as given in equation 13.

$$S_{semi-norm} = y \frac{\Delta y}{\Delta x_n} \quad (13)$$

Absolute values and the rate of changes of both output and input variables exist in the definition of the relative sensitivity as formulated in equation 14.

$$S_{abs} = \frac{y}{x} \frac{\Delta y}{\Delta x_n} \quad (14)$$



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Relative sensitivity differs from absolute sensitivity in two ways. The first difference is that relative sensitivity considers the values of the input and output variables such that the effects caused from the amounts are taken into account. While absolute sensitivity is merely a ratio of the change of input and output variables, relative sensitivity gives a better understanding of the effects of input variables on the output variables. Secondly, it is easier to obtain the time dependent sensitivity with the relative sensitivity concept. Hence, because of these reasons, it is logical to use relative sensitivity as well as absolute sensitivity for econometric applications.

## IV. The Data and the Economic Expectations

The purpose of the study is the determination of the relationships among producer prices, the real exchange rate and the commercial interest rate. Therefore, error term represents the effects of other factors affecting producer inflation. The dependent variable of the study is the change in the producer price index, PPI inflation base year the 2000. Independent variables are the 2000 PPI-based real effective exchange rate index (rise of this index is shows Turkish lira appreciation) and weighted average interest rate applied to the commercial loans by banks. All variables have been obtained from the Electronic Data Dissemination System of the Republic of Turkey Central Bank. Monthly data were used in models. Calculated annual percentage change of all of the data and seasonally adjusted using the Exponential Smoothing Method.

In the previous studies it is indicated that decrease or increase in the exchange rate affects occur to the supply side inflation and the deterioration in inflation expectations (Agenor and Montial, 2008). If exchange rate increases cost of production is high. Therefore, we know that interest rate is an input cost for producers. An increase interest rate can be accusing an increase on the producer prices. So economical expectation between these two variables is positive.

## V. Results and Discussion

In this part of the study are presented stability tests, Johansen Co-integration, weak externalities test, VECM, Granger Causality analysis, and RSA analysis results. Firstly, in the Table 1, the variable stability tests are given.

*Table 1:* Stationary test results

| | ADF, Level | | KPSS, Level | |
|---|---|---|---|---|
| | Cons. | Cons.&trend | Cons. | Cons.&trend |
| INT | -3.45 | -3.24 | 0.46 | 0.47 |
| | (-5.15) | (-6.14) | ( 0.35) | ( 0.15) |
| EXC | -4.89 | -4.65 | 0.36 | 0.37 |
| | (-5.92) | (-6.02) | (0.33) | (0.12) |
| PPI | 0.29 | 0.50 | (0.47) | (0.46) |
| | (-2.00) | (-2.17) | (0.35) | (0.11) |
| | ADF, First Differences | | KPSS,First Differences | |
| | Cons. | Cons.& trend | Cons. | Cons.&trend |
| INT | -8.66* | -8.69* | 0.18* | 0.17* |
| | (-3.47) | (-5.04) | (0.74) | (0.7) |
| EXC | -6.09* | -3.72** | 0.16** | 0.142** |
| | (-3.49) | (-3.25) | ( 0.24) | (0.22) |
| PPI | -7.38* | -7.33* | 0.20* | 0.13* |
| | (-3.49) | (-4.05) | (0.73) | (0.72) |

** 1%, ** 5% significance level, the coefficients are statistically significant. Values in parentheses are indicate the t statistic values for the coefficients.*

In Table 1, according to the ADF and KPSS statistic, variables are not stable in the level. Therefore, the first difference is taken of variables. All variables's first differences are stationary. Depending on these results was examined the Co-integration relationship between variables.

In Table 2, trace and maximum eigenvalue is greater than 5% critical value. Hence, there is a Co-integration relationship between variables. Normalized co-integration equation has been estimated as in equation (15).

$$PPI = 7.822 + 0.0891EXC + 0.0612INT \quad (15)$$

Stand. Eror (0.04) (0.02)

Equation (15) shows that if the effective exchange rate index is 1%, producer inflation is increase average 0.09% and if the interest rate is increase 1%, producer inflation is increase 0.06%. This result shows that variables effective on producer inflation, but also the real exchange rate is the more impact on inflation than the interest rate. For the normalization of the Co-integration testing is made weak externalities test.



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*Table 2:* Johansen Co-integration results

| Eigenvalues | Trace Statistics | %5 critical value | Co-integration hypothesis $H_0$ | $H_a$ | Results |
|---|---|---|---|---|---|
| 0.443 | 55.768 | 35.010 | r=0 | r≥1 | Accept |
| 0.153 | 18.834 | 20.398 | r≤1 | r≥2 | Rejection |
| 0.109 | 12.064 | 16.641 | r≤2 | r≥3 | Rejection |
| **Eigenvalues Statistics** | **Max. Eigenvalues statistics** | **%5 critical value** | **Co-integration hypothesis $H_0$** | **$H_a$** | **Results** |
| 0.244 | 32.481 | 24.252 | r=0 | r≥1 | Accept |
| 0.101 | 12.090 | 18.943 | r≤1 | r≥2 | Rejection |
| 0.092 | 11.062 | 3.840 | r≤2 | r≥3 | Rejection |

In Table 2, trace and maximum eigenvalue is greater than 5% critical value. Hence, there is a Co-integration relationship between variables. Normalized co-integration equation has been estimated as in equation (15).

$$PPI = 7.822 + 0.0891EXC + 0.0612INT \quad (16)$$

Stand. Eror (0.04) (0.02)

Equation (16) shows that if the effective exchange rate index is 1%, producer inflation is increase average 0.09% and if the interest rate is increase 1%, producer inflation is increase 0.06%. This result shows that variables effective on producer inflation, but also the real exchange rate is the more impact on inflation than the interest rate. For the normalization of the Cointegration testing is made weak externalities test.

*Table 3:* Weak externalities test

| Variables | LR Test | p value |
|---|---|---|
| PPI | 12.76* | 0.00 |
| EXC | 2.01 | 0.11 |
| INT | 1.36 | 0.23 |

** indicates that rejection of the null hypothesis on the 1% significance level. According to the null hypothesis, variable is weak external.*

Accepted as the speed parameter ECt-1 has negative sign, different zero and statistically significant. According to this parameter, the deviation between the the long-term value and the actual value of inflation is eliminating 14% of each period. The exchange rate and the interest rate are effective variables on producer inflation in the short run. Because these parameter's coefficients are statistically significant. In order to determine the error correction model stable, CUSUM (Cumulative Sum of The Recursive residuals: the cumulative total of successive error) and CUSUMQ analyses are utilized.

*Table 4:* Vector error correction model results

| Dependent V.: ΔPPI Independent V. | Coefficient | Std. Error | t-Ist. | Possibility |
|---|---|---|---|---|
| ΔEXC | -0.09 | 0.02 | -4.56 | 0.00 |
| ΔINT | 0.06 | 0.03 | 2.89 | 0.00 |
| $EC_{t-1}$ | -0.14 | 0.02 | -7.00 | 0.00 |
| C | 7.73 | 0.16 | 48.31 | 0.00 |
| $R^2$ | 0.89 | | | |
| Adjusted $R^2$ | 0.88 | | | |



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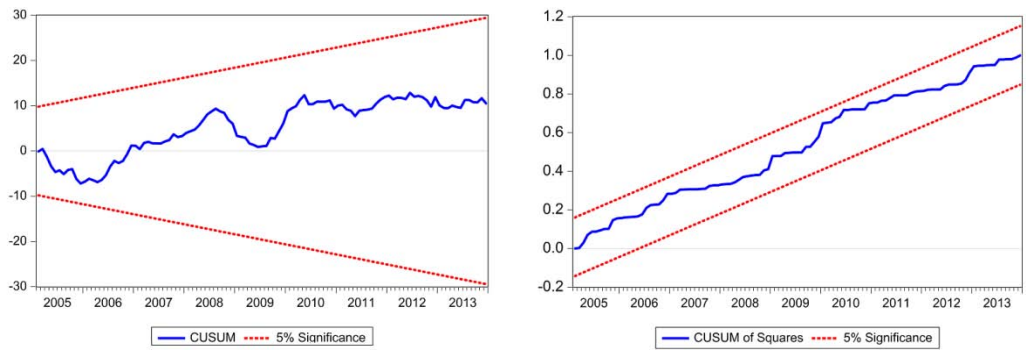


*Figure 1:* CUSUM and CUSUMQ test results

*Table 5:* Granger causality analysis

| Equations no | Dependent Variable | Independent Variables | F ist. (p value) | $EC_{t-1}$ Coefficient | $EC_{t-1}$ t ist.(p value) |
|---|---|---|---|---|---|
| 8 | ΔPPI | ΔPPE<br>ΔEXC<br>ΔINT | -<br>-4.6 (0.05)<br>1.33 (0.54) | -0.12 | 5.58 (0.00) |
| 9 | ΔEXC | ΔPPE<br>ΔEXC<br>ΔINT | 5.21 (0.02)<br>-<br>2.08 (0.15) | -0.88 | 20.91 (0.00) |
| 10 | ΔINT | ΔPPE<br>ΔEXC<br>ΔINT | 3.09 (0.00)<br>-5.04 (0.00)<br>- | -0.14 | 4.55 (0.02) |

Figure 1 shows that as stability diagnostics tests results CUSUM and CUSUMQ tests in the VECM. There is no structural breakage on the VECM.

According to the improved Vector Error Correction-Granger Causality (Table 5), all of the ECt-1's coeficient values are between zero and one. Morever their signs are negative. Depending on these results, the effects of independent variables on the dependent variable was significantly improved in the long term. However, there are long-term causal relationship between the variables. When looking at the short-term causal relationship, there is a two-way causal relationship between exchange rate and producer inflation. There is a one-way causal relationship between interest and inflation rates, which is to the rate of inflation from interest rate. Between exchange rate and interest rate, there is one-way causal relationship, which is to the interest rate from exchange rate.

After obtaining the co-integration and causality relationship between variables, RSA was performed. This analysis has endles to see the relationship among variables on a monthly basis. Thus, it could be seen monthly value of variables's relative sensitivity coefficients, relations between variables are in what month high / low or not. This analysis allows to carry out in the corresponding month exchange and / or interest amendments, as can be seen the impact on producer prices. It also enables will allow to see the effects of the currency and interest rate policies on producer prices in the monthly scale.

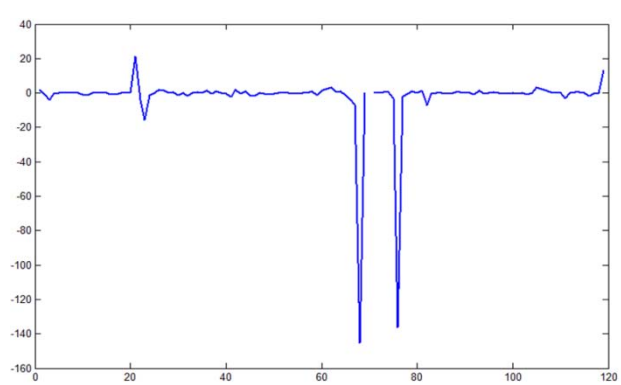

*Figure 2:* Relative sensitivity the inflation rate to the exchange rate



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According to Figure 2; 20-25 (2005: 7/2005: 12), 65-75 (2009: 04/2010: 02), and 115-120 (2013: 06/2013: 11) periods, the effect of changes in the inflation rate are higher than in other periods. In particular, 2009: 04/2010: 02, during the real effective exchange rate increases, the sensitivity producer inflation to the exchange rate has increased (-130 / -140 range). For some years, the relative sensitivity coefficient between inflation and the exchange rate is zero. In this case can be interpreted there are not a relationship between these variables.

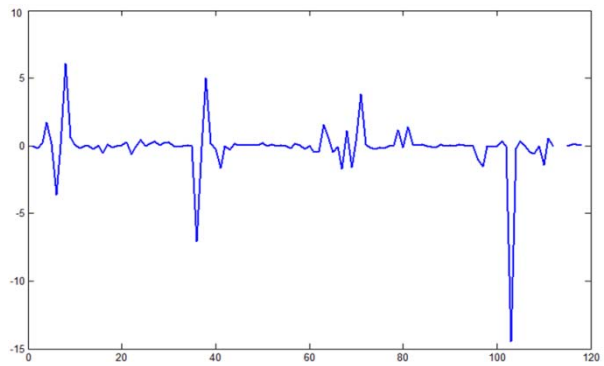


*Figure 3:* Relative sensitivity of the inflation rate to the interest rate

Figure 3 shows the sensitivity the rate of inflation to the interest rates. Although the impact of the interest rates to the inflation lower than the exchange rate, changes in interest rates was affected to the inflation rate. It can be seen more clearly 6-12, 38-43, 62-75 and 100-110 periods.

On the other hand, if we compare the exchange rate and interest rate effects on the inflation rate; the period of high sensitivity coefficients of both variables appear to be different from each other. For example, where high sensitivity between inflation and real exchange rate in the 65-75 (2009: 04/2010: 02) period, the relationship between interest rate and inflation is low. Or when the relationship between interest rate and inflation rate are the strongest, in the 103-105 (2012: 06/2012: 08) period, the relations between inflation and real exchange rate are the weak. Based on these results, it was investigated in the exchange rate between the real interest rate relative sensitivities.

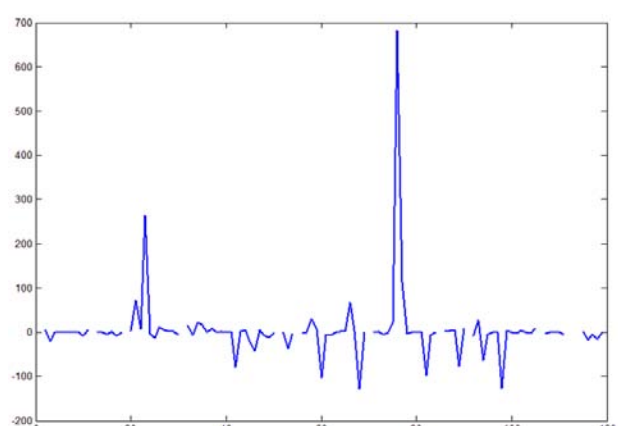


*Figure 4:* Relative sensitivity of the interest rate to the exchange rate

According to Figure 4, the relative sensitivity coefficients of the interest rate for the exchange rate are high. The highest of these coefficients is average 690 in 76-78. (2010: 03/2010: 05) period. Than in the 20-25 (2005: 07/2005: 12), 40-43 (2007: 03/2007: 05), 58-62 (2008: 09/2009: 01), 67-70 (2009: 06/2009: 09 ) and 82-98 (2010: 09/2012: 01) periods are higher than the other periods, except 76-78. (2010: 03/2010: 05) period. Since 2012, gradually decreased the the relative sensitivity between these variables.



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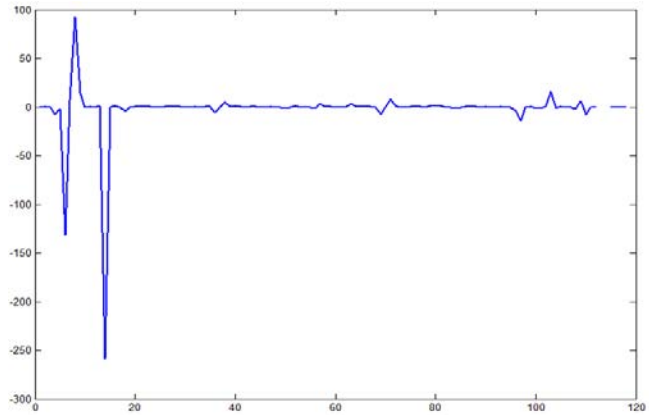


*Figure 5:* Relative sensitivity of the exchange rate to the interest rate

According to Fig. 5, the effect of change in interest rates on the real exchange rate is high for the first 18 periods and than it is lower. In 13-18. (2004: 12/2005: 02) periods, reached the highest level the relative sensitivity coefficient between the two variables. Period from 2005 until 2013, it can be said that the change in the interest rate has weak impact to the exchange rate. Because interest rate is weak impact on the exchange rate changes, but adversely effect on the producer prices, therefore the interest rate tool should be handled with care.

## VI. Conclusions

In this study relationships between the inflation, exchange rate and interest rate are examined, during the period 2004-2013, using monthly data, in Turkey. To the determine relationships between variables are used Johansen Co-integration, Error Correction, Granger Causality and Relative Sensitivity Analysis (RSA). RSA, in studies in this area have not been used before. In this context, the dependent variable is producer inflation and independent variables are real effective exchange rate and for commercial loans interest rate. The results of the study are as follows: According to the Johansen and VECM analysis; there are long and short term relationships between producer inflation, exchange rate and interest rate. According to normalized cointegrated equation; 1% increase in the real exchange rate leads to 0.09% increase on producer inflation and 1% increase in interest rates leads to 0.06% increase in producer inflation. These results indicate that exchange rate and interest rate are effective on the producer prices. Beside this, the real exchange rate is more effective than the interest rate on producer inflation. According to the VECM, each time, are eliminated 14% the real value of the inflation deviation from the long-term value. According to a VECM-Granger causality analysis; there is a bidirectional relationship between the exchange rate and inflation. However, there is a unidirectional causality towards the interest rate to the inflation and towards the exchange rate to the interest rate.

According to the Relative Sensitivity Analysis results; the relative sensitivity of the real exchange rate of inflation reached the highest value 2005, 2009-2010 and 2013 years. The values for the other months, in general, is higher than the interest rate. In some months, the relative sensitivity coefficients between the exchange rate and producer inflation is zero. In this case, in the related month, it was not disclosed as the relationship between the exchange rate and producer inflation. On the other hand, if we compare the effects of exchange rate and interest rates on producer inflation; the sensitivity coefficients periods between these two variable and producer inflation are different. For example, where high inflation sensitivity between the real exchange rate during the 2009-2010 periods, the relatively weak association between inflation and interest rate or where the highest interest rates in the last months of 2012, the relationship between inflation and exchange rate impact of producer inflation is low. At this point, whether interest rate is effective tool for to use in order to eliminate the impact of exchange rate on inflation can be discussed.

The effect of the interest rates on the exchange rate is lower. Although higher values for the period 2004-2005, can be specified the weakening of the relationship between two variables for the 2005-2013 period. In this case, while using interest rate as a policy tool for prevent to the inflation must be considered all impacts on the economy. As observed in 2013, despite the high interest rate policy for prevent the depreciation of the Turkish lira, the exchange rate continued to increase. As an economic policy proposal to prevent the increase in producer prices is said that need real measure in Turkey, more than monetary measures, like the increase the foreign exchange earnings/reducing expenses. As a matter of the fact, if relationships among interest rate and producer inflation rate is low, which is mean low proportion of interest rate in the production cost in Turkey, to ensure stability in the exchange rate can protection from producer inflation.



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# Dairy Farmers' Welfare Losses from Farm-To-Retail Milk Price Adjustments: Highlight on Market Integration and Price Transmission

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*Keywords: milk supply chain, price transmission, seasonality, price elasticity, co-integration, dairy prices, error correction model, punjab.*

*GJMBR-B Classification: JEL Code: M20*

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# Dairy Farmers' Welfare Losses from Farm-To-Retail Milk Price Adjustments: Highlight on Market Integration and Price Transmission

Mazhir Nadeem Ishaq [α], Li Cui Xia [σ] & Rukhsana Rasheed [ρ]

*Abstract-* This study was carried out in four districts of Punjab province of Pakistan with a focus to examine milk market integration, price adjustments and price spreads in short-run and long-run equilibrium for fluid milk. Price transmission describes how a price change at one level of market chain corresponds to another level. Vector Error Correction Model (VECM) was applied to estimate the symmetry of price transmission. Monthly average prices of milk producer and consumer covering the period from 2010 to 2016 were used in the empirical analysis. Seasonality was an important factor in milk production and was kept in account. Stationarity between farm and retail prices was examined through Augmented-Dicky Fuller (ADF) test whereas, the nature of long-term co-integration among price series was estimated by Johansen co-integration test. Analysis results proves that an asymmetric price transmission existed in milk supply system. Granger causality test established the price causality direction, from retailer to producer and not vice versa. VECM confirmed an inefficient market integration and endorse the fact that market power is towards the retailers' side who abuse their power to place the farmers as price takers. The study suggest public-private interventions to improve the milk market structure to strengthen farmers' negotiation power in vertical market.

*Keywords: milk supply chain, price transmission, seasonality, price elasticity, co-integration, dairy prices, error correction model, punjab.*

## I. Introduction

### a) Background of Study

Volatility of price in agribusiness markets not only affects farm revenue and farmer's ability to maintain their operations but it also validates the market structure and it performance. Price is an essential economic tool which linked the different levels and/or intermediaries of a particular product market, such as dairy enterprise (Serra and Goodwin 2003). The efficiency of agricultural markets depends on a high degree of perfect and fair price mechanism based on efficient integration among various marketing stakeholders. Agriculture development may be achieved if changes in price at one level (e.g. consumer) are efficiently transmitted to next level of Market structure (Producer). In Pakistan, milk producers are deprived from the welfare effects of positive price changes due to inefficient transmission from retailers to dairy farmers. This price disparity resulted the rural economy with losses and under-development. This market inefficiency dilemma has led to the unfair redistribution of economic resources form agriculture sector to other enterprises.

In Pakistan's agriculture, the dairy farming is an important income generating activity. Milk produce contributes a major share to gross national income (GNP). Milk is very important livestock product which can provide a consistent source of income to small-scale dairy farmers (Shinoj et al. 2008). Livestock farming in agriculture sector is recognized as a potential source of employment generation for rural small, marginal and landless laborers. Livestock supplements human food in form of milk, meat, eggs, and skins along with farmyard manure for agriculture production. According to official statists of Economic survey of Pakistan, the contribution of livestock towards agriculture value addition and in the national GDP is 58.3% and 11.6 % respectively. Livestock's gross value addition represents an increasing trend of 2.7 percent to the corresponding previous period of 2014-15 and overall value had increased from 756.6 billion PKR to 776.5 PKR. The current estimated population milk producing animals (cow, buffaloes, goats, sheep and camel) was around 176.6 million. In Pakistan, the total milk production for the year 2015-16 was recorded as 54.328 million tons and is presumed to be 6th in global milk producers. Buffaloes and cows are two major dairy animals which are primarily reared for milk production in Pakistan and their share in total milk production is 61 % and 32.8% respectively (GOP2015, and GOP 16).

The milk marketing system generally engaged various marketing agents which add some kind of utility at each specific marketing node. A marketing node in any marketing chain is referred to as a stage/level where exchange or transformation of a product takes place (Zia 2007). In Pakistan, milk marketing chain is usually composed of five different marketing nodes; milk producers, local milk collectors (Dhodi), processors/dairy plants, wholesalers/distributors, and retailers or milk shops. The overall milk marketing system is broadly segmented into two marketing channels; informal milk marketing channels and formal milk marketing channels. The traditional or informal milk marketing system deals with collection and distribution

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of raw fresh milk without any legal license issued from a regulatory department. Formal milk marketing system undertakes milk collection, processing and distribution under a lawful mechanism of dairy and food regulatory department to ensure food safety regulations. Milk marketing in Pakistan is dominated by informal sector as it occupies more than 94% share and rest is of milk is marketed by formal milk processing sector. Due to huge investment in reconstruction and new capacity building in formal dairy sector, the scenario is altering with rapid pace. However, the milk producers are free to sell their milk production according to price and services provided by existing available marketing system; either informal or formal channels.

Vertical price transmission analysis in milk marketing channels and spatial markets is a subject of considerable attention to examine price relationship among milk producers, wholesalers and final consumers. The price transmission is a complex economic relationship between the producers and the consumers and it explains how a price change atone marketing level react towards the next level in the marketing system of product. The prices of milk producers on farm gate is a sensitive issue as the marketing agents/middlemen often offered low prices as compare to their fair share from retail market prices. The price spread in milk marketing chain of Pakistan is wider as many small scale intermediaries are engaged. Retail prices do not absorb any negative change in prices which can lowers the retailers' profit margin and the price change is immediately shifted to consumer price (Azzam 1999).The market power exercised by processors or retailers tend to increase the difference between producer and consumer prices and resultantly reduce producer's share in consumer expenditure. This could be possibly explained in presences of adjustment costs, noncompetitive market structure, profit maximizing motives and non-linearities in supply & demand (Falkowski 2010).

According to the Peltzman (2000) majority of producer and consumer markets are often characterized by asymmetrical price transmission. The distribution of welfare effects e.g. farmers' benefit due to rise in retail price or consumer advantage due to fall in farm prices could not be materialized due the asymmetric price movements (Tekguc 2013).In developing countries to examine the functioning of vertical food markets, it is important to evaluate how marketing agents are delivering for the farmers and the consumers' welfare. The conditions of agribusiness market play a vital role in determining the retail prices and marketing middlemen (processors, distributors, retailers) often have enough market power to have upper hand over farm prices.

The potential causes of asymmetric price transmission could be the abuse of marketing power (Von Cramon-Taubadel and Meyer 2004); intensity of competition in market (Bailey and Brorsen, 1989); elasticity of product demand (Pletzam 2000); extent of product perishability (Reziti 2014); search costs in local markets (Chavas and Mehta2004); adjustment costs; menu and spatial costs (Goodwin and Harper 2000); government interventions to support farm gate prices (Lass et al. 2001).The distribution efficiency of a product can be examined through getting insight into the nature of relationship between producer and consumer prices. An asymmetric price relationship is considered as an economic disadvantageous for producers and consumers ((Stewart and Blayney 2011).

In agriculture marketing, the distribution of profits and issues of marketing margins within the marketing channels are important to be investigated. Analysis of demand and supply shocks assist to understand the direction of market adjustments and price movements in moving goods from one level of marketing chain to another. Globally the subject of price transmission has been widely studied for many commodities such as wheat and wheat flour (Jung and Byeong 2015), pork (Goodwin and Harper 2000; Abdulai 2002), lamb meat (Ben-Kaabia and Gil 2007), maize (Acquah and Dadzie 2010), fish (Shinoj et al. 2008), and milk (Lass et al. 2001; Capps and Sherwell 2007).

As regards dairy products, although various studies had already been conducted on price transmission mechanism and market cointegrations issues; however their conclusion and the evidences varies and mixed across the geographical locations and commodities. Chavas and Metha (2004) carried out an empirical analysis for the butter market in the US and they found a strong evidence of asymmetry in the adjustment of retail prices. A study on whole milk price transmission elasticity was conducted by Capps and Sherwell (2007). The applied Houck error correction model (ECM) for analysis and their results proved that an asymmetric price transmission mechanism was present in farm-retail price relationship. Reziti (2014) found positive asymmetries during their study on milk and butter in the dairy industry of Austria. Stewart and Blayney (2011) conducted a study for the whole milk and cheddar cheese market in US and reported that asymmetric price movements between farm and retail level. They proved that the price shocks between two levels were transmitted with a delay as well as in an asymmetrical pattern. Recently, Reziti (2014) carried out a study in the Greek milk sector and threshold error correction autoregressive model was applied on monthly price data ranging from January 1989 to April 2009. This study results detect a nonlinear price adjustment between milk consumer and producers and abuse of market power by milk processor and retailers was observed.

*b) Statement of the Problem*

To analyze price adjustments in an unregulated milk marketing system and to evaluate the underlying



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symmetries is a complex phenomenon. The available information about Pakistani milk market evidenced that milk producers within prevailing milk supply chain are in a vulnerable position. Usually they sell milk to local milk collectors (Dodhi) at the prices which are almost half of retailers' prices. In Pakistan some studies had been conducted on rice and citrus markets; however so far no research is carried out to examine the vertical price transmission and cointegration issues for milk marketing in Punjab province. Therefore for Pakistan's dairy sector, a research gap exist to identify the behavior and the nature of relationship among milk marketing agents/ middlemen arising from milk price shocks. This study is an attempt to undertake the vertical price transmission analysis and to gain an insight into price adjustments among milk producers, wholesalers and retailers in four districts. The specific objectives of this study were; (i) to examine the short run milk price variation among inter-market and intra-marketing agents during flush and lean season of milk production; (ii) To analyze the nature of market integration and the long run vertical price transmission between the prices of milk producers and consumers. Hence, this study will deliver some valuable information on the directions of price adjustments and market integrations which is expected to be useful for the stakeholders involved in milk supply chain of Pakistan.

## II. Materials and Methods

### a) *Description of Study Area and Data Source*

The study area for this research was the south region of Punjab province. Agriculture and rearing of livestock is the primary source of livelihood for rural residents of this geographical location in Pakistan. From south region of Punjab province four districts namely Vehari, Lodhran, Bahawalpur and Muzaffargrah were purposively selected. These districts have a rich population of livestock and milk production activities. Monthly average prices for milk producer and consumer were collected from four districts of the Punjab. The data used for this research was obtained from secondary sources. To acquire milk producer prices that match up with retail prices is a complex proposition. Agriculture statistics of Pakistan (2010) was chosen as first source of data. Second source of data was the essential food commodity price list which is monthly publicized from each of the District Coordination Office (DCO). A continuous reliable source of data on milk producers' prices could not found as such; however the data for one pair of milk consumer prices and milk producers' prices for four districts was estimated on averages after discussions with livestock, dairy development officials and dairy industry experts. Monthly milk price observations ranging from January 2010 to June 2016 were collected and undergone through data analysis. The nominal price data provided by the agriculture statistical office and the DCO office was deflated to January 2010 in terms of the Pakistan consumer price index to calculate the real price change in milk. Variables are transformed in logarithms.

### b) *Methodology for Price Spread over Different Markets*

Efficiency analysis of marketing chain provides reliable information about price movements or spread within markets and over different marketing agents. In this paper for calculating price spread over selected district markets and for various marketing agents, we used Rudra's (1992) approach which is explained the price spread by symbol $\theta \pm \delta$. The sign $\theta$ indicate the midpoint of milk price to various market middlemen in a given market. The symbol $\theta + \delta$ expressed the highest observed value and $\theta - \delta$ is for the lowest observed value. The intra-market price variation is denoted by the symbol $\pm\delta$. After estimating and comparing the values of $\theta$ for different middlemen within the same market or for different regional markets for the same middlemen gives some idea about the inter-market and intra-market price variations. Rudra (1992) hypothesis for the calculation of price spread for different markets and over different marketing middlemen was applied. This hypothesis explained that a market of homogenous product becomes perfectly competitive as if the range of price variations for the homogenous product within different markets (excluding transactions cost) in any particular marketing middlemen as well as inter-marketing agents for the same period is almost close to uniformity. In developing economies like Pakistan, the agricultural inputs and outputs data related to market analysis are usually short-term in nature. Hence, in determining the competitiveness of milk producers' and consumers' prices within districts markets, the Rudra's (1992) estimates seem to be more pertinent and applicable.

### c) *Selection of Price Series for Price Transmission Analysis*

Due to various milk marketing agents (i.e. milk collectors, wholesalers, processors, distributors and retailers), there could be a number of possible combination of price series. However, we only emphasis on milk producer and consumer level in the vertical milk market linkages and selected farm and retail prices. According to study objectives, in this paper we applied different test for estimating the trend of price transmission. First of all, the descriptive statistics was applied in order to examine the relationship between milk producer and consumer as well as to describe the main features of a data collection. Certain other statistical tests were also applied to validate the results.

### d) *Unit root Test, Cointegration Test and Granger's Causality Test*

It is very important to examine the price relationship over time; a) whether selected price series are stationary or not, b)if the price series are non-stationary with a unit root, what is the type of co



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integrated orders, c) if price series are co-integrated what is the direction of causality. If the price series are stationary at levels, then we can apply "ordinary least square" estimation method to examine the relationship between two price series. But if the series are non-stationary and have unit root then to determine the relationship, the series are taken at the first or second difference levels and the Error Correction Models (ECM) is applied for the purpose. We applied the commonly developed Augmented Dicky-Fuller test to assess whether the selected price series have unit root or not. The null hypothesis for milk producer and consumer price series was that; it is non-stationary having a unit root. Null hypothesis results, if fail to reject $H_o$ rather accept it, meaning that price series have unit root and are non-stationary. The required lag number for ADF test is determined by using Schwarz information criteria (SIC).

$$\text{Pt}=C+\beta t+\alpha Pt-1+\sum_{i=1}^{K}\gamma\Delta Pt-1+\varepsilon t \qquad (1)$$

Where
Pt = denote prices natural logarithm
C = denote intercept
t = is a linear time trend

If the selected time series price data is stationary on differencing, then the co-integrated order [I(1)] between price series is said to be present. We used Johansen (1988) test to find out the cointegration relationship between the price series.

$$P_{pt}^{\sim}=\alpha+\beta P_{ct}^{\sim}+Vt \qquad (2)$$

If Ppt and Pct price series are co-integrated and in the order of I(1), then the residuals $V_t$ would be I(0).

To examine the long run conintegration between two price series, we applied Granger causality test. The presence of long run relationship between two price series is detected if a significant information is statistically predicted by P1 about the future values of P2. The relationship is defined as P1 have Granger-causality for P2.In this study the estimation of Granger-causality test was very important; as no prior information on causal relationship between milk producer and consumer prices is established in literature for milk marketing system of Punjab. The null hypothesis was formulated in such a way that its rejection would provide Granger causality for P1 to the price series P2.

*e) Empirical Models used for Price Transmission*

Meyer and Von Cramon-Taubadel (VECM) model (2004) was used to examine the price dynamic relationship for non-stationary and co-integrated price series (Ppt and Pct). The Vector Error Correction model assumes the equation as follows:

$$\Delta Pct=\alpha+\rho\left(\Delta P_{ct-1}-\beta\Delta P_{pt-1}\right)+\delta\Delta P_{pt-}+\theta\Delta P_{ct-1}+\varepsilon_t \qquad (3)$$

Where
ΔPpt and ΔPpt-1 stand for the changes in farm-gate and lagged changes in farm-gate prices. ΔPct and ΔPct-1 denotes the changes in retail and lagged changes in farm-gate prices. The speed of adjustment to long run equilibrium is denoted by an error correction term "ρ". While "β" and δ indicates price transmission elasticity in long-run and short-run between two prices respectively. εt represent the white noise ( residual). The white noise (εt) is expected to be zero at the long run equilibrium levels of both Pct and Ppt. However $\varepsilon_t$ could be either positive or negative when both price series are away from their long run equilibrium. In other words; the white-noise (εt) would be positive if Pct series is well above its long-run equilibrium and(εt) is negative in the opposite case of Ppt series.

The error correction term (ECT) entered into Error Correction Model is a residual of equation (1) which is lagged by one period.

$$\Delta P_{ct}=\beta_0+\sum_{n=1}^{K}\beta_{1n}\Delta P_{pt-1+1}+\sum_{m=1}^{L}\beta_{2m}\Delta P_{ct-m}+\varphi*ECT_{t-1}+\varepsilon_t \qquad (4)$$

Where $ECT_t-1=Pct-1-\alpha_0-\alpha1*Ppt-1$

Granger and Lee (1989) in their study of US industry inventory proposed a modification in equation (2) which enables to estimate the two co-integrated prices variables asymmetric price transmission. They included additional dummy variables in the model and segmented the error correction term into ECT+ -and ECT-.

$$\Delta P_{ct}=\beta_0+\sum_{n=1}^{N}\beta_{1n}\Delta P_{pt-n+1}+\sum_{m=1}^{L}\beta_{2m}\Delta P_{ct-m}+\varphi_1D_{1t}^{+}ECT_{t-1}+\varphi_2D_{1t}^{-}ECT_{t-1}+\varepsilon_t \qquad (5)$$

with $D_{1t}^{+}=1$ if $ECTt-1>0$ and 0 otherwise, $D_{1t}^{-}=1$ if $ECTt-1<0$ and 0 otherwise.

The long -run asymmetry hypothesis in equation (3) is:

$H_0$: $\varphi1=\varphi2$ it will tested through F-test.

To assess both aspect of response variation, the contemptuous response term was segmented into positive and negative components through Von Cramon-Taubadel and Flahlbusch (1994) which follow the form

$$:\Delta P_{ct}=\beta_0+\sum_{k=1}^{N}\beta_{1k}^{+}D_{ct}^{+}\Delta P_{pt-n+1}+\sum_{k=1}^{L}\beta_{1k}^{-}D_{2t}^{-}\Delta P_{pt-n+1}+\sum_{m=1}^{L}\beta_{2m}\Delta P_{ct-m}+D_{1t}^{+}ECT_{t-1}+\varphi_2D_{1t}^{-}ECT_{t-1}+\varepsilon_t \qquad (6)$$



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with $D_{2t}^{+}=1$ if $\Delta P$pt$-k+1>0$ and 0 otherwise, $D_{2t}^{-}=1$ if $\Delta P$pt-$l+1<0$ and 0otherwise.

To test both symmetry hypothesis for short run and long run, the equation (4) can be used in conjunction with joint F-test as under:

$$H_0=\sum_{k=1}^{N}\beta_{1k}^{+}=\sum_{k=1}^{N}\beta_{1k}^{-}\ and\ \varphi_1=\varphi_2 \qquad (7)$$

According to von Cramon-Taubadel, valid inferences with respect to the parameters of interest in (1) or (4) requires the Ppt to be weakly exogenous. On account of this, Boswijk and Urbain testing procedure was followed and in the first step "Ppt" was estimated through marginal model as follow:

$$\Delta P_{pt}=\gamma_0+\gamma_1(L)\Delta P_{pt-1}+\gamma_2(L)\Delta P_{pt-1}+e_t \qquad (8)$$

In the second step; we applied a variable addition test and fitted residual "εt" was estimated through marginal model (5); {in the structural model (2) and (4)}. If the outcomes of this test explained insignificant results for fitted residual in the structural model, a slightly conditioned "Error Correction Model" is assumed on short-run weekly exogenous variables. To proceeds further and to test the significance of long run parameters with respect to weak exogeneity, the ECTt-1 is added from equation (1) to equation (5).

However, if the results of all tests revealed a non-cointegration between variables, the VAR model can be specified and estimated. In this situation, the two equation included in VAR model can be written as follows:

$$P_{pt}=\alpha_{\circ}+\alpha_1P_{pt-1}+\ \dots\dots\dots\dots+\alpha_kP_{pt-k}+\gamma_1P_{ct-1}+\ \dots\dots\dots.+\gamma_kP_{ct-k}+\varepsilon_t \qquad (9)$$

$$P_{ct}=\beta_{\circ}+\beta_1P_{ct-1}+\ \dots\dots\dots\dots+\beta_kP_{ct-k}+c_1P_{pt-1}+\ \dots\dots\dots.+c_kP_{pt-k}+\varepsilon_t \qquad (10)$$

Where

$P_{pt}$ and $P_{ct}$ are milk producer and consumers prices, and $P_{pt-k}$ and $P_{ct-k}$ are lagged milk producer and consumers prices respectively.

## III. Results and Discussion

*a) Descriptive Statistics of Milk Prices at Dairy farmers and Milk Consumer level*

In this section, we would discuss the price transmission and price adjustment analysis between the milk producer and consumer prices for selected four districts of Punjab province. The important descriptive statistics derived from the analysis of respective price series are mentioned in Table 1.Average price per liter of fresh raw milk for producers ranged from was 23 PKR to 48 PKR. Average retail milk price ranged 40PKR/L to 78PKR/L. The information reported in Table 1, demonstrates noteworthy difference between farm and retail level milk prices among four districts during the period 2010 to 2016. The relative variation in milk prices under investigation are likely due to unregulated marketing system and cost of transporting ,ilk from rural areas to urban center.

*Table 1:* Overview of milk prices along milk marketing channel over period: 2010-2016

| Districts | Mean | Median | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Milk Prices at Farm Level | | | | | |
| Vehari | 36 | 35 | 1.45 | 23 | 38 |
| Lodhran | 34 | 33.5 | 2.36 | 24 | 36 |
| Bahawalpur | 35 | 34 | 1.34 | 25 | 37 |
| Muzaffargarh | 38 | 36 | 1.36 | 25 | 38 |
| Milk Prices at Retail Level | | | | | |
| Vehari | 45 | 44 | 2.35 | 35 | 77 |
| Lodhran | 46 | 45.6 | 3.56 | 36 | 75 |
| Bahawalpur | 45 | 44 | 2.35 | 35 | 74 |
| Muzaffargarh | 46 | 45 | 3.5 | 38 | 78 |

*Source: Authors calculations from collected data, 2016.*

*b) Seasonality and Milk Price Variations*

In Pakistan, the seasonality is an important factor and the milk production cycle encompassed flush and lean seasons. Milk production from December 15th to April15th is considered as flush season whereas, from 16th April to August 15th is lean season. The rest of period also varies between mini flush (September to October) and mini lean (November and April). This variation in milk production is due to changing weather and availability of fodder production in hot summer and winter. The prices during flush and lean seasons remained fluctuated. In flush season, milk production is more but consumption is less. Therefore, milk collectors (Dodhi) decrease milk prices. On the other hand during the lean season, extreme hot summer / or in winter months, the consumers like to consume more milk in the



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form of milk beverages and tea. Therefore, in summer and winter due to lean season and more consumption, milk prices rise up very high towards consumers' side but a slight increase is observed for milk producers. The market integration and price variation among districts Vehari, Lodhran, Bahawalpur and Muzaffargarh and over different marketing middlemen was estimated during both lean and flush season of one year. The important outcomes are mentioned in Table-2.

*Table 2:* Price Variations during Flush and Lean seasons among Inter and Intra- Milk Marketing Agents/Middlemen

| Flush Season Milk Price Adjustments among Middlemen | | | | |
|---|---|---|---|---|
| District | Milk Producers | Milk Collectors (Dhodi) | Small Processors | Retailers/ Milk Shops |
| Vehari | 45.75±2.90 | 55.30+10.10 | 62.65+8.25 | 63.5+8.00 |
| | (6.33) | (18.3) | (13.16) | (12.6) |
| Lodhran | 43.50±2.50 | 57.00+9.90 | 64.25+8.75 | 65.00+8.25 |
| | (5.74) | (17.5) | (13.61) | (12.61) |
| Bahawalpur | 46.25±2.00 | 54.00+9.88 | 63.50+7.5 | 64.00+8.20 |
| | (4.32) | (18.3) | (11.8) | (12.8) |
| Muzaffargrah | 45.00±2.25.00 | 56.50+9.75 | 61.25+7.7 | 63.50+7.75 |
| | (5) | (17.27) | (12.57) | (12.2) |
| Lean Season Milk Price Adjustments among Middlemen | | | | |
| Vehari | 48.25±2.00 | 58.00+10.50 | 66.25+8.00 | 68.00+8.25 |
| | (4.14) | (18.1) | (12.07) | (12.13) |
| Lodhran | 47.50±2.50 | 57.50+11.25 | 67.25+8.75 | 69.00+9.50 |
| | (5.26) | (19.56) | (13.01) | (13.76) |
| Bahawalpur | 49.35±2.20 | 58.25+10.25 | 68.25+8.25 | 70.00+8.20 |
| | (4.45) | (17.6) | (12.08) | (11.71) |
| Muzaffargrah | 48.55±2.50 | 60.20+10.25 | 65.25+8.00 | 68.50+8.50 |
| | (5.14) | (17.02) | (12.26) | (12.4) |

*Note: Price for standard milk (Fat 4.5%, SNF 8.5% and CLR 27.74) in lean season by Milk Producers was Rs.48 and flush season it was Rs.43 during 2015-16.(ii) Figures within parenthesis indicate percentage variation of price during milk peak and lean season*

The estimation of fresh milk price variation was not far from uniformity when milk is sold directly from producers to consumers, as the percentage of price variation lies between 4.14 and 6.33. However, the percentage of price variation lies between 11.71 and 19.56 for inter-markets and/or intra-marketing agents which was far from uniformity. The possible explanation of this pattern may be as when milk collectors (Dhodi), small milk processors and retailers engaged in milk marketing chain; they added more transactions costs and absorb highest price margin. The highest percentage change in price was absorbed by milk collectors (Dhodi), followed by processors and retailers. The results in Table-2 explained the significant impact of seasonality on milk prices. The price for per liter was a little high during the lean season for all district markets and/or for all types of marketing middlemen. The graphical representation also explained that milk prices exhibit seasonal patterns for flush and lean season (Figure 2).



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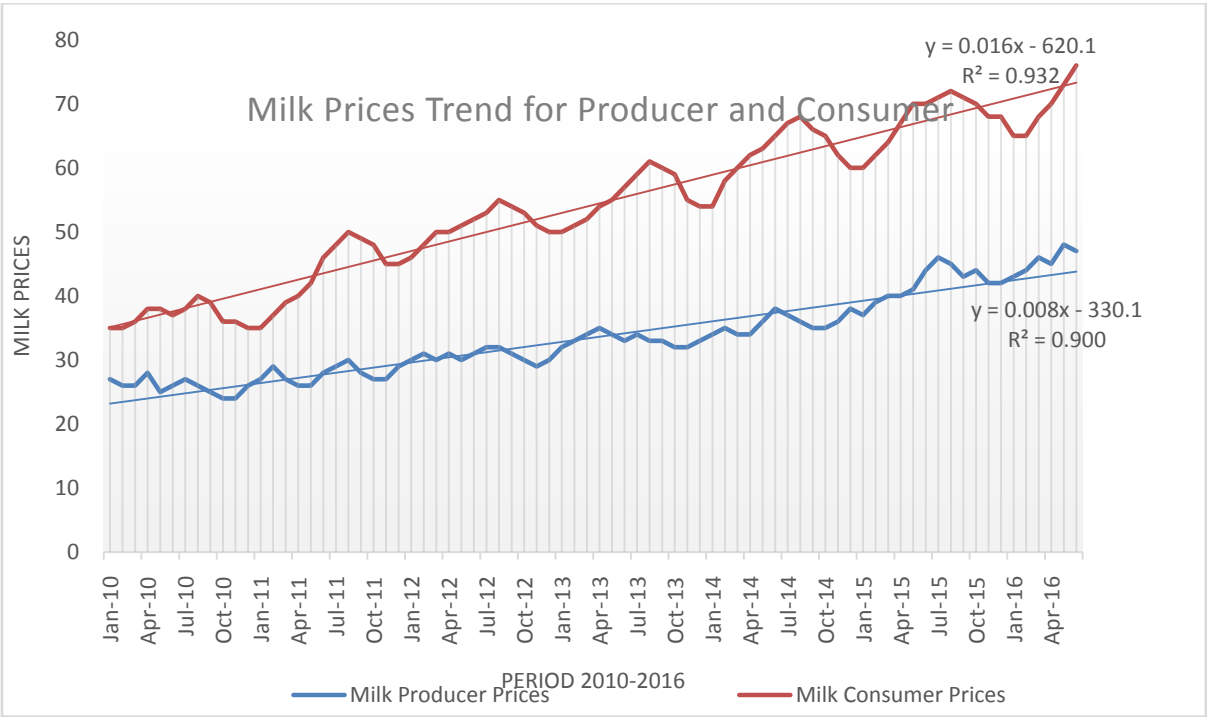


*Figure 2:* Milk prices trend for producer and consumer

The above Figure-2 demonstrates that milk producer and consumer prices increased and decreased with seasonal fluctuations and this trend suggest a price transmission symmetry. The price trend lines also indicate that large increases in consumer prices are followed by slightly increases in milk producer prices. This happened due to the existence of transactions costs or relatively high marketing margins at retail level.

*c) Stationarity of Price series*

Figure 2 depicted that both price series i.e. milk producer and consumer prices contained a consistent time trend with a shift. Stationarity of price series was checked with unit root test to analyze the prescribed models for price transmission at milk producer and consumer level. Thus, a Unit root test at level and the first difference was estimated by applying Augmented Dickey –Fuller (ADF) procedure and the outcomes are reported below in Table 3.

*Table 3:* Augmented Dickey –Fuller (ADF) Procedure for testing the Unit Root at Levels and First Difference

| Variables | Levels | | First Difference | | Critical Value | |
|---|---|---|---|---|---|---|
| | ADF | PP | ADF | PP | 5% | 1% |
| Producer Price | -2.39 | -1.43 | -7.16 | -6.18 | -2.83 | -3.44 |
| Consumer Price | -2.26 | -1.56 | -5.43 | -5.7 | -2.83 | -3.44 |

*Source: Authors calculation, 2016. Note: * =0.05 level (5%) ** = 0.01 level (1%) significance*

The null hypothesis about the stationarity of both price series were tested at levels and the first difference through ADF-test. Appropriate lag length was determined by using Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC). The results showed that null hypothesis was rejected for all variables on first difference and the test statistics were significant at 5 % and 1% level. Both price series for has one serial unit root but not at the corresponding frequencies. Hence, all the price variables were of the order one I (1), and one cointegrating vector exist between each pair of milk producer and consumer prices at retail level (see Table 3).

*d) Co-integration Outcomes*

These results support to proceed for co-integration tests to check the long-run equilibrium relationship. Johannsen's co-integration procedure in a dynamic framework suggested that if a long-run relationship exist between both price series then; the movements among them will be bounded together and/or will be co-integrated. The outcome of Johansen test for both price series are presented under Table 4.



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*Table 4:* Results of Johansen Co-integration test for milk producer and consumer prices

| District | Hypnotized co-integration equations | Trace test statistics | p-value | Max-Eigen value statistics | p-value |
|---|---|---|---|---|---|
| Vehari | None | 21.64 | 0.0013* | 19.63 | 0.0103* |
| | At most 1 | 2.156 | 0.13 | 2.156 | 0.1302 |
| Muzaffargrah | None | 9.37 | 0.321 | 9.21 | 0.237 |
| | At most 1 | 0.063 | 0.853 | 0.063 | 0.853 |
| Lodhran | None | 19.83 | 0.0011* | 17.38 | 0.0113* |
| | At most 1 | 2.36 | 0.129 | 2.36 | 0.129 |
| Bahawalpur | None | 23.64 | 0.0023* | 21.27 | 0.0023* |
| | At most 1 | 1.85 | 0.183 | 1.85 | 0.183 |

*Source: Authors findings, 2016. ** MacKinnon-Haug-Michelis (1999) p-value and *indicate rejection of the hypothesis at the 0.05 level. Trace and Max-eigen value tests indicate 1 co integration equation at 0.05 levels.*

The coinegrating vector in Johansen (1998) test included a constant term with formulation of null and alternative hypotheisis [$H_o$ = the number of cointegrating vectors is zero (r=0); $H_1$=one cointegrating vector is (r=1)]. AIC criteria were used to determine appropriate lag lengths. The statistics values of both λ trace and λ max test suggested that the null hypothesis was rejected for the zero cointegrating vectors and long-run relationship for one cointegrating vector was present between each price series (see Table 4).

*e) Detection of Milk Price Symmetry*

The next important step in price transmission analysis of milk marketing was to determine the asymmetry of price movements between producer and consumer. Granger causality test was applied to find out the possible direction of price movements between marketing agents. To avoid from heteroscedasticity and Autocorrelation-consistent (HAC), seasonal dummies were added in the model. Granger causality test findings are presented in Table 5.

*Table 5:* Granger Causality test based on monthly data of milk producer and consumer level from 2010:01 to 2016:06

| District | Effect | Hypothesized cause | F- statistics | p value | Conclusion |
|---|---|---|---|---|---|
| Vehari | Producer Price | Consumer Price | 0.21 | 0.763 | Reject |
| | Consumer Price | Producer Price | 3.16 | 0.028* | Do not reject |
| Muzaffargarh | Producer Price | Consumer Price | 1.27 | 0.261 | Reject |
| | Consumer Price | Producer Price | 0.46 | 0.56 | Reject |
| Lodhran | Producer Price | Consumer Price | 1.02 | 0.346 | Reject |
| | Consumer Price | Producer Price | 8.79 | 0.002* | Do not reject |
| Bahawalpur | Producer Price | Consumer Price | 0.39 | 0.624 | Reject |
| | Consumer Price | Producer Price | 4.83 | 0.003* | Do not reject |

*Source: Author findings, 2016.Notes: The null hypothesis is that one price series does not Granger cause to another; significance */** indicate rejection of null hypothesis at 1% and 5%.*

The Granger causality analysis suggested two parallel effects of upward and downward price movement in a typical milk marketing chain :

$$\text{milk producer} \rightarrow \text{milk collector/dodhi} \rightarrow \text{milk processors} \rightarrow \text{distributors} \rightarrow \text{retailers}$$

The outcomes of Granger Causality test proved that in our marketing chain, there is a downward price mechanism. Hence, the direction of causality was from milk consumers to milk producer because the milk marketing middlemen have enough market power. This situation dragged the dairy farmers in a vulnerable position and deprived them from getting fair prices of their milk production. This problem stemmed from two major reasons; (i) milk is a perishable commodity and it cannot be retained or stock for a longer period of time (ii) the Pakistani's dairy farmers have not established and joined effective cooperative organizations. Hence, this poor structural arrangement of dairy sector compelled the dairy farmers in a price taker position.

*f) Estimates of Vector Error Correction Model and Price Transmission*

The findings presented in Table 3 & 4 explained that the trace and Maxi-eigen statistics were greater than critical values; price series were stationary at first



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differences and one co-integrating vector long-run relationship exist. These conditions support us to run the Vector Error Corrections Model (VECM) to evaluate how one price behave if one price increases or decrease in short-run and how it adjust for long-run equilibrium. The findings for testing asymmetry in price transmission within milk supply from producer to consumer through Vector Error Correction Model are presented under Table 6.

*Table 6:* Estimates of Vector Error Correction (VECM) for testing Asymmetry in Price Transmission of Milk Marketing Channels

| Variables | Coefficients | Std. Error | t-statistics | (p-value) |
|---|---|---|---|---|
| Δ ln Producer price$_{t-1}$ | 0.482* | 0.071 | 6.789 | 0.007 |
| Δ ln Consumer price$_{t}$ | 0.316* | 0.126 | 2.507 | 0.013 |
| Δ ln Consumer price$_{t-1}$ | 0.416* | 0.119 | 3.496 | 0.002 |
| β1 | 0.028* | 0.0106 | 2.641 | 0.021 |
| β2 | -0.013* | 0.006 | -2.167 | 0.021 |
| β3 | -0.029** | 0.005 | -5.801 | 0.035 |
| β4 | 0.231 | 0.119 | 1.94 | 0.246 |
| β5 | -0.026* | 0.008 | -3.250 | 1.48e-05 |
| β6 | 0.035** | 0.009 | 3.889 | 0.034 |
| β7 | -0.026** | 0.007 | -3.714 | 0.051 |
| β8 | 0.038* | 0.011 | 3.454 | 0.024 |
| β9 | -0.029* | 0.005 | -5.80 | 0.001 |
| β0 | 0.0001 | 0.008 | 0.0125 | 0.384 |
| $ECT^{-}_{t-1}$ | -0.076 | | | |
| $ECT^{+}_{t-1}$ | 0.280 | | | |
| D-W | 1.92 | | | |
| R- squared | 0.685 | | | |
| Adjusted R2 | 0.659 | | | |
| S.E. of Regression | 0.023 | | | |
| RSS | 0.103 | | | |
| Mean Dependent | 0.006 | | | |
| S.D. Dependent | 0.042 | | | |
| F-Statistics | 36.435 | | | |

*Source: Authors calculations, 2016. */**/*** statistically significant at the 1% 5% and 10% levels, respectively. Δ ln Producer_milk is the milk producer log-price in first difference; Δ ln Consumer_milk is the consumer log-price in first difference. Lag order has been selected according to (AIC) Information Criteria.*

The findings of VECM revealed that there exist positive relationship for outward price movements (**milk producer → milk consumer**) and negative relationship is found for downward movement (**milk consumer → milk producer**). The test of asymmetry for short-run suggested that the pattern of price movements for increase in prices was different than to decrease in prices (Table 6). The coefficients of ECT± showed that increase or decrease in consumer prices will affect the change in producer prices; however, greater price variations were observed for long run equilibrium rather than short run adjustment. According to our results, it is evident that a decrease in milk prices at retail level are more quickly adjusted to decrease farmer price however, a increase in consumer prices is not transmitted with same adjustments. These results are also supported by findings of Rezitis and Reziti (2011) article which conclude that consumer prices increase faster than milk producer price. Our study results are also in accordance to Awokuse and Wang (2009); Capps and Sherwell (2007); and, (Yong and Nie 2016) studies, where asymmetric price transmission was also evidenced for both long run and short run equilibrium. The estimates in Table 6 conclude that when milk producer price increases one unit, the milk retailers contemptuously shift this one unit increase



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to consumer price in order to retain its profit at fixed level (deviation equal to zero).The coefficient of VECM expressed price adjustments during a period of time. For one month (i.e. short-run period) one unit positive change in consumer's price would approximately adjust milk producer price 7.6% whereas in long-run equilibrium it is around 28% (Table 6). Hence, decrease in milk producer prices during flush season in long-run equilibrium did not transmitted to consumer welfare. This is attributable to marketing middlemen/retailers who absorb all the positive price deviation and did not shift this advantage to consumers. Consequently, coefficients of the segmented ECT revealed the asymmetric price transmission was obvious in milk marketing chain, Table 6. Our findings were also supported by a study conducted by Acosta and Valdes (2013) who analyzed the vertical milk market price transmission pre-consignation methods. Their study also suggested positive price transmission asymmetries and concluded that increase in farmer prices are passed on more quickly and more completely to retail prices than to decrease in farmer prices.

## IV. Conclusions and Recommendations

This study was carried out to examine the price adjustments for short-run and long-run equilibrium. The symmetry of price adjustments between milk producer and consumer was studied through price transmission analysis. Time series data of milk prices ranged from January 2010 to June 2016 for producer and consumer were analyzed by applying VECM along with descriptive statistics. Both the price series were stationary at first difference; the Johansen cointegration test provided the evidence of long term cointegration in prices. The estimates of Vector Error Correction model (VECM) revealed that milk consumer price (Pct) was exogenous and the outcomes of Granger causality test validate the evidence of unidirectional price causality from farm to retail side and not vice versa. The analysis provide an indication that milk marketing system working in selected districts is imperfect , market power is on the demand side and asymmetric price transmission is evident in milk supply chain. The possible justification for this could be that marketing middlemen earn large profit margins when milk price increases during hot summer or winter (lean season). The middlemen still make abnormal profit during flush seasons when milk supply is more but its demand declines. Thus, prices are transmitted from consumers to milk producers in an asymmetric mode and middlemen abuse their market power to absorb positive price shock or transmit with delay in long run equilibrium. The pattern of asymmetric price transmission towards the principal stakeholders i.e. milk producers and consumers during peak and lean seasons of milk production, not only lowers the dairy farmers' profitability but also abolish the consumer welfare effects.

The study suggest that the asymmetric flow of prices can be make smaller if milk producers are integrated into small or large milk cooperatives organizations. The milk collecting associations will help to reduce the transactions costs, offer reliable milk market with better returns and minimize the middlemen role/margins. The public or private interventions are also recommended to improve the milk marketing system of Pakistan. It could be achieved through better storage or low cost chilling units provided to milk producers at substantial rates for enhancing the perishable life of milk. These efforts would results to capture a larger share of milk producer in consumer price. Thus, study evidenced for market imperfections could be utilized for achieving a close collaboration of milk producers to re-structure the milk supply system in Punjab province. Such collaboration would enable the farmers to strengthen their negotiation power in the vertical market linkages and having a better position for taking the price decision.

## V. Acknowledgement

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# Contribution De La Consommation Finale Des Ménages A La Croissance Et A La Création D'emploi Au Maroc: Simulation A L'aide D'un Modèle Input-Output

By Nouzha Zaoujal

*Resume-* La demande finale, particulièrement la consommation finale des ménages, est considérée comme un des stimulateurs de l'activité économique. Cette étude, vise à mesurer l'effet d'une variation de la consommation finale des ménages sur la valeur ajoutée, aussi bien globale que sectorielle. Une attention particulière est accordée à la détermination de l'effet sur la demande des facteurs primaires, notamment le travail. Les modèles input-output, par leur concept de multiplicateur, nous permettent de mesurer les effets directs et indirects, sectoriels et globaux, d'une variation exogène de la demande finale ou de l'une de ses composantes dont la consommation finale des ménages. Pour mener cette étude, nous nous sommes basées sur les données du Tableau Entrées-Sorties (TRE) relatif à l'économie marocaine de 2013 et nous avons utilisé le logiciel GAMS-MINOS comme outil.

*Mots-cles:* *croissance, demande finale, analyse input-output, multiplicateur, tre, gams-minos.*

*GJMBR-B Classification:* *JEL Code: M29*

CONTRIBUTIONDELACONSOMMATIONFINALEDESMNAGESALACROISSANCEETALACRATIONDEMPLOIAUMAROCSIMULATIONALAIDEDUNMODLEINPUTOUTPUT

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# Contribution De La Consommation Finale Des Ménages A La Croissance Et A La Création D'emploi Au Maroc: Simulation A L'aide D'un Modèle Input-Output

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*Mots-clés: croissance, demande finale, analyse input-output, multiplicateur, tre, gams-minos.*

## I. Introduction

La demande finale est considérée, dans la théorie économique, comme un des moteurs de la croissance (principe de la demande effective). La consommation finale des ménages marocains, représente une part importante de la demande finale intérieure, soit presque 54%, même si son poids a enregistré quelques fluctuations au cours des dernières années, passant de 58,3% en 2000 à 53,54% en 2007 et 53,60 % en 2015. Relativement au PIB, les dépenses en consommation finale des ménages, ont représenté une part supérieure à 57% en 2015 (avec 61% en 2000 et 58 % en 2007). Par ailleurs, le Haut Commissariat au Plan (HCP) affirme que la demande intérieure a apporté, au premier trimestre 2016, une contribution de 3,3 points à la croissance et que les dépenses de consommation finale des ménages en ont contribué pour 1,6 point.

Dans ce papier, nous nous proposons d'étudier et d'évaluer, à partir du TRE du Maroc de 2013, l'impact d'une variation de la consommation finale des ménages marocains sur la valeur ajoutée de chaque secteur d'activité ainsi que sur la valeur ajoutée globale d'une part, et sur la création d'emploi au niveau sectoriel et global de l'autre.

Pour ce faire, nous avons eu recours à l'analyse input-output et au concept de multiplicateur utilisé par Leontief que nous avons appliqué sur les données du TRE du Maroc de 2013 en utilisant le logiciel GAMS-MINOS comme outil.

Ainsi, ce papier est articulé en quatre sections : une première présente l'évolution, la structure ainsi que la contribution de la consommation finale des ménages à l'économie du Maroc

La deuxième, donne une lecture du TRE du Maroc en 2013 et en déduit la structure de l'économie marocaine en cette année. La troisième rappelle l'analyse input-output et le concept du multiplicateur de Leontief. Alors que, la quatrième et dernière section, relate les résultats ou les effets des simulations de chocs sur la consommation finale des ménages pour en tirer des leçons et recommandations au niveau de la conclusion.

## II. La Consommation Finale Des Menages au Maroc : Contribution, Structure et Evolution

L'étude de la demande finale intérieure au cours des 3 dernières années (2013-2015) montre que, même si elle a enregistré une baisse en 2015, sa part dans le PIB demeure importante, soit plus de 77,5% du PIB du Maroc aux prix courants (passant de 79,8% en 2013 à 80,33% en 2014) avec une contribution majoritaire pour la consommation finale des ménages qui en représente, à elle seule, plus de 57%. L'analyse de l'évolution de cette dernière, montre qu'elle a enregistré une hausse de 6,3% entre 2013-2015, même si sa croissance s'est ralentie de 3,63% entre 2013-2014 à 2,58% entre 2014-2015.

Par ailleurs, le haut commissariat au plan (HCP) estime que la consommation finale des ménages a contribué pour 1,1 point à la croissance en 2015, au lieu de 1,4 point une année auparavant, alors que la

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Formation Brut du Capital Fixe (FBCF) n'en a contribué qu'à hauteur de 0,5 point. La figure 1, résume l'évolution, entre 2013 et 2015, de la contribution de composantes de la demande finale dans le PIB (en %) (le tableau 1 de l'annexe, donne les données qui correspondent à la figure).

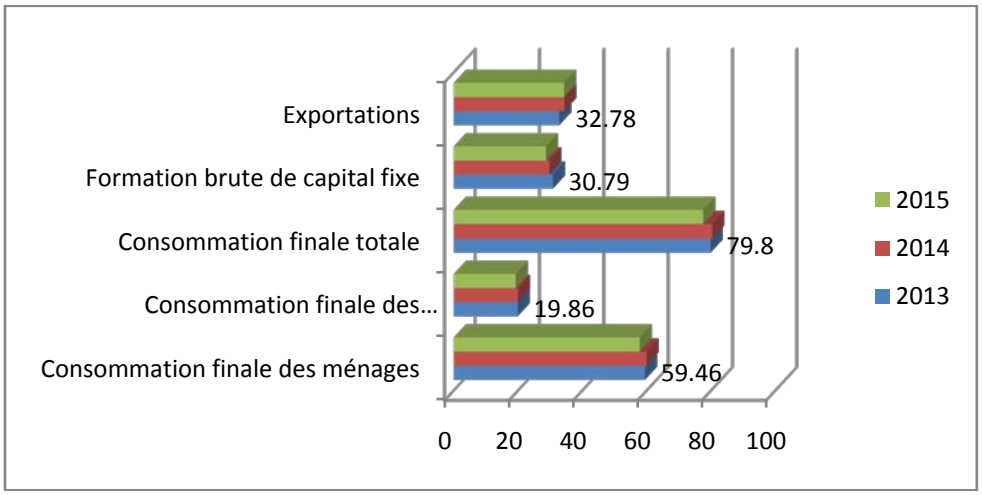


*Fig. 1:* Evolution de la contribution (en %) de composantes de la demande finale dans le PIB (2013-2015)

En plus, une analyse des dépenses de consommation finale des ménages par branche d'activité montre que la structure de ces dépenses est maintenue stable au cours de la période 2013-2015 et que les produits de l'Industrie alimentaire et de l'Agriculture accaparent à eux seuls plus de 42% du total des dépenses de consommation finale des ménages en 2013 (27,8% et 14,6% respectivement) suivies des dépenses en Immobilier, location et services rendus aux entreprises, presque 9%. Il est à signaler aussi, que les dépenses des ménages en Éducation, santé et action sociale ne dépassent pas 3% alors que celles relatives à l'Électricité et Eau atteignent 4,2%. La figure 2, relate la structure des dépenses de consommation finale des ménages en 2013.

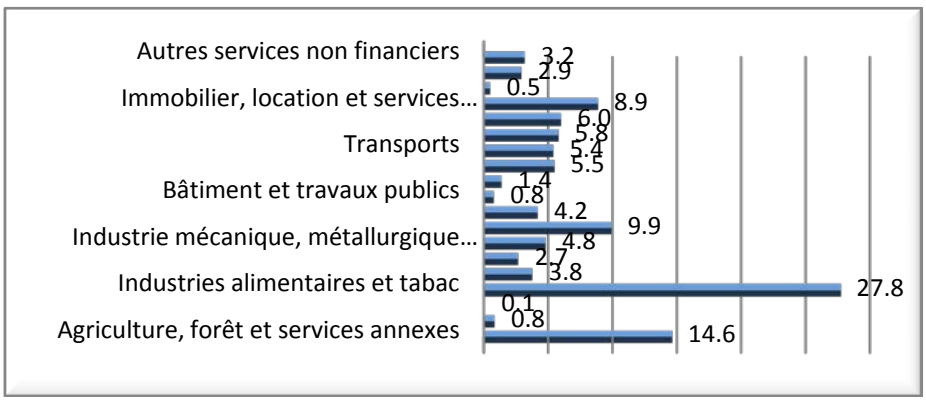


*Fig. 2:* Structure de la consommation finale des ménages (CFM), par branches d'activités (en 2013)

## III. Structure De L'économie Du Maroc En 2013

Les données du TRE de 2013 indiquent que, la valeur ajoutée globale réalisée par l'économie marocaine, s'est élevée à 818 413 millions de dirhams alors que le PIB global (valeur ajoutée augmentée des marges et impôts et corrigée des subventions sur les produits) a atteint 897 923 millions de dirhams enregistrant un taux de croissance de 4,5% par rapport à 2012. La contribution de chacune des branches d'activité dans cette valeur ajoutée globale est ventilée dans la figure 3.



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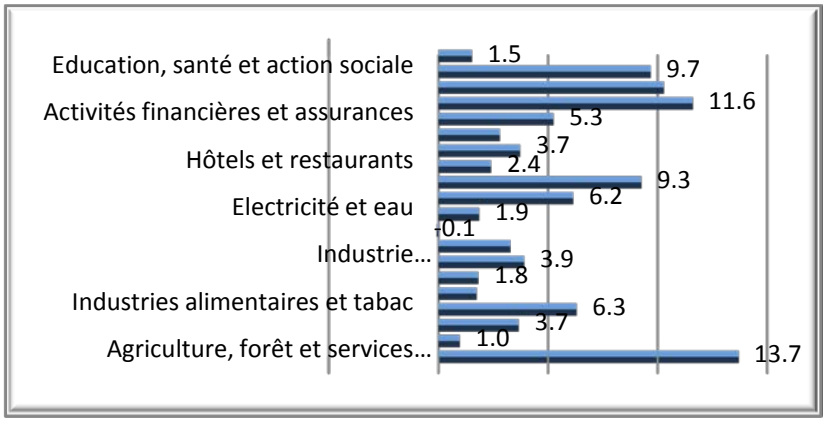


*Fig. 3:* Contribution relative de chaque branche d'activité dans la Valeur ajoutée globale (en 2013)

Ce graphique montre qu'en 2013, l'Agriculture, forêt et services annexes reste la branche la plus importante, en termes de contribution dans la valeur ajoutée, puisqu'elle en représente presque 14%, suivie de l'Immobiliers, locations et services aux entreprises (11,6%) et Commerce et réparation (9,3%). Il est à noter aussi, que l'Administration publique générale et sécurité et Education, santé et action sociale contribuent à elles seules à près de 20% dans la valeur ajoutée globale. Le Raffinage de pétrole enregistre, par contre, une contribution négative due aux difficultés vécues par le secteur et à la cessation de l'activité de la SAMIR[1].

En plus, le calcul de la contribution de chaque branche dans la rémunération des facteurs primaires et principalement le travail (plus de 35% de la valeur ajoutée globale) montre que l'Administration publique générale et l'Education, santé et action sociale apportent respectivement 25% et 22,2% (soit plus de 47%) de la masse salariale totale, suivies du Commerce et réparation (6,5%) et du Bâtiment et travaux publics (5,6%).

Ajoutons que, au niveau de chaque branche d'activité, le coefficient de la masse salariale dans la valeur ajoutée varie de plus de 0,82 pour l'Administration publique générale (0,88) et Education, santé et action sociale (0,82) à 0,25 pour le Commerce et Autres industries manufacturières y compris le raffinage et à moins de 0,07 pour l'Agriculture, forêt et services annexes. La figure 4 résume cette information.

## IV. Analyse Input-Output et Multiplicateur de Leontief

L'analyse input-output, dans sa version préliminaire, permet d'utiliser les interrelations entre les différentes branches d'activité d'une économie donnée afin de simuler l'impact d'une variation exogène de la demande finale, ou de l'une de ses composantes. Elle se base sur un critère simple, celui de la proportionnalité, pour déduire à partir d'un cadre comptable de base (le TRE), des multiplicateurs de la demande finale. On distingue généralement entre les effets directs (matrice A($a_{ij}$) dite de Leontief) et les effets indirects (matrice $R(r_{ij}) = (I - A)^{-1}$ dite le multiplicateur de Leontief ou multiplicateur d'inputs simple).

Le coefficient $a_{ij}$ de la matrice A, est appelé coefficient technique et représente la quantité du produit i nécessaire pour produire une unité du produit j soit:

$$\boldsymbol{a_{ij} = \frac{CI_{ij}}{XB_j}} \quad où:$$

- $XB_j$ : *la production de la branche j et*
- $CI_{ij}$ : *la consommation intermédiaire de la branche j en produit i*

Alors que le coefficient $r_{ij}$ de la matrice R, représente la quantité du produit i directement et indirectement nécessaire pour satisfaire une unité de la demande finale en produit j. Ce coefficient permet aussi de mesurer le lien entre les branches d'activité et de déterminer, par les techniques de linkage, les branches les plus ancrées et les plus influentes dans une économie donnée (branche clés produisant l'effet de contingent (d'entrainement) le plus élevé).

En effet, le principe de base du modèle input-output est de respecter l'équilibre ressources-emplois pour chaque produit i de l'économie (le nombre de produits étant égal au nombre de branches d'activité) en prenant en considération la différence entre le prix de base et le prix d'acquisition. Ceci revient à déduire des emplois, les marges et les impôts et taxes liés à la distribution et à rajouter les subventions sur les produits. L'équation ressources-emplois pour un produit i s'écrit alors :

[1] SAMIR (Société Anonyme Marocaine d'Industrie de Raffinage) est le seul raffineur au Maroc.



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$$XP_i = \sum_{j=1}^{n} CI_{ij} + DF_i - M_i - MT_i - MC_i - IT_i + Sub_i \; ; \; i = 1, \dots n \qquad (1)$$

Où :

- $XP_i$ = la production totale interne du produit i, au prix de base ($XP_i = \sum_{j=1}^{n} P_{ij}$);
- $\sum_{j=1}^{n} CI_{ij}$ = la demande intermédiaire, par toutes les branches d'activité, sur le produit i ;
- $DF_i$ = la demande finale totale sur le produit i, y compris les exportations ;
- $M_i$ = les importations du produit i ;
- $MT_i$ = la marge de transport sur le produit i ;
- $MC_i$ = la marge commerciale sur le produit i ;
- $IT_i$ = les impôts et taxes sur le produit i, y compris la TVA ;
- $Sub_i$ = les subventions sur le produit i.

Cette équation se transforme en modèle de Leontief, si on introduit l'équation qui lie la consommation intermédiaire à la production de la branche. Soit (2) l'équation comportementale de la production : $\boldsymbol{CI_{ij} = a_{ij}\, XB_j}$ (2)[2]

$avec\ XB_j\ la\ production\ totale\ de\ la\ branche\ j$

N'oublions pas de souligner qu'il existe, dans ce cas, une différence entre la production de la branche d'activité ($XB_j$) et la production du produit j ($XP_j$) puisque, selon la construction des TRE, un produit j peut être fabriqué par plusieurs branches à la fois et une branche peut produire plusieurs produits à la fois. Il s'agit alors, d'une matrice de production $P(p_{ij})$ et non pas d'un vecteur de sorte que :

$$XB_j = \sum_i P_{ij} \quad et \quad XP_i = \sum_j P_{ij} \qquad (3)$$

On peut démontrer que $XB_j$ peut s'écrire aussi: $XB_j = \sum_i \frac{P_{ij}}{\sum_k P_{ik}} \times \sum_k p_{ik}$ , k=1,…,n

D'où :

$$XB_j = \sum_i (\beta_{ij} \times XP_i) \quad \text{et} \quad \beta_{ij} = \frac{P_{ij}}{\sum_j P_{ij}} \qquad (4)$$

L'équation (4) permet de déduire $XB_j$ à partir de $XP_i$ .

De la production de chaque branche j, on peut déduire sa valeur ajoutée ($VA_j$):

$$VA_j = XB_j - \sum_{i=1}^{n} a_{ij} XB_j \qquad (5)$$

Cette dernière permet de calculer la rémunération salariale ($RS_j$):

$RS_j = cms_j\, VA_j$ (6) où :

$cms_j = \frac{RS_j}{VA_j}$ le coefficient de la masse salariale dans $VA_j$.

## V. Effet De la Variation de la Consommation Finale Des Menages

Nous considérons que toute la demande finale est exogène, y compris la consommation finale des ménages. C'est donc, le cas d'un modèle ouvert de Leontief. Le modèle a été résolu à l'aide du logiciel Gams-Minos et initialisé et calibré sur la base des données du TRE du Maroc relatif à l'année 2013 tel que publié par le HCP3.

Il est à signaler, toutefois, que certains ajustements de ce TRE ont été nécessaires afin de l'adapter aux besoins du calcul. Il s'agit du traitement de la ligne 'correction territoriale', qui a été annulée en l'ajoutant à la ligne 'Poste et télécommunication' et en faisant tous les ajustements qui en découlent afin de rééquilibrer le TRE. Les résultats du choc introduit sur la consommation finale des ménages (augmentation de 25% de la CFM de tous les produits) sont :

### a) *Variation de la valeur ajoutée*

Le calcul de la variation de la valeur ajoutée de chaque branche d'activité, montre que toutes les branches d'activité ont connu une augmentation de leur valeur ajoutée. L'ampleur de cette variation est variable et dépend de l'insertion de la branche dans l'économie et donc de l'effet multiplicateur. En effet, la variation la plus grande profite à l'Industrie de l'extraction (72%) suivie par Postes et télécommunications (presque 53%), raffinage de pétrole et autres (plus de 47%) et Industrie de textile et cuir (presque 46%). L'effet le moins élevé est subi par les branches Bâtiments et travaux publics (1,4%) et Administration publique générale (2,6%).

Le produit intérieur brut, de son côté, a enregistré une variation positive de 166761,750 millions de DH, soit une augmentation de 19,3%, ou ce qui signifie encore, une augmentation du PIB de 1,15 DH pour chaque dirham supplémentaire consacré à la consommation finale des ménages. Le tableau 1, relate la variation relative (en %) des valeurs ajoutées de toutes les branches d'activité (Les tableaux 2 et 3 de l'annexe, donnent respectivement les variations de la valeur ajoutée et de la production des branches d'activité).

[2] Il s'agit d'une technique de production de type Leontief où les facteurs sont complémentaires.

[3] HCP : Comptes nationaux provisoires 2015 (base 2007), juin 2016.



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*Tab.1:* Variation relative (en %) de la VA des branches d'activité

| Code | Branche | ΔVA (en %) | Code | Branche | ΔVA (en %) |
|---|---|---|---|---|---|
| A00 | Agriculture, chasse, services annexes | 23 | F45 | Bâtiments et travaux publics | 1 |
| B05 | Pêche, aquaculture | 21 | G00 | Commerce et réparation | 20 |
| C00 | Industrie de l'extraction | 72 | H55 | Hôtels et restaurants | 24 |
| D01 | Industrie alimentaire et tabac | 25 | I01 | Transports | 30 |
| D02 | Industrie du textile et cuir | 46 | I02 | Postes et télécommunications | |
| D03 | Industrie chimique et parachimique | 20 | J00 | Activités financières et assurances | 53<br>22 |
| D04 | Industrie mécanique, métallurgique et électrique | 16 | K00 | Immobiliers, location et services aux entreprises | 16 |
| D05 | Autres industries manufacturières | 17 | L75 | Administration publique générale. | 3 |
| D06 | Raffinage de pétrole et autres | 47 | MN0 | Education, santé et action sociale | 5 |
| E00 | Electricité et eau | 25 | OPO | Autres services non financiers | 22 |

*b) Variation de la masse salariale*

La rémunération salariale est une composante importante de la valeur ajoutée (optique revenu) puisque chaque augmentation de la valeur ajoutée est source d'une distribution de revenus nouveaux, notamment salariaux, ce qui pourrait se traduire par une création de nouveaux postes d'emplois.

La liaison de la rémunération salariale d'une branche d'activité à sa valeur ajoutée, par un coefficient de la masse salariale (équation 6 ci-dessus), nous a permis de déduire les salaires supplémentaires distribués par la branche pour chaque augmentation de sa valeur ajoutée. Ceci, peut donner une idée sur le nombre d'emplois potentiels qui pourraient être crées par la branche, si on considère un salaire moyen au niveau de la branche4. Nos résultats, montrent une augmentation de la masse salariale distribuée par chaque branche d'activité (tableau 2 ci-dessous).

Par ailleurs, l'utilisation des données du HCP5, relatives à la population active occupée nous permet d'estimer le salaire moyen par branche d'activité et d'en déduire le nombre de postes d'emplois supplémentaires crées. Le résultat de cette estimation est ventilé dans la colonne 'Emplois' du tableau 2. La figure 5, permet de résumer et de mieux visualiser ce même résultat.

Nous constatons que, les branches les plus créatives d'emplois sont, Commerce et réparation (9,5%), Transport, Activités financières et assurances et Education, santé et action sociale (plus de 7%) viennent après, l'Industrie d'extraction, Industrie alimentaire et tabac, Postes et télécommunication et Immobilier, location et services rendus aux entreprises (6%). L'Agriculture, l'Administration publique générale et l'Industrie mécanique, métallurgique et électrique ne contribuent, quant à elles, qu'avec moins de 5%. Les branches dont la contribution à la création d'emplois est la moins élevée sont: Raffinage de pétrole et autres (0,7%) et Bâtiment et travaux publiques (0,6%).

Au niveau globale, nous aboutissons à une augmentation de la masse salariale globale évaluée à 39 338 millions de DH (soit 13,4%), ce qui correspond à 0,27 DH pour chaque dirham supplémentaire de la consommation finale des ménages ou encore à 8 742 milliers de postes crées, si on considère un salaire mensuel moyen de 4 500 DH6, inférieur au double du salaire minimum interprofessionnel garantie (SMIG) en 2012.

Il est à souligner aussi, que le modèle input-output dans la version que nous adoptons dans ce papier, considère que la consommation finale des ménages est exogène et par conséquent ne permet pas d'évaluer

[4] $Salaire\ moyen\ de\ la\ branche = \frac{Remuneration\ salariale\ de\ la\ branche}{effectifs\ employes}$

- $Emplois\ crees = \frac{\Delta remuneration\ salariale}{salarie\ moyen}$

[5] Annuaire statistique du Maroc, HCP, 2014, p : 424.

[6] Le SMIG = 2545,92 DH par mois au 1-7-2012, selon l'annuaire statistique du Maroc, HCP, 2014, p : 439.
- 1$USA ≈ 9DH



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*Tab.2:* Variation de la masse salariale (RS) et de l'emploi par branche d'activité

| Code | Branche | ΔRS | Emplois | Code | Branche | ΔRS | Emplois |
|---|---|---|---|---|---|---|---|
| A00 | Agriculture, chasse, services annexes | 1798 | 399561 | F45 | Bâtiments et travaux publics | 237 | 52626 |
| B05 | Pêche, aquaculture | 1166 | 259198 | G00 | Commerce et réparation | 3733 | 829639 |
| C00 | Industrie de l'extraction | 2620 | 582293 | H55 | Hôtels et restaurants | 1726 | 383471 |
| D01 | Industrie alimentaire et tabac | 2299 | 510996 | I01 | Transports | 2819 | 626452 |
| D02 | Industrie du textile et cuir | 2474 | 549762 | I02 | Postes et télécommunications | 2562 | 569268 |
| D03 | Industrie chimique et parachimique | 1652 | 367073 | J00 | Activités financières et assurances | 3010 | 668952 |
| D04 | Industrie mécanique, métallurgique et électrique | 1932 | 429430 | K00 | Immobiliers, location et services aux entreprises | 2260 | 502208 |
| D05 | Autres industries manufacturières | 1151 | 255838 | L75 | Administration publique générale.. | 1928 | 428392 |
| D06 | Raffinage de pétrole et autres | 278 | 61688 | MN0 | Education, santé et action sociale | 3032 | 673789 |
| E00 | Electricité et eau | 1718 | 381775 | OPO | Autres services non financiers | 942 | 209326 |

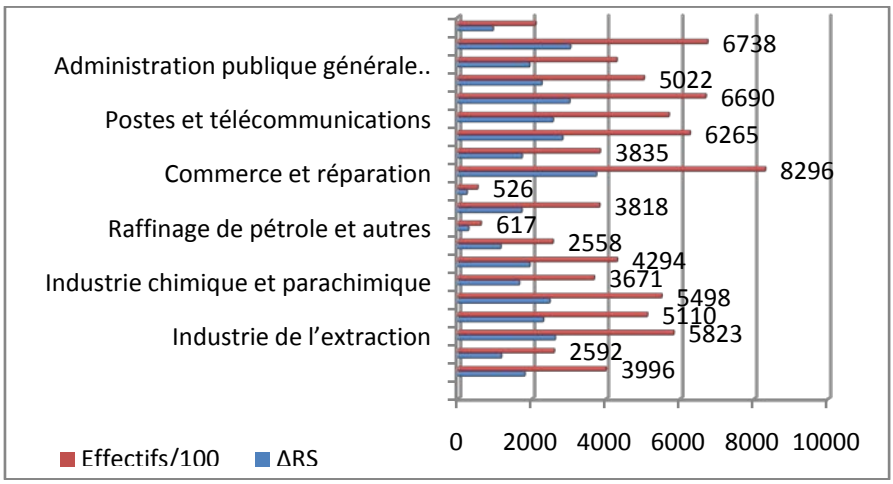


*Fig.5:* Variation de la masse salariale (RS) et des effectifs employés *par branche d'activité*

l'effet de la variation des revenus (en l'occurrence les salaires) sur les dépenses des ménages ce qui donne une sous- estimation de l'effet multiplicateur.

## VI. Conclusion

La demande finale et la consommation finale des ménages particulièrement sont des stimulateurs de l'activité économique. Le modèle input-output, que nous avons utilisé, a mis en évidence le rôle de la consommation finale des ménages dans la relance de l'activité économique aussi bien au niveau global (augmentation du PIB de 19,5%) que sectoriel (augmentation de la valeur ajoutée de toutes les branches d'activité). Il s'en suit, une augmentation de la masse salariale globale de 13,4%.

Cependant, et comme il a été souligné, le modèle input-output ne permet pas de capter l'effet de la variation des revenus sur la consommation et ne prend pas en considération le comportement des agents. Ce qui constitue une limite majeure de ce type de modèles. Ajoutons encore que, le TRE, source de nos données, n'a pas été corrigé des importations ce qui ne manque pas d'affecter les résultats.

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## Annexe

*Tableau 1:* Evolution de composantes de la demande finale et leurs contributions dans le PIB (2013 – 2015) (*Source: données HCP)* Valeurs en $10^6$ dhs courants % par rapport au PIB

| | 2013 | | 2014 | | 2015 | |
|---|---|---|---|---|---|---|
| | Valeur | % | Valeur | % | valeur | % |
| Consommation finale des ménages | 533903 | 59,46 | 553287 | 59,90 | 567535 | 57,78 |
| Consommation finale des administrations publiques | 178309 | 19,86 | 183841 | 19,90 | 188720 | 19,21 |
| **Consommation finale** | **716454** | 79,80 | **742051** | 80,33 | **761694** | 77,55 |
| Formation brute de capital fixe | 276496 | 30,79 | 274028 | 29,67 | 281492 | 28,66 |
| Exportations | 294318 | 32,78 | 317129 | 34,33 | 336846 | 34,29 |
| **PIB** | **897923** | - | **923696** | - | **982223** | - |

*Tableau 2:* Variation de la VA des branches d'activité

| Code | Branche | ΔVA | Code | Branche | ΔVA |
|---|---|---|---|---|---|
| A00 | Agriculture, chasse, services annexes | 25670,75 | F45 | Bâtiments et travaux publics | 727,72 |
| B05 | Pêche, aquaculture | 1660,10 | G00 | Commerce et réparation | 14904,41 |
| C00 | Industrie de l'extraction | 21603,58 | H55 | Hôtels et restaurants | 4787,38 |
| D01 | Industrie alimentaire et tabac | 12767,87 | I01 | Transports | 9003,70 |
| D02 | Industrie du textile et cuir | 6545,49 | I02 | Postes et télécommunications | 12149,75 |
| D03 | Industrie chimique et parachimique | 2941,88 | J00 | Activités financières et assurances | 9351,72 |
| D04 | Industrie mécanique, métallurgique et électrique | 5160,94 | K00 | Immobiliers, location et services aux entreprises | 15601,78 |
| D05 | Autres industries manufacturières | 3119,41 | L75 | Administration publique générale. | 2208,43 |
| D06 | Raffinage de pétrole et autres | -317,18 | MN0 | Education, santé et action sociale | 3696,13 |
| E00 | Electricité et eau | 3782,00 | OPO | Autres services non financiers | 2763,97 |

*Tableau 3:* Variation de la production (ΔProd.) par branche d'activité

| Code | Branche | ΔProd. | Code | Branche | ΔProd. |
|---|---|---|---|---|---|
| A00 | Agriculture, chasse, services annexes | 38743 | F45 | Bâtiments et travaux publics | 1795 |
| B05 | Pêche, aquaculture | 2586 | G00 | Commerce et réparation | 22880 |
| C00 | Industrie de l'extraction | 27560 | H55 | Hôtels et restaurants | 7829 |
| D01 | Industrie alimentaire et tabac | 40132 | I01 | Transports | 18665 |
| D02 | Industrie du textile et cuir | 23575 | I02 | Postes et télécommunications | 18045 |
| D03 | Industrie chimique et parachimique | 10949 | J00 | Activités financières et assurances | 13486 |
| D04 | Industrie mécanique, métallurgique et électrique | 17793 | K00 | Immobiliers, location et services aux entreprises | 18143 |
| D05 | Autres industries manufacturières | 12577 | L75 | Administration publique générale.. | 3039 |
| D06 | Raffinage de pétrole et autres | 22556 | MN0 | Education, santé et action sociale | 4213 |
| E00 | Electricité et eau | 7969 | OPO | Autres services non financiers | 3786 |



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# Consumerism – Consequence of the Absence of Ethics

By Zdenek Dytrt

*Abstract-* Consumerist society is the consequence of the philosophical movement that started to form at the end of the Second World War. Dynamic development of technology required by the war needs started to be asserted in peace conditions of management mainly in information technology and computing.

The philosophy of management reacted on the changes resulting from the political development and the post-war state of economy. It focused on the quantity law that in time changes to quality. Qualitative management that focused on the benefits of information technology and computing started to develop. It increased the attention to measurable values in economics and limited the observation of immeasurable values of economic phenomena. It was done in good faith that desirable development of immeasurable consequences of economic phenomena will be ensured by legislation. For that reason a slogan "what is not forbidden is allowed" was created and it enabled the "dance" among paragraphs with the help of complicated mathematic methods and computing.

*Keywords: consumerism, management, quality, quantity, technology, methods, managerial ethics, philosophy.*

*GJMBR-B Classification: JEL Code: D12*

CONSUMERISMCONSEQUENCEOFTHEABSENCEOFETHICS

*Strictly as per the compliance and regulations of:*

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# Consumerism – Consequence of the Absence of Ethics

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*Abstract-* Consumerist society is the consequence of the philosophical movement that started to form at the end of the Second World War. Dynamic development of technology required by the war needs started to be asserted in peace conditions of management mainly in information technology and computing.

The philosophy of management reacted on the changes resulting from the political development and the post-war state of economy. It focused on the quantity law that in time changes to quality. Qualitative management that focused on the benefits of information technology and computing started to develop. It increased the attention to measurable values in economics and limited the observation of immeasurable values of economic phenomena. It was done in good faith that desirable development of immeasurable consequences of economic phenomena will be ensured by legislation. For that reason a slogan "what is not forbidden is allowed" was created and it enabled the "dance" among paragraphs with the help of complicated mathematic methods and computing.

Quantitative management enables solving of past problems of society by frequently inefficient methods so that it can simulate success and support of own decisions and profit. Extent of corruption and clientelism, bureaucracy etc. convinces us about it.

Quantitative development of society is dynamic and it frequently surpasses methods of sustainable development of society. Final form of consumerist society as the consequence of quantitative management could be hardly imagined. But it cannot be expected that the contemporary trend of the development of management could be innovated on its own.

Each philosophical trend of the social development evolves and comes alive with the effort of humans. Developed consumerism in management and society for that reason requires enforcing of the innovation of management which would add the observation of qualitative values to the quantitative ones so that the law of unity of quality and quantity would be respected.

*Keywords: consumerism, management, quality, quantity, technology, methods, managerial ethics, philosophy.*

## I. Introduction

Undesirable economic results of consumer development of society are the most frequently excused by the economic causes or by the failure of individuals. Various methods and forms of financial support and amendments to the already existing legislation that usually cannot solve the problem permanently are recommended to overcome crisis that occur.

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Challenging innovation of existing development of management could be seen in respecting the ethical postulate within the unity of quantity and quality. It, of course, gives rise to the need to solve the further development systematically in context. It is, first, necessary to define various concepts that we use nowadays but there is no agreement on their contents. It means that the solution must be based on the transparent complexity with the help of innovation process.

Efficient challenging innovation of management would respect the undesirable development of consumerist management, growth of social needs of society etc. That requires fundamental solution for the philosophy of strategic objectives of management. They should follow the objectives of the development of the society that have been changing in connection with the dynamic development of technical sciences.

It is the convergence of theory and praxis of management of social reproduction so that they would know their visions and would be able to increase mutual cooperation. The main idea is that the final objectives should be known to all participants and they should focus their activities of production and scientific sphere so that the mutual isolation would not decrease the final effect. Non-complex innovation process decreases its efficiency by unbalanced development.

Further complications result from the fact that quantitative management is appreciated by many. It enables routine at work and increase of social demands without the increase of the work efficiency.

Management must focus not only on the dominant development of quantitative values, without proportional development of their qualitative contents. That enables managed objects to manifest their behaviour as if it was completely isolated systems. There are only relatively closed systems in reality that can neither exist nor evolve without their surroundings.

## II. Consumer Society

When the results of the Transparency International survey on the causes of contemporary behaviour of society were published mainly widespread corruption, disrespect or circumvention of legislation, entanglement of illegal activities to public administration etc. came out. If we take the results of the survey and search for the causes of the situation, we will find out that consumer thinking and consumer behaviour of



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individuals and society arising from that still exists in our conditions.

Factors stimulating the cause of origin and development of consumer thinking: 1)

- Formality – ethics in management and business is focused on rhetoric, even though some managers already acknowledge its importance and application in theory and praxis.
- Organizations would like to behave as absolutely isolated systems and they do not want to accept the co-responsibility for the process of sustainable development of society.
- Decision making of managers is based on measurable properties and values of economic phenomena and it overestimates the importance of their quantitative values. Decision making processes neither respect the rules of innovation process nor responsibility for unsuccessful results. Both managers and their co-workers are responsible for them.
- Ethics, responsibility and cooperation within the inner and outer partnership relations is not enforced. Organizations work short-term, there is no team work, they do not create any creative ethical work relations with scientific institutions and ministries
- Speaking of ethics we think of managerial ethics whose definition has not been agreed on but non-consumer philosophy of management cannot exist without.

1) Results of survey from the publication: Zdeněk Dytrt, et col, Manažerská etika v otázkách a odpovědích, CPRESS, 2011, ISBN 978-80251-3344

The instability of rules limits strategic projecting of business activities and limits the company to operational management. It leads to gaining of fast profit that is often connected with complications with ethical values. The pace of novelization of legislation and implementation of economy management reforms does not correspond with the dynamics of the business development. Possible contradictions are not solved fast enough by courts. In this way educational impact of law is reduced.

Lack of conviction about the benefits of ethics in management and business creates space for undesirable development of consumer thinking that is the counterpart of ethical decision making. Permeation of consumer thinking to management and business leads to the deformation of ethics. Such state of market environment helps to contribute to consumer behaviour of society.

If we are to evaluate the relation of managers to ethics, it is necessary to differentiate. Strategic decisions of big companies usually arise in the parent company. Ethics is not believed in once non-ethics brings profit and recognition to someone. Unethical methods in business are sometimes even admired. By applying of the ethics in management of each of us business in economic environment would strengthen both stability and competition.

Ethical thinking in decision making is important not only in praxis of management in individual organizations. It is also important as it brings the feeling of satisfaction from the results of a well done job to managers and their co-workers. These feelings act anti-depressive and they are the stimuli for further innovation activity of workers in the process of strategic sustainable development of managed objects.

*a) Is it possible to prevent consumer behaviour?*

- Upbringing, Education, Setting Examples
  - in family, private and social organizations (stabilization of workers, minimization of undesirable fluctuation)
  - systematic and life-long education
  - being synthetic and analytic
- Education to ethical thinking and behaviour
  - on all levels of education including universities, appropriately concretize the use of contents and the system of ethics in management
  - humanization of information on public net, publishing of successful innovations in management and sanctioning the results of non-ethics
- Thinking and working strategically
  - Overcoming undesirable phenomena in us, in the company and in the society
  - Admiring neither consumerism nor non-ethics and follow its consequences
  - Publishing of ethical approaches of managers
  - Preventing of unethical decisions – get to know the problem deeply, solve it on the basis on knowledge, possibilities and analysis of bad decisions
- Transparent behaviour
  - Thinking and behaving in the category “we” not “I”
  - We are part of social and economic environment
  - Cultivating ethics both in dealings and behaviour in themselves as well as in the environment
- Partnership is responsibility (winner – winner)
  - Developing of team work, associations in thinking, managing of human resources and fair relations in cooperation
- Management deciding about the realization of changes (innovations)
  - Respect the rules of innovation process – continuity, complexity, consistency and realization of innovation in an appropriate time and with appropriate methods
  - Respect the uniqueness of managed object and its environment, consider the specific conditions as a reserve of business



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- Not evaluate the success of decision (innovation) in a short term
- Seeing a target of decision making in a goodwill of a managed object
- Considering the decision as creating innovations
- Maximizing of short term profit is connected with consumerism
- The goodwill of the company results from a long term stable position on the market and ethical satisfying of needs and interests of economical and social environment

## III. Who is a Manager?

Manager is anyone who manages and decides about a change of contemporary state of a particular problem. That is the state that was decided about in the past and that was overcome by further development. Management is a science that is not connected to a job position and it concerns us all as we all make decisions about our lives and responsibility at work. Management is a tool of strategic management and tactic fulfilling of own or given goals. It is impossible to find a solution to any problem without applying the management and the outcome of decision. Manager´s philosophy of the one who makes a decision is important. In case it is not connected with ethical principles success cannot be expected.

Where could the ethical principles of decision making be gained? The existence of unity of quality and quantity law must be reminded. It requires the unity of both to be respected already in the decision making process. Needless to say the unity of quantity and quality applies to everyone who makes decisions. The factors of decision making process differentiate not only according to level of management and social importance, that is according to the character of decision that is an innovation. The level of innovation is influenced by its contents and extend of a problem being solved that should correspond with its social or functional position, as well as the appropriate level of solved problem.

Management is manifested in decision making process. If every decision means a change of contemporary situation, that it is necessary to be considered an innovation, resp. innovation process, that, to be successful, requires innovation rules to be respected. Successful decision making assumes preventing of creation of bottleneck within the managed object. Manager should not be a general but a leading member of a working team.

To enable manager fulfill this role, manager must be able to use strategic and creative thinking that results from the nature of managerial ethics and communicative abilities. The necessity of adequate information is closely connected to it. It is not desirable to obtain the information by unethical methods due to the fact that its quality could be influenced by that. That is why it is effective to actively cooperate with scientific institutions and ministries and seek the convergence of goals so that the methods as well as the decisions are appropriate for the future innovation to come to life.

Ethical competition is not based on non-ethical methods of gaining information at any cost but on cooperation with institutions of common interest. It is one of the reasons why the managerial ethics both in theory and praxis of management is inevitable.

## IV. Managerial Ethics – Qualitative Management

The name managerial ethics was created so that the desirable application of ethics in philosophy and practice of management theory was emphasized. In case the effort of maximization and acceleration of profit of producers and workers is not supported by the ethics and creativity of work productivity a spiral of undesirable influences and intensity of undesirable impacts on business climate of society evolves.

Managerial ethics is considered a qualitative innovation of methods of contemporary contents of managerial work both in the field of companies and public administration. It ensures qualitative values within the unity of quantity and quality management.

System of managerial ethics – Qualitative Management

| Business Ethics | Subsystem | Output |
|---|---|---|
| Morality | Character of Managers | Moral Dispositions |
| Competencies | Work Ethics | Manager's Personal Presentation |
| Application – realization | Professional Ethics | Management Effectiveness |

a) *Elements of the Subsystem Morale*

- Principles of general morality,
- Ethical legislation – (dilemma of managerial ethics)
- Influence of history and reaction on the development of society
- Responsibility for behaviour and decision making
- Internal conviction about role of morale
- Improvement and self-education of moral attitudes.
- Enforcement of morale and creativity in everyday doing and thinking



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*b) Elements of the Subsystem Competence*

- Theoretical and practical knowledge and experience
- Responsibility for qualitative growth of managed system
- Responsibility for the results of decision making and the way of realization
- Long-life education (own, co-workers)
- Knowledge and respecting of specific conditions of managed object
- Creative thinking – ambitious innovations – strategy – tactics
- Application of synthesis and synergy in management.

*c) Elements of the Subsystem Application – Realization*

- Systemic application of subsystems and elements of managerial ethics
- Stimulation and evaluation of ethical approach of workers
- Stimulation to creative work and motivation of workers
- Systematic intensification of managerial ethics
- Analysis of ethics contributions to management
- Deepening of the development of ethics in own managerial work (management – management)

*d) Decision making – creating of innovations*

Present development of theory and praxis of management depends on the boom of the development of technical sciences and on maximal use of technology in management work. From the point of view of management it is both a positive that enables the acceleration and quality processing of information which serves as the advantage for the needs of decision making process. On the other hand the obtained information is incomplete as it only reflects the quantitative values that are presented by technical-economic indicators.

We forget that the indicators are only able to represent measurable phenomena. It could be said that it is non-complexity of management as it actually opens space for the use and realization of any method of maximization. Due to the fact that management is a matter of human beings and their uniqueness it is not possible to rely only on legislation that ethical values of management will be respected. It is mainly due to the fact that from the discussion of lawyers themselves often arises the fact that legislation does not utterly have to respect the principles of managerial ethics.

Creation and growth of imbalances occur owing to the dynamics of technical and social-economic development of the society. It is a natural process that depends on the tempo of development of science and technology that must be anticipated and regulated. The solution of the arisen problems requires a change of contemporary situation that is considered an innovation.

Not every innovation is unfortunately positive so would be a guarantee of efficient decision making process. There are also negative innovations that usually lead to negative or unethical results. Innovation has the form of sinusoid. Negative innovations are shown it its lower part.

Positive part of innovation is the goal of responsible management and it solves every problem efficiently. On the other hand the negative part of innovation does not solve the responsible management but the undesirable goals of a manager. They could be either intentional (corruption, causing crisis) or unintentional as a consequence of incompetence.

*The level of innovation* determines the extent and importance of innovation for manages object. It defines the action radius of innovation that should correspond to the organizational level on which a manager functions because it enables functioning of synergy effect in functioning of organizational structure project.

Frequency of innovations results from the frequency of them being enforced in time. The smaller importance of innovations for a managed object, the higher frequency and on the other hand the higher importance of innovations for a managed object the longer the longevity should be so that the frequency should be smaller.

*e) Rules of innovation process*

*Continuity* – concerns both positive and negative part of the sinusoid. It lies in division on three parts

- Invention of decision should be verified from the point of its efficiency whether the fulfillment in time will be efficient on the basis of a change of inner and outer conditions. In the positive case an order of the manager and responsible worker must be given. That is the first stage of innovation.
- Second stage of innovation is the time space in which the innovation fulfills the aims for which it was created. It is its boom that unfortunately is individual and depends on the importance and extent of wear to its demise in time. The second stage of innovation is considered a boom of innovation.
- No innovation can be long lasting, that would mean stagnation and termination of a company. That is why it is necessary to monitor the extent of wear of innovation in time and prepare new solution according to developing conditions. On the contrary, if a manager wants to secure themselves, if they want to apply new innovation earlier, yet in time of boom, the anarchy in the managed object would arise.

*Timeliness*– The rule of timeliness is a difficult task that requires information that must be worked with. The problem of gaining it should already be ethical. It should be dependent on public involvement of a manager,



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ethics in behaviour and experience. The rule of timeliness is related to the rule of continuity and adds time aspect to it. It is about the minimization of the period of anarchy. That is the time of moral wear of the first innovation and decision making about term of further innovation. That is a desirable situation mainly from the point of view competition and growth of expenditures connected with lowering the tempo of production.

We often come across breaching of the rule of timeliness in practice because for several reasons the management is not ready to make a decision about the start of further innovation. In this way the period of anarchy arises that is connected with undesirable consequences. Investment development is the frequent example.

In the period of anarchy of innovation process of managed system it is always about an insufficient definition of the goals of innovation and unpreparedness of constituent factors of its inner structure. The rule of timeliness aims to minimize the period of anarchy by preparing a new innovation already in the period of boom of still valid innovation.

Essential is the decision when to start preparing a new innovation and mainly when to set the date of its realization. If it was still in the period when the previous innovation is functional, it would bring anarchy into the system and the period of anarchy would arise.

The basis for the estimation of tempo of fast and qualitative solution for problems and quality of decision making is the information technology and computing and opinions and experience of experts either co-workers or cooperation with scientific and specialized institutions. During the period of anarchy of innovation process of managed system it is often about the insufficient definition of the goal of innovation and unpreparedness of coherent factors of inner structure.

*Complexity*– Non-complex asserting of innovation usually brings lower or negative effect, if we solve the problems isolated, without searching for consequences that are related to the problem being solved, as well as inquiring the causes of their origin and correlation. Complexity of decision (order) is ensured from the point of overall impact on the managed object, that is both from the horizontal point of view (width of action radius of innovation) and vertical point of view, action radius of innovation process (order of innovations). The condition of complexity is fulfilled if a given problem is being solved in all basic areas and problems of the managed object as well as the relations that exist among them.

It is about creating of innovation net that is from the horizontal point of view usually divided to seven factors that solve the crucial bottleneck that could arise either now or when the innovation is applied (f. ex. it could be insecure entries into the system, quality and number of workers, organization of the environment, production technology etc.).

From the vertical point of view it is the order that is the number of managed levels (or their inner structure) that should participate in the realization of innovation process. Each factor means a problem that a particular problem should solve and for which a certain worker should be responsible for. The innovation should be incentive and should arise innovation in each part of the innovation net. The aim is to fulfill every part of the net which actually means delegating of particular rights and duties. The innovation net is the important aid of a manager that is nowadays missed.

*Consistency*- Fulfilling the rule of consistency ensures a manager with information about the efficiency of previous and about the need of future precautions within the innovation process of managed object. The tool to enforce the condition of consistency is the analytic activity of measurable and non-measurable values that were reached within the functioning of managed system and what economic and social benefit they brought. Computing and information technology also play in important role in this process.

Significant condition of successful analysis as the basis for qualified and responsible decision making about the strategic development and assessment of managed object, that is contents of innovation and when the strategy of contemporary theory and practice of management of particular system should be enforced. It mainly concerns respecting the complexity and synthesis that is the unity of quality and quantity within the management and evaluation of results of economy.

The extent of synthesis depends on the level of management the information should serve to. The higher the organization pyramid of management is, the higher extent of synthesis of information the top manager needs for own activity. The management system should mainly be synthetic. On the other hand the lower the vertical level of organization of management is the approach should be more analytical. But it cannot do without synthetic approach so that they could both successfully participate on the management system as the whole. It means that synthetic approach cannot be marginalized otherwise the managers on the managerial level of subsystem would not be able to participate on managing of the system as the whole. To motivate the workers it is essential for them to know why they work and what the importance of their work is.

The information that is obtained from the analysis of results of economy, from accountant record and statistics has the form of technical-economy indicators. It is necessary to create systems of indicators for complex evaluation of results of economy but it is essential to add survey or even verbal evaluation of methods through which the results were obtained.

If we are aware of the fact that the quantitative values are not sufficient enough then we do not think



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about leaving the system of work with indicators but we look for quantitative relations and connections. It is about systematic monitoring of quantitative and qualitative properties of economic, social and political phenomena to understand their behaviour and developing tendencies. Even here we cannot do without respecting the principles of managerial ethics.

## V. Conclusion

Consumer society is not static and it still develops and we are not able to imagine its final form. According to the topical experience it can be seen that consumerism in the society develops dynamically and aggressively. We know that we all are consumers and that we aim to create desirable balance between the necessary and unnecessary needs. That of course concerns each of us.

It is also known that to reach the desirable balance between the necessary and unnecessary needs respecting the principles of managerial ethics is essential. It is clear that it is not a short term struggle and that many of us are interested neither in its causes nor in its results. It is certain that not everyone is convinced about the necessity of this effort and about the tools used to overcome it or even about the necessity of its innovation because they are satisfied with the contemporary situation.

It is mainly necessary to reevaluate contemporary philosophy, theory and practice of management that has been stagnating since the last century because it focuses mainly on technology of management. It is a huge task for educationists on all levels of educational process because younger graduates might not be able to understand this problem.

The centre of problem solving lies in ethical cooperation between fields of science and production so that they link in collective effort to solve the problems of quantitative management both in itself and in the society. Cooperation of everyone is no less important than the creators and realizers of all changes–innovations are.



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Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

**5.STRUCTURE AND FORMAT OF MANUSCRIPT**

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

**Papers**: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

**Format**

*Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.*

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

**Structure**

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

*Abstract, used in Original Papers and Reviews:*

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

*Acknowledgements: Please make these as concise as possible.*

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

*Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.*

*Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.*

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

*Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.*

**6. AFTER ACCEPTANCE**

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

**6.1 Proof Corrections**

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

**6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)**

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

**6.3 Author Services**

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

**6.4 Author Material Archive Policy**

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

**6.5 Offprint and Extra Copies**

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org .

You must strictly follow above Author Guidelines before submitting your paper or else we will not at all be responsible for any corrections in future in any of the way.

Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

## TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

**1. Choosing the topic:** In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

**2. Evaluators are human:** First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

**3. Think Like Evaluators:** If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

**4. Make blueprints of paper:** The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

**5. Ask your Guides:** If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

**6. Use of computer is recommended:** As you are doing research in the field of Computer Science, then this point is quite obvious.

**7. Use right software:** Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

**8. Use the Internet for help:** An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

**9. Use and get big pictures:** Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

**10. Bookmarks are useful:** When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

**11. Revise what you wrote:** When you write anything, always read it, summarize it and then finalize it.

**12. Make all efforts:** Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

**13. Have backups:** When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

**14. Produce good diagrams of your own:** Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

**15. Use of direct quotes:** When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

**16. Use proper verb tense:** Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

**17. Never use online paper:** If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

**18. Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

**19. Know what you know:** Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

**20. Use good quality grammar:** Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

**21. Arrangement of information:** Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

**22. Never start in last minute:** Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**23. Multitasking in research is not good:** Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

**24. Never copy others' work:** Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

**25. Take proper rest and food:** No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

**26. Go for seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

**27. Refresh your mind after intervals:** Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

**28. Make colleagues:** Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

**29. Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

**30. Think and then print:** When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

**31. Adding unnecessary information:** Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

**32. Never oversimplify everything:** To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

**33. Report concluded results:** Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

**34. After conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

## Informal Guidelines of Research Paper Writing

**Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

**Final Points:**

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

**General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

**Title Page:**

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

**Abstract:**

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

**Introduction:**

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

**Procedures (Methods and Materials):**

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

**Discussion:**

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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|---|---|---|---|
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# Index


## A

Alimentaire · 5, 10, 12, 14

## C

Consommation · 4, 5, 6, 9, 11, 12, 13
Contemptuous · 4

## D

Dampened · 1

## G

Galloping · 10

## I

Intérieure · 4, 5

## K

Kwiatkowski · 15, 24

## M

Marocaine · 4, 5, 6

## P

Pertinent · 3
Poschingerstr · 5
Precursors · 14

## R

Recursive · 18
Rhetoric · 16
Ricardian · 2, 5

## S

Schwarz · 15, 4, 1
Sinusoid · 19

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