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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
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A COMPARATIVE STUDY BETWEEN THE VOLATILITY OF CRUDE OIL PRICE INDEX AND GASOLINE PRICE STOCK RETURNS

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ABSTRACT

This paper analyzes the relationship between exchange rate Indian oil exchanges like Crude oil, Gasoline. It measures the impact of changes in exchange rate on Indian oil exchanges like Crude oil, Gasoline. Several statistical tests have been applied in order to measure the impact of exchange rate on Indian oil exchanges like correlation, t-test Multiple Regression Analysis, descriptive statistics, Skewness and Kurtosis. The period for the study has been taken (from October 2013 to May 2018) using daily closing price and daily price are converted in to monthly price. From the data analysis we found that the result of Correlation confirmed that there is negligible relation between Oil rate and Gasoline rate negligible relation between Exchange rate and Price.

KEYWORDS

crude oil price returns, gasoline price index returns, implied volatility.

JEL CODES

C32, E44, G12, G15.

INTRODUCTION

Crude oil Industry is considered to be the back bone of an economy, because this is the main source of energy till date. Any economy around the world would fail to precede a single step in the absence of crude oil industry including the refining of crude oil. The price of crude oil is determined by the demand, supply mechanism around the globe. Crude oil is not a domestic product and any kind of shortage in the same has serious ramifications on all possible industries along with the economies all over the world. Crude oil industry always needs to perform exploration research all over the world for finding more crude oil sites which also become instrumental in the setting up of crude oil industry.

IN INDIA

India is one of the largest importers of oil and petrol in the world. Like many other Indian industries, the development of the Indian crude industry began very slowly. It started mainly in the northeastern part of Indian especially in the place called Digboi in the state of Assam. Until the 1970's the production of crude oil and the exploration of new location for extraction of crude oil were mainly restricted to the northeastern state in India. However, an important advancement in the Indian crude oil industry came with the passing of Industrial Policy Resolution in 1956, which emphasized focus on the growth and promotion of industries in India. The crude oil industry has contributed heavily to the manufacturing industry in the country through foreign trade in petroleum products. Rapid globalization, fast-changing technology, and the changing methods in the way business is conducted have brought significant changes and enormous opportunities for petroleum companies in India to flourish and expand their operation to global markets.

IN GLOBAL

The global oil industry is a very complex industry. It is one of the oldest in the world as well as one that affects tremendously all aspects of business. Oil is a precious energy source that fulfills 40% of the global energy needs. The products of oil companies revolutionize daily life and the way we do things. Upstream and down-stream are two major sectors in the oil industry. In between, there is another sector namely the midstream. The midstream sector processes, stores, markets and transports commodities such as crude oil, petroleum, natural gas liquids as ethane, propane and butane. The upstream sector involves the processes of oil explo-ration and drilling. Over these years, because of technological advancement, oil producers have been able to access more deposits which resulted in an increase in reserves. The downstream sector involves refining, transporting and marketing of oil and oil products. At the production unit, it is processed and refined into different products that include gasoline, kerosene, residual fuel oil and asphalts.

The Indian Crude oil Industry was dependent from the very beginning on foreign capital, expert personnel, and technology, which led to the industry's globalization. Globalization entails and integration of the nations' economies through corporate investments, financial flow, and trade in goods and services between nations. The Indian Crude oil Industry's Globalization took place since foreign involvement in the various important stages such as production, refining, exploration, and transportation increased oil consumption. To encourage Indian Crude oil Industry globalization has offered the contract of discovered fields to foreign and private companies. The various companies that have helped in the globalization of the Indian Crude oil Industry are Enron Oil and Gas Company, Videocon Petroleum Ltd, Reliance industries Ltd, Rave Oil ltd, and Command petroleum.

The Indian government in an attempt to further boost the globalization of the Indian Crude oil Industry formed the Exploration Licensing Policy by which it tried to attract the foreign and Indian companies in production and exploration. The incentives that were declared by the government to encourage globalization and the Indian Crude oil Industry are that, on imports that were required for Crude oil Operations Customs duty would not have to be paid, state participation is not compulsory, no tax on the production of crude oil, provisions for liberal depreciation, tax holidays for seven years from the day that production starts, and the freedom to sell natural gas and crude oil in the domestic market at prices that are related to the market. The government of India has taken several measures in order to ensure that the Globalization of the Indian Crude oil Industry is successful for the industry.

REVIEW OF LITERATURE

Jones and Kaul (1996) 98 tested whether the reaction of international stock markets to oil shocks can be justified by current and future changes in real cash flows and/or changes in expected returns. They found that aggregate stock market returns in the U.S., Canada, Japan and the U.K. were negatively sensitive to the

adverse impact of oil price shocks on those economies. From the data collected from 1970 to 1995 they used the GARCH and Granger causality test and argued that investors in stock markets under react to oil price changes in the short run. They concluded that in the postwar period, the reaction of U.S and Canadian stock prices to oil shocks can be completely accounted for by the impact of these shocks on real cash flows alone. In contrast, in both the United Kingdom and Japan, innovations in oil prices appear to cause larger changes in stock prices than can be justified by subsequent changes in real cash flows or by changing expected returns. Siliverstovs, Hegaret, Neumann and Hirschhausen (2005)99 investigated the degree of integration of natural gas markets and their relation to the oil price were explored through principal components analysis and Johansen likelihood-based co-integration procedure for Europe, North America and Japan markets for the period between the early 1990s and 2004. They found in both the analysis a high level of natural gas market integration within Europe, between the European and Japanese markets as well as within the North American market. At the same time, the obtained results suggested that the European and the North American as well as the Japanese and North American markets were not integrated, confirming with the earlier studies that the gas markets were not integrated across continents. Haesun, Mjelde and Bessler (2008)100 studied the relationships among eight North American natural gas spot market prices. The study provided a dynamic picture of daily information flow among natural gas spot markets from 1998 to 2007. The study used the error correction model (VECM) as the basic tool for analysis. Results indicated that the Canadian and U.S. natural gas market was a single highly integrated market. Further results indicated that price discovery tends to reflect both regions of excess demand and supply. Across North America, Malin Hub in Oregon, Chicago Hub, Illinois, West Texas Intermediate, Henry Hub and Louisiana region were the most important markets for price discovery. Opal Hub in Wyoming was an information sink in contemporaneous time, receiving price information but passing on no price information. Alberta Energy Company (AECO) Hub in Canada received price signals from several markets and passes on information to Opal and the Oklahoma region. Maslyuk and Smyth (2009)101 studied co-integration between oil spot and future prices of the same and different grade in the presence of structural change. The purpose of the study was to examine whether crude oil spot and futures prices of the same and different grades were co-integrated using a residual-based co-integration test that allows for one structural break in the co-integrating vector and high-frequency data. For the analysis, U.S. WTI (West Texas Intermediate) and UK Brent was chosen as the representative crudes since these two crudes have well-established spot and futures markets. The results revealed that spot and future prices of the same grade as well as spot and future prices of different grades were co-integrated. Matthew, Jian and Kuan (2009)102 examined whether Dubai crude oil and Brent crude oil futures prices were stationary as well as whether there exist a long-run equilibrium relationship in the oil markets. Further, they investigated the dynamic process of the endogenous variables and future periods through VECM. The study period was from January 3, 2000 through October 1, 2009 with a total of 2481 daily samples. They found that Brent crude oil prices lead Dubai crude oil prices.

Shaharudin, Samad, Fazilah, Bhat and Sonal (2009) examined the effect of oil prices movements on the stock price of oil and gas companies in three different markets (U.S., India ad UK) using daily data. The dynamic interaction between oil prices and stock prices was investigated in the presence of economic variables like interest rates and industrial productions. They collected the daily data for the period August 08, 2003 to August 8th, 2008. The oil price was the London Brent crude oil Index. The oil stocks included the Exxon Mobil and Chevron stocks from the NYMEX. Reliance Industries and Indian Oil Corporation Limited stocks were collected from the NSE of India and Royal Dutch Shell and Gazprom stocks from the LSE. They employed unit root tests, co-integration tests, variance auto regression, error-correction models with variance decomposition and impulse response and ARCH/GARCH models. The results suggested that there exists significant short run and long run relationship between oil price and the oil stocks including the effect of the other variables such as interest rate and the stock index. The oil price volatility transmission has a persistent effect on the volatility of the stocks of the oil companies in all the countries that were taken up for the study.

Pushpa, Chakraborty and Mathur (2011)108 investigated the existence of long term relationships between oil prices and stock market prices of two big emerging economies in Asia viz., India and China. Since India and China were the major oil consuming market, their stock markets were likely to be susceptible to oil price fluctuations. A data series from January, 2000 to May, 2011 was considered. The stationarity of the data series was checked using ADF Test. Johansen's co-integration model was applied to find out the co-integration among the oil prices and stock prices of India and China. VECM was employed to trace the existence of long run relationship between the variables109. The results of the co-integration analysis found the existence long-run relationship between oil prices and stock market prices for both the countries. The trace and maximum Eigen value test results also revealed the existence of unique co-integrating vectors between test variables. They provided evidence on the existence of at least one co-integrating vector in the model and therefore concluded that the variables exhibit a long-run association between them. 108 Pushpa Negi, Anindita Chakraborty and Garima Mathur. (2011). Long term price linkages b between them.

OBJECTIVES OF THE STUDY

1. To measure the impact of crude oil price index future returns on the volatility of gasoline.
2. To examine the relationship between the crude oil price index future returns and gasoline.
3. To evaluate the persistence of stock price volatility in crude oil price index and gasoline.
4. To identify whether there is any relation between crude oil price index and gasoline.
5. To examine the predictive ability.

NEED FOR THE STUDY

India is heavily dependent on crude oil and LNG imports with 82.8% import dependence for crude oil and 45.3% for natural gas/LNG. The net foreign exchange outgo is 63.305 million US$ in the financial year 2017-18 on account of crude oil imports. India generated 35.2 million tons of petroleum products from indigenous crude oil production whereas the consumption of petroleum products is 204.9 million tons. Similarly, India generated 31.7 bcm natural gas locally against the consumption of 58.1 bcm. LNG price is linked to the prevailing crude oil price in global markets.

India is the third biggest oil importer after US and China in 2017. In the year 2019, US is going to become net exporter of LNG, LPG, crude oil and its products from its shale oil production boom. Shale oil production cost would be the lower ceiling price for the crude oil in international trade as its substantial production is consumed internally in US.

Due to lack of adequate petroleum reserves, India has to depend mostly on crude oil imports in near future till its renewable energy resources such as solar, wind and bio-mass resources are exploited adequately to achieve energy security by replacing the petroleum products consumption which is also major contributor to the air pollution. In these adverse situation, India has to proactively play major role in global crude oil trade as swing oil producer by using its limited crude oil production base to bring down the high price of crude oil fixed by OPEC and the multinational crude oil production companies. International crude oil prices vary steeply for a small mismatch between global supply and global demand. To become swing oil producer, India should enhance crude oil extraction rate twice of the normally designed rate for continuous extraction from its developed oil fields and extract crude oil on intermittent basis only when crude oil prices exceed a preset upper ceiling value instead of continuously extracting oil.

Also, India and China being major oil importers, both countries should coordinate for mutual benefit while trading in global oil markets to moderate the crude oil price to nullify the oil pricing power of OPEC, etc. Normally, crude oil pricing and gold pricing exhibit opposite trends in global trading (i.e. while one appreciates the other depreciates). India should procure crude oil in futures market by hedging gold.

RESEARCH HYPOTHESIS

Ho=There is no significant relationship between crude oil price index future and gasoline.

H1=There is significant relationship between crude oil price index future and gasoline.

SCOPE OF THE STUDY

The study is conducted to understand the extent of relation between crude oil price index future and gasoline. Daily closing values of Crude oil Petroleum and Gasoline were taken to calculate return for the period from October 1st 2013 to May 31st 2018.Standard Deviation and Mean Returns are calculated to know volatility and returns in both the indices. Co-efficient of correlation is estimated to know the relation between crude oil price index future and gasoline. Descriptive

Statistics, for monthly returns of variables and stock market carried out to understand the significant of relation. Statistics of the monthly returns, mean, standard deviation, skewness and kurtosis are analyzed the study.

RESEARCH METHODOLOGY

Daily returns of crude oil price index future and gasoline are calculated using daily closing values for period of year that is from October 1st 2013 to May31st2018.Mean, Standard Deviation and Skewness and kurtosis are estimated using excel. Correlation is estimated to understand the relation prevailing between crude oil price and gasoline index price in future.

ANALYSIS

TABLE 1: RESULTS OF DESCRIPTIVE STATISTICS FOR CRUDE OIL PRICE INDEX STOCK RETURNS DURING THE STUDY PERIOD FROM 01.10.2013 TO 31.5.2018

Descriptive Statistics								
Values	**N**	**Minimum**	**Maximum**	**Mean**	**S.D**	**S.E**	**Skewness**	**Kurtosis**
Crude Oil Price	57	-100	18.24582	1.857	15.82877	2.09657	-4.3613619	26.52964

The table 1 Displays the results of descriptive statistics for crude oil price during the study from 1.10.2013 to 31.5.2018. The results of minimum and maximum values of long run returns of oil price,were in the range of -100.00 to 18.2458 with an average return of-1.857there were variations in the crude oil price of different quarters during the study period. The Skewness and Kurtosis, which indicates, flatness (or) peakedness of data distribution revealed that an asymmetric distribution, with negative skewness and more peaked distribution (Lepto Kurtic), was for crude oil price during the study period.

CHART 1

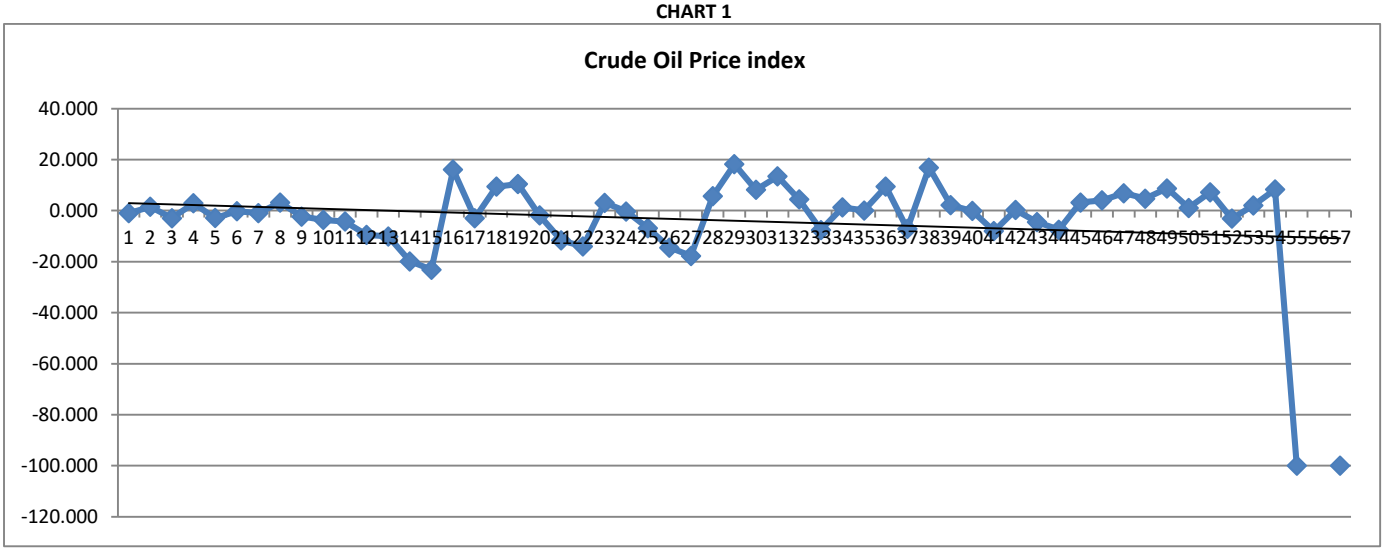


TABLE 2: RESULTS OF DESCRIPTIVE STATISTICS FOR GASOLINE PRICE INDEX IN FUTURE STOCK RETURNS DURING THE STUDY PERIOD FROM 01.10.2013 TO 31.5.2018

Descriptive Statistics								
Values	**N**	**Minimum**	**Maximum**	**Mean**	**S.D**	**S.E**	**Skewness**	**Kurtosis**
Gasoline Price	57	-100	19.5058	1.675	15.60448	2.066864	-4.5426198	28.445834

The table 2 Displays the results of descriptive statistics for Gasoline Price index in future during the study from1.10.2013 to 31.5.2018. The results of minimum and maximum values of long run returns of gasoline price index, were in the range of -100 to 19.505 with an average return of -1.675. There were variations in the gasoline price index future of different quarters during the study period. The standard deviation which is volatility, was 15.60, an asymmetric distribution, with long tail towards left, was observed in gasoline price index future. The value of kurtosis was 0.00284, which indicated that the gasoline price index returns recorded platykurtic distribution during the study period.

CHART 2

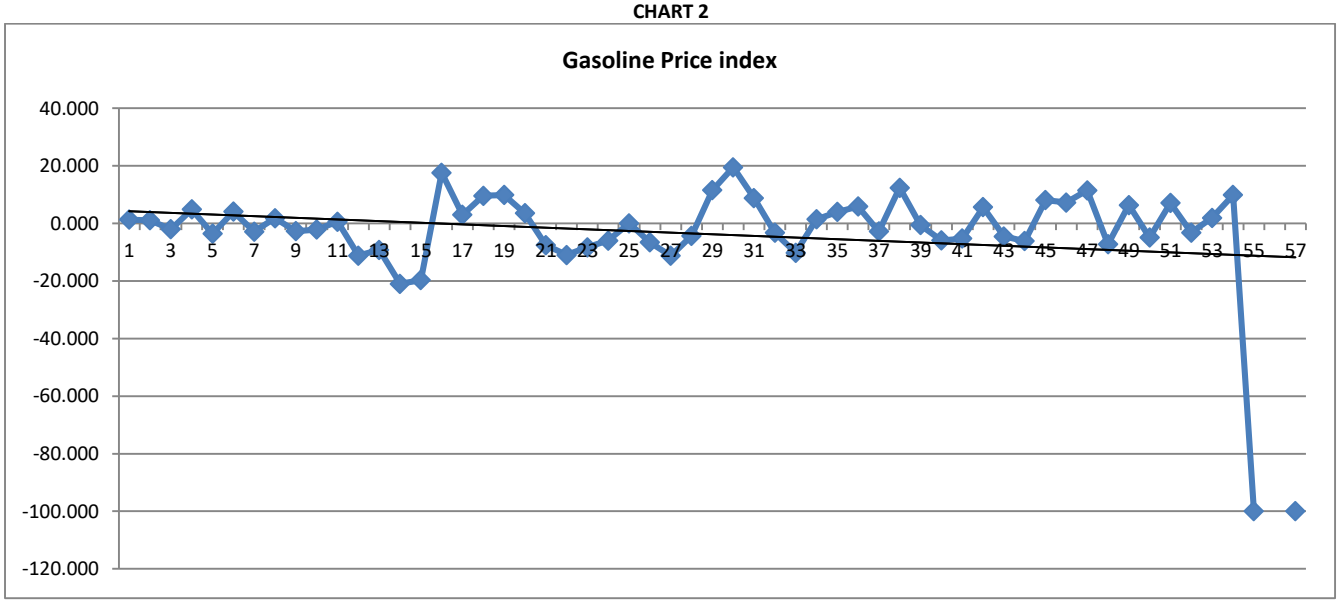


TABLE 3: REGRESSION STATISTICS FOR 2013-2018

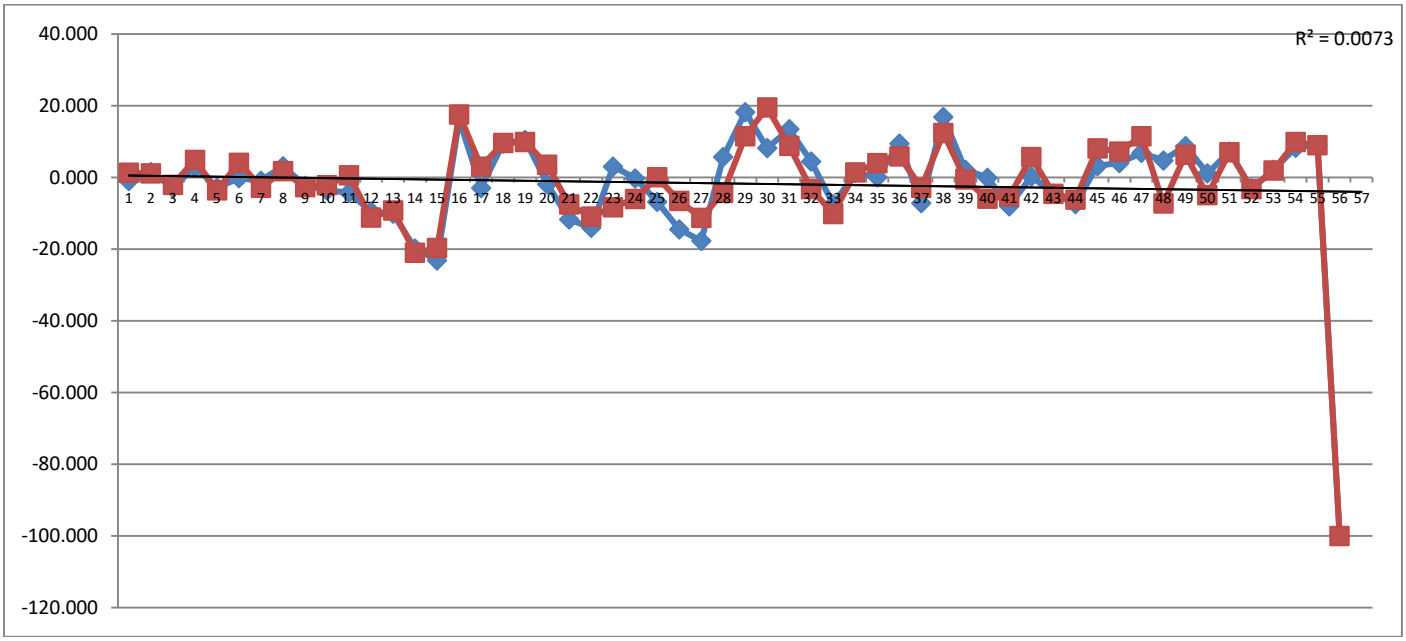
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.955591674							
R Square	0.913155447							
Adjusted R Square	0.911576455							
Standard Error	4.640165217							
Observations	57							
ANOVA								
	df	***SS***	***MS***	***F***	***Significance F***			
Regression	1	12451.78775	12451.78775	578.315485	7.31496E-31			
Residual	55	1184.212328	21.53113324					
Total	56	13636.00008						
	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	0.073956467	0.618897316	0.119497153	0.90531692	-1.166341461	1.314254396	-1.16634146	1.314254396
X Variable 1	0.942051365	0.039173482	24.04819088	7.315E-31	0.863545954	1.020556777	0.86354595	1.020556777

TABLE 4: SUMMARY RESULTS OF DESCRIPTIVE STATISTICS OF SAMPLE CRUDE OIL PRICE INDEX AND GASOLINE PRICE INDEX DURING THE STUDY PERIOD FROM 01.10.2013 TO 31.5.2018

Variables/Statistic	Minimum	Maximum	Mean	S.D	S.E	Skewness	Kurtosis	observations
Crude Oil Price	-100	18.24582	1.857	15.82877	2.09657	-4.3613619	26.52964	57
Gasoline Price	-100	19.5058	1.675	15.60448	2.066864	-4.5426198	28.44583	57

The table 4 Provides the summary results of descriptive statistics, for the sample crude oil price index and gasoline price index variables, during the study period. It is clear that Minimum and Maximum values of the selected sample variables ranged from -100 to 18.24. Among all the sample crude oil price index and gasoline price index variables, the gasoline price index the highest average returns. However, crude oil price returns witnessed negative mean returns during the period. The Standard Deviation, which is an indication of volatility, was high for crude oil price index returns. The Skewness was negative for two sample variables.

CHART 3: CRUDE OIL PRICE INDEX AND GASOLINE PRICE INDEX RETURNS:



t- Test Paired Two Samples For Means

The **t-Test Paired Two Sample for Means** tool performs a **paired two-sample** Student's **t-Test** to ascertain if the null hypothesis (**means** of **two** populations are equal) can be accepted or rejected. This **test** does not assume that the variances of both populations are $d_z = \frac{\mu_1 - \mu_2}{\sigma_{x_1 - x_2}} \approx \frac{\bar{x}_1 - \bar{x}_2}{s_z}$ equal.... The result of this tool is a calculated **t**-value.

TABLE 5: t-TEST PAIRED TWO SAMPLE FOR MEANS

t-Test: Paired Two Sample for Means		
A	**B**	**C**
	Crude Oil Price	**Gasoline Price**
Mean	-1.857499976	-1.675903921
Variance	250.5500626	243.5000015
Observations	57	57
Pearson Correlation	0.955591674	
Hypothesized Mean Difference	0	
df	56	
t Stat	-0.292382183	
P(T<=t) one-tail	0.385537494	
t Critical one-tail	1.672522304	
P(T<=t) two-tail	0.771074987	
t Critical two-tail	2.003240704	

Interpretation

Table 5 Provides Cells B4 and C4 contain the mean of each sample, Variable 1 = Beginning and Variable 2 = End. Cells B5 and C5 contain the variance of each sample. Cells B6 and C6 contain the number of observations in each sample. Cell B7 contains the Pearson Correlation which indicates that the two variables are rather closely correlated. Cell B8 contains our entry for the Hypothesized Mean Difference. Cells B9 contain the degrees of freedom, 10 – 1. Cell B10 contains the result of the actual t-test. We will compare this value to the t-Critical two-tail statistic. Note: Use a one-tail test if you have a direction in your hypothesis, i.e. if testing that a value is above or below some level. In this example P(T <= t) two tail (0.7710)gives the probability that the absolute value of the t-Statistic (0.29) would be observed that is lesser in absolute value than the Critical t value (2.003). Since the p – value is less than our alpha, 0.05; we reject the null hypothesis that there is no significant difference in the means of each sample.

FINDINGS

The empirical data analysis provided sufficient facts that stock market returns are negatively related with the India volatility index. The minimum and maximum values of selected sample variables ranged from -100.00. Among all the sample crude oil price index returns and gasoline price index returns variables recorded the highest average returns the crude oil price return the highest average returns. However, crude oil price returns witnessed negative mean returns during the period. The Standard Deviation, which is an indication of volatility, was high for crude oil price returns. The Skewness was negative for two sample variables. The kurtosis value was less than three for two sample variables. The Standard Deviation, which is an indication of volatility, was high for crude oil price returns than gasoline price. Skewness was negative for the sample of crude oil. kurtosis value was greater than gasoline price, which indicated leptokurtic distribution (more peaked than normal distribution).it is clear from the analysis of multiple regression indicated that none of the selected sample gasoline price returns influenced crude oil price. The results of during the study period Use a one-tail test if you have a direction in your hypothesis, i.e. if testing that a value is above or below some level. In this example P (T <= t) two tail (0.7710) gives the probability that the absolute value of the t-Statistic ((0.29) would be observed that is lesser in absolute value than the critical t value (2.003). Since the p – value is less than our alpha, 0.05; we reject the null hypothesis that there is no significant difference in the means of each sample.

CONCLUSION

The oil and gas sector is fairly well developed in India, and is poised to contribute a large share to India's energy basket over the next 10 years. A conservative estimate of 7 per cent growth in the Indian economy is expected to approximately double India's per capital energy consumption over the next 20 years. Since energy demand and economic growth are almost interlinked, the Indian oil and gas sector, which provides the country with a significant portion of its energy requirements, has been identified as a key metric that will drive future GDP growth. To cope up with the increasing demand, the government has allowed 100 per cent FDI in the oil and gas sector, enabling some large partnerships such as the US$ 7.2 billion deal between BP and Reliance Industries. In order to further aid the development of the sector, the government introduces legislations such as the NELP to enable companies to bid for exploration rights, and encourage private sector participation. The participation of the private sector is expected to bring in monetary resources and technological capabilities, especially in the field of deep sea exploration while simultaneously reducing the dominance of PSUs in the country's competitive landscape. This year's Union Budget is expected to have a mixed impact on the sector, as the government has increased cess on crude oil production by approximately 80 per cent, thereby reducing its under recoveries. On the other hand, the government has also exempted the basic customs duty on the import of liquefied natural gas for power generation for two years, and made oil and gas pipelines eligible for viability gap funding, consequently aiding the midstream segment and thereby greatly benefiting the sector. The main future opportunities for the sector include assessing the feasibility of using non-conventional fuels such as coal bed methane, hydrogen and bio diesel. The sector must also lay greater focus on developing midstream infrastructure, with specific attention on city gas distribution networks, and the construction of strategic storage facilities as a safeguard against short term disruptions in fuel supply. The present study examined the relationship between crude Oil Price index future returns it is noted that there was no evidence of positive relationship between the dependent variables Gasoline Price and the independent variables during the study period. The results of correlation and causality analysis provided a different view. The Two variables are subjected to volatile pattern. However, the findings indicated that volatility was highly persistent in the returns.

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CONSTRAINTS FACED BY MSMEs IN INDIA IN ACCESS TO FORMAL CREDIT CHANNEL & SUGGESTIVE MEASURES FOR IMPROVEMENT

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ABSTRACT

Micro, Small & Medium Enterprise (MSME) sector is the most dynamic, heterogeneous and important segment of economy of almost all the country across the world. In India, MSMEs are the major employment generator; contribute significantly to the GDP and export of the country. Despite their significant contribution to the economy, the sector is plagued by multiple challenges viz lack of access to credit, poor marketing skills, inadequate financial awareness and leadership skills etc. The purpose of this paper is to comprehensively analyse the challenges of MSMEs and to explore the reasons responsible for hindering their access to formal credit channels like banks & financial institutions. A descriptive study was conducted with the help of both primary data collected from 50 MSMEs entrepreneur based on survey and secondary data retrieved from different reports, newspapers, etc. The study is based on extensive review that significantly contributes in directing the stakeholders to explore appropriate measures for empowering MSMEs for holistic growth. The major findings from the study are personal savings is still the major source of fund for business in MSME sector, there is low awareness about new age technology, lengthy loan process and demand for collateral are the major barrier to entry for access to formal credit channel. Various suggestive measures for empowering the MSMEs and to foster an environment of inclusive and sustainable growth has been provided in this study.

KEYWORDS

challenges, credit facility, finance, growth, micro small & medium enterprises (MSMEs).

JEL CODE

H81

INTRODUCTION

Micro Small & Medium Enterprise (MSME) sector contributes significantly to employment generation, exports, GDP, and inclusive growth. In India, time and again several initiatives have been taken by the Government and Regulatory Bodies to empower MSME sector. The MSMED act 2006, was enacted for development of MSME sector, Schemes like CGTMSE, MUDRA, STAND up India, Priority Sector Lending were introduced to provide collateral and hassle free loans to small entrepreneurs.

Facility like TRDeS, PSB59 Minutes loan are some of the measures introduced to support the cash flows of MSMEs.

Despite several favourable initiatives in India, the total addressable demand for external credit is estimated to be Rs.37 trillion (IFC report -2018), while the overall supply of finance from formal source is estimated to be Rs.14.5 trillion. Therefore, the overall credit gap in the MSME sector is estimated to be approximately Rs. 23 trillion.

The MSMEs continue to face challenges of access to timely and adequate finance, latest technology and benefit from advances in digitization. These problems are hindering the development of conducive business environment.

DEFINITION OF MSME AS PER MSMED ACT, 2006

TABLE 1: DEFINITION OF MSME

Classification	Manufacturing Enterprise (Investment in Plant & Machinery)	Service Enterprise (Investment in Equipment)
Micro	Upto Rs. 25 Lakh	Upto Rs. 10 Lakh
Small	Above Rs. 25 Lakh to Rs. 5 Crore	Above Rs. 10 Lakh to Rs. 2 Crore
Medium	Above Rs. 5 Crore to Rs. 10 Crore	Above Rs. 2 Crore to Rs. 5 Crore

REVIEW OF LITERATURE

Omidyar Network & BCG (2016) in the report titled- "Credit Disrupted – Digital MSME lending in India" said that MSME face challenge of widespread inability to gain sufficient access to formal credit.

In Financing India's MSMEs of IFC (2018), it is said, "Informal debt dominates the flow of credit to both registered and unregistered MSMEs".

In the report titled "MSME Finance Gap Assessment of the shortfalls and opportunities in financing MSMEs in Emerging Market" it is said, "With respect to closing MSME finance gap, two features are particularly important: the financial structure and competition. More financially diverse market is associated with improved access to finance".

De, Sankar (2009) in his article has viewed that SME's in India face many challenges, but perhaps none are as difficult as the challenge of financing, both short term and long term.

Nanda, Ramana & William R. Kerr (2009) have expressed the view that financing constraints are one of the biggest concerns impacting potential entrepreneurs around the world.

NEED OF THE STUDY

MSME sector is backbone of Indian economy, despite introduction several development measures from time to time majority of the sector is unorganised, deprived from access to formal credit channel and remain isolated from global value chain.

Given the importance of the sector in the context of the Indian economy, it is necessary to study the challenges faced by the MSMEs.

STATEMENT OF THE PROBLEM

Challenges faced by MSMEs in India in access to formal credit channel. Despite several initiatives by regulatory body and Government of India, the credit gap in this sector is significant.

OBJECTIVE OF THE STUDY

To study the challenges faced by MSMEs in India in formal access to credit.

RESEARCH METHODOLOGY

The present study is based on both primary as well as secondary data.

Primary Data

For the purpose of the study, primary data has been collected through survey forms, discussion with 50 spread across different location in India and after considering all the relevant aspects gathered by the researcher based on review of literature.

Secondary Data

Secondary data were collected from Annual Report of MSMEs, several Newspapers, RBI circulars, journals, books, survey etc. For literature, the researcher had gone through various books, websites, journal, newspapers on MSMEs.

The data are presented in the form of pie chart and tables. The data has been interpreted keeping in view the objective of the research. Total **50 MSMEs** were approached to share their views on the following pre-defined parameters:

1. Ownership pattern
2. GST registration
3. Udhyog Aadhar Memorandum/ GST registration
4. Nature of activity
5. Major source of fund
6. Types of credit facility availed by the respondents
7. Difficulty in access to credit
8. Nature of Business transactions
9. External rating
10. Motivation factor for applying for loans
11. Awareness about Government Initiatives for MSME
12. Expectation from Bank and other lenders
13. Purpose for requirement of fund
14. Use of technology in business
15. Qualification of respondents

FINDINGS

OWNERSHIP PATTERN

TABLE NO. 2

Ownership	Number of Respondents	Percentage
Sole Proprietorship	23	46
Partnership	11	22
Private Limited	15	30
Public Limited (Non Listed)	1	2
Total	**50**	**100**

Source: Primary Data

The table no. 2, reveals that majority of the respondent in survey area is Sole Proprietorship, constituting 46%.

It is easy to start Sole Proprietorship firm, because of minimal requirement of regulatory compliance.

Lack of adequate capital and knowledge about policy and procedure for necessary registration, small scale of businesses are the major reason cited by the respondent for preferring sole proprietorship and partnership form of business.

AGE OF BUSINESS ENTITY IS ALSO A DETERMINANT FACTOR FOR OWNERSHIP PATTERN

TABLE NO. 3

	Ownership Pattern				
Age of Business	**Sole Proprietorship**	**Partnership**	**Private limited**	**Public limited (Non Listed)**	**Total**
Up to 3 years	9	0	1	0	10
>3-6 Years	5	6	3	0	14
>6-10 years	4	1	2	0	7
>10 years	5	4	9	1	19
Total	**23**	**11**	**15**	**1**	**50**

Source: Primary Data

The above data reveals that 90% of the respondent with up to 3 years of business are Sole Proprietorship firm. In case of business with more than 10 years of age, majority of respondents are private limited company, which constitutes 47%.

There is positive co -relation between age of the business entity and nature of constitution. With the growth of business, the promoter gathers knowledge about prevailing legal policies and accumulate sufficient net worth that helps in growth of business. Sole Proprietorship is simple form of business entity but for growth and perpetual succession private limited company is an ideal constitution. Thus, we observe that most of the respondent with more than 10 years in business are established as Private limited company.

GST REGISTRATION

TABLE NO. 4

GST Registration status	Number of Respondents	Percentage
Yes	39	78
No	11	22
Total	**50**	**100**

Source: Primary Data

Entrepreneurs having GST registration informed that it helped in their formalization and easy access to credit. Majority of the non-GST registered respondents are at the initial stage of business (less than 3 years).

UDYOG AADHAR MEMORANDUM/ DIC REGISTRATION

TABLE NO. 5

Registration status	Number of respondents	Percentage
Yes	41	82
No	9	18
Total	**50**	**100**

Source: Primary Data

Udyog Aadhar system is based on simple procedure of self-certification.

The respondents believed that Udyog Aadhar Registration provides several benefits like sanction of loan under credit guarantee scheme and concession in electricity bills etc. To avail formal credit Udyog Aadhar registration is considered as an important document.

NATURE OF ACTIVITY

TABLE NO. 6

Activity	Number of Respondents	Percentage
Manufacturing	24	48
Retail Trade	15	30
Services	11	22
Total	**50**	**100**

Source: Primary Data

MAJOR SOURCE OF FUND

TABLE NO. 7

Nature of Fund	Number of respondents	Percentage
Owned fund	31	62
Bank loan	16	32
Unsecured loan	3	6
Total	**50**	**100**

Source: Primary Data

Credit gap is one of the major challenge for MSME. According to several reports, credit gap in MSME sector in India is estimated to be Rs.20-25 trillion. 62% of the respondents told that their own savings is the major source of finance for the business.

Informal nature of business, inability to offer collateral security, high cost of borrowing makes it difficult to avail loan from formal lending institution.

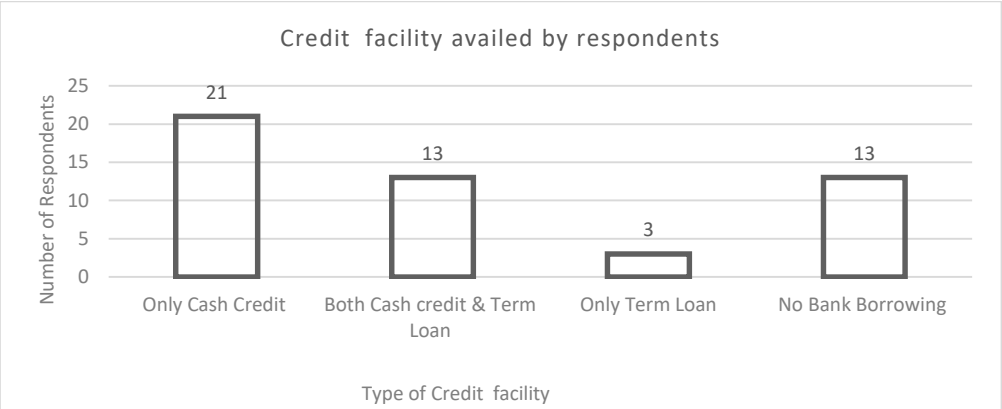
56.25% of the respondents who said that bank loan is the major source of finance are in the business activity for more than 10 years.

Formalisation of the business is one of the important factor, which affects the ability to borrow from formal source.

Business entity at the initial stage of the life cycle lacks the ability to prove their credit worthiness through official documents. The formal financial institutions particularly banks consider lending to MSMEs as highly risky since the entrepreneurs often do not possess adequate collateral to support the credit. Very often, the loans are rejected, despite the project prima facie, being feasible. The credit culture has not matured enough to a level existing in developed economies where lending is done based on nature of business and cash flow.

TYPE OF CREDIT FACILITY AVAILED BY THE RESPONDENTS

GRAPH 1 : TYPES OF CREDIT FACILITY

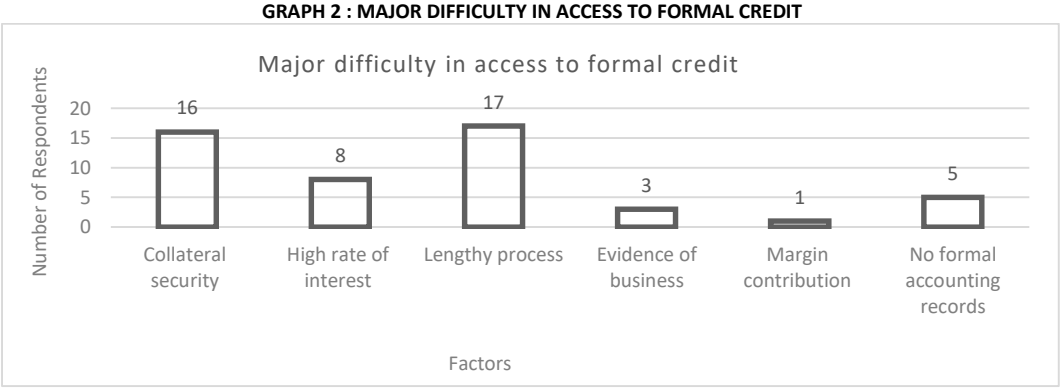


Source: Primary Data

The data reveals that respondents consider cash credit as the most common type of credit limit extended by the Banks. Obtaining long-term credit is comparatively tougher for MSMEs. The graph reflects that Banks/ FIs are generally reluctant in sanctioning long-term loan. Only 3 out of 50 respondents received exclusive term loan facility and total 13 respondents received term loan along with cash credit limit.

DIFFICULTY IN ACCESS TO CREDIT

GRAPH 2 : MAJOR DIFFICULTY IN ACCESS TO FORMAL CREDIT



Source: Primary Data

The data reveals that the main hindrance to formal credit channel is the "lengthy process involved in getting the loan". The respondents told that lenders do not inform on time whether the loan will be sanctioned or rejected. The applicants are kept in "**keep guessing"** stage for a long period of time and after a long hiatus the "decision is advised to the borrower".

TABLE 8: TURN AROUND TIME (IN DAYS) SOURCE: SECONDARY DATA-MSME PULSE

Lenders	2016	2017	2018
NBFCs	24	19	18
PSBs	41	35	31
Private Sector Banks	32	29	29

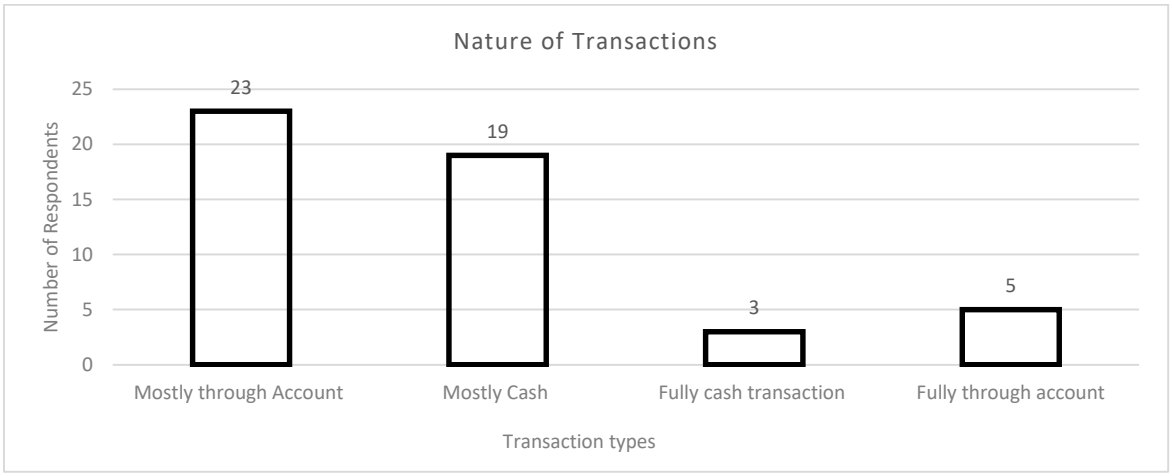
In the Table no. 8, the data shows that average Turn Around Time (TAT) for MSME loans is around one month in traditional credit assessment system. MSME sector suffers from the problem of inadequate capital, often they are forced to forego viable business opportunity due to delay in sanction of loan. Raising of query in piecemeal basis by the lender is one of the common observations of majority of respondent.

According to survey, demand of collateral security is the second major challenge. Information asymmetry, lack of evidence of credit worthiness and poor accounting records makes MSME sector as unprofitable and risky business proposition for lenders. In order to mitigate risk in lending to MSMEs, lenders demand collateral security. Small entrepreneurs lack the ability to offer any security and therefore they fail to get loan from formal lending institution.

The other challenging factors are high rate of interest and lack of formal accounting records. Rate of interest is fixed based on internal credit rating of the bank. As the small business entity does not have past credit history and lack managerial skills they are mostly rated in moderate to high-risk category and accordingly high rate of interest is advised to the borrower.

NATURE OF BUSINESS TRANSACTIONS

GRAPH 3: TYPES OF TRANSACTION BY MSMEs



Source: Primary Data

46% of the total respondents told that they do business transactions through account and remaining 54% of the respondents are still depending on cash transactions.

The several initiatives of the Government of India under Cashless India initiative has helped the small business entity to adopt different payment channels like BHIM PAY, Aadhar Enabled Payment System (AEPS) and IMPS etc.

The respondents told that digital payments are safer, convenient and hassle free. Moreover, it helps in developing better financial discipline.

64% of respondents, who are dealing in cash, are in the business activity for less than 6 years and these respondents are dependent on their own fund for their business. They have very limited access to formal credit channel due to lack of evidence related to trade transactions.

Any lending institution requires evidence of business transactions. Use of digital transaction tools helps in mitigating lending risk by ensuring cash flow. Thus, respondents having business transaction records have more favourable chance of getting access to formal credit channel.

EXTERNAL RATING

TABLE 9

External Rating	Number of respondents	Percentage
Yes	9	18
No	41	82
Total	**50**	**100**

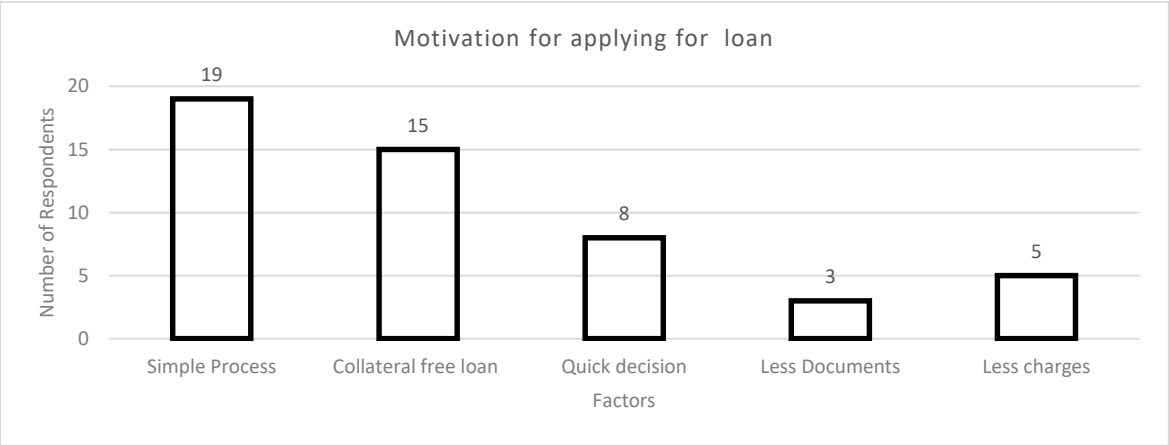
Source Primary Data.

Several Credit Rating Agencies have specialised rating model for MSMEs known as "**SME rating".** As the assessment of credit worthiness of MSMEs is difficult because of the inherent limitation of the sector these credit rating agencies assess the SMEs based on their individual business model and provide a rational report. The report is considered as important source of information by lenders. Some lending institutions also fix rate of interest based on the rating accorded by the agencies.

The survey reveals that 82% of the respondents do have any external rating. Out of this 75% of the respondents told that they are not aware of such rating facility and remaining 25% of them told that though they have heard of external rating but they did not get themselves rated because it is costly and time-consuming process.

MOTIVATION FOR APPLYING FOR LOAN

GRAPH 4: MOTIVATION FOR APPLYING FOR LOAN



Source: Primary Data

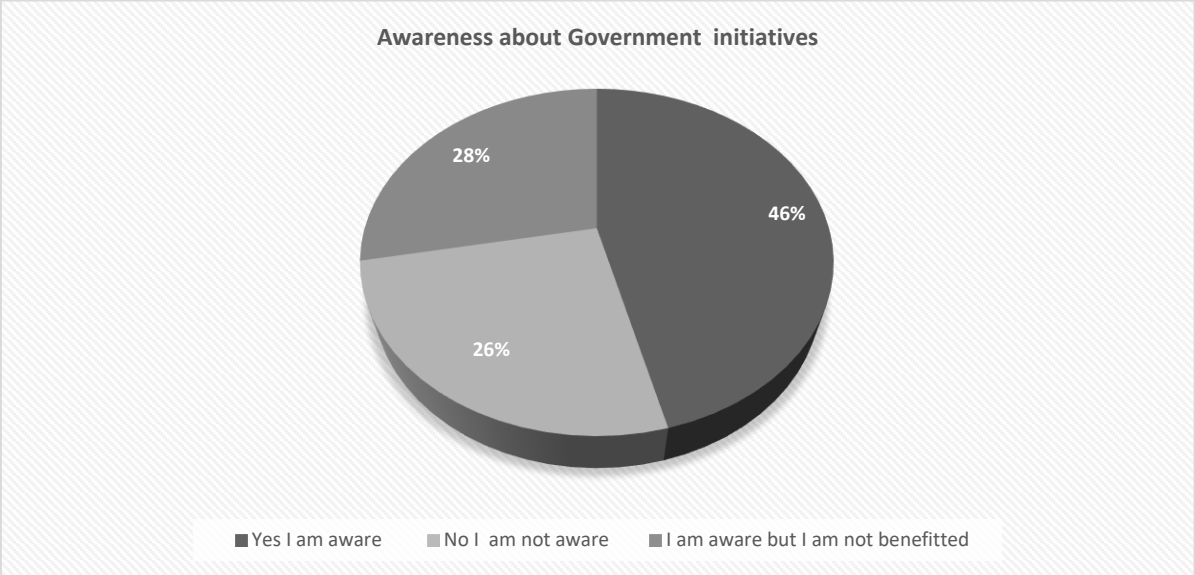
Two major factors that will motivate MSMEs entrepreneurs to approach banks for loan are – 1.the process to get loan must be simple and 2. Collateral free loan. The respondents said that demand of huge pile of papers, frequent queries on loan application and demand of multiple data etc de-motivates them in approaching bank for loan.

The respondents further said that during the discussion stage, the lenders do inform that loan eligibility will improve if they offer any asset as collateral security and sometime loan is denied if the applicant fails to provide any collateral security. Security Obsessed lending methodology still dominates the loan segment.

Quick decision is the third important motivating factor according to the respondents. The lenders do not convey the fate of the application on time and the applicant has to run from pillar to post to get the final verdict.

AWARENESS ABOUT GOVERNMENT INITIATIVES FOR MSMEs IN INDIA:

GRAPH 5: AWARENESS ABOUT GOVERNMENT INITIATIVES



Source: Primary Data

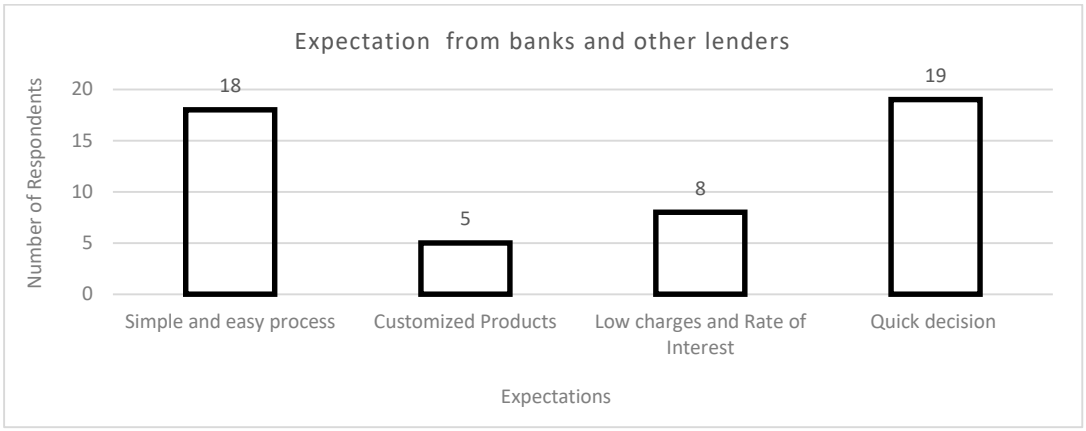
46% of the respondents told that they are aware of the Government initiatives for MSMEs like PSB59minutes loan scheme, Stand-up India scheme, make in India initiatives, public procurement policy and TReDS etc but majority of them said that to get benefit under the scheme requires “paper work and proper documents” which they do not have.

Most of the respondents did not approach for the benefits under the different schemes because they feel that are not eligible under the schemes.

26% of the respondents are not aware of the different Government Initiatives for MSMEs and remaining 28% though aware of the schemes but did not opt for any of the benefit under the scheme, as they believed it will be time consuming and their fellow businesspersons have also not opted for such schemes. They appeared to be satisfied with their present business model.

EXPECTATION FROM BANKS AND OTHER LENDERS

GRAPH 6: EXPECTATIONS FROM BANKS AND OTHER LENDERS



Source: Primary Data

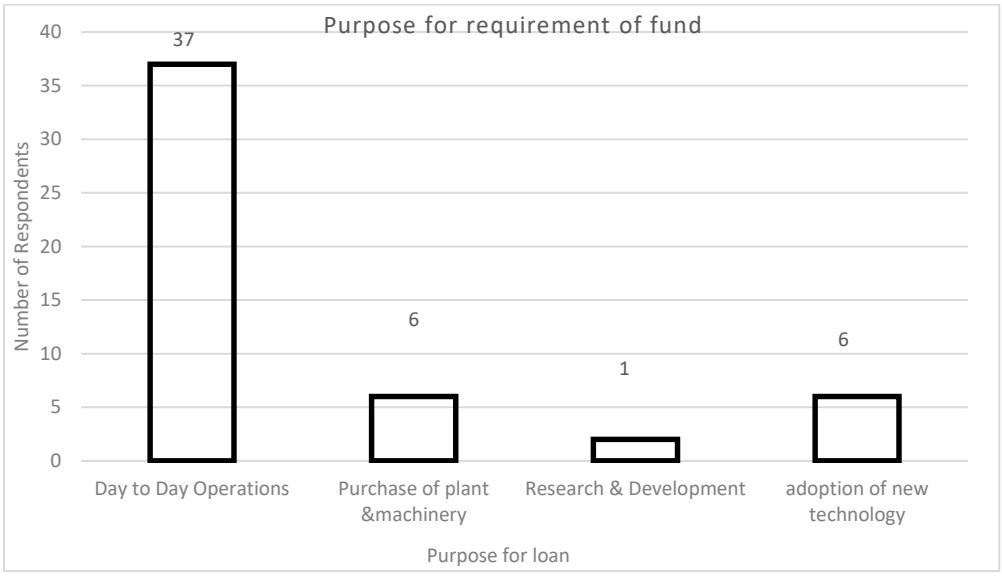
38% of the respondents said that Lenders must "take a call" on their application within a reasonable time. Due to delay dallying by lenders, the MSMEs tend to lose business opportunity and fail to honour their commitments towards fellow business entity that leads to financial and reputational loss.

Simple and easy process is the second major expectation of the respondents. During the interaction, the promoters said that lenders must device the loan scheme in such manner that with minimum data they can take a call and sanction the loan amount. Majority of the respondents said that to get loan from formal sources they are forced to hire consultants who promise to prepare papers as per the requirements of lenders and in turn charge 5%-10% of the loan amount as commission. These additional expenses over and above the bank charges makes loan costlier.

16% of the respondents said that bank must reduce the charges and rate of interest. They also said that banks must give incentive to good borrowers in the form of rebate in interest amount paid.

PURPOSE FOR REQUIREMENT OF FUND

GRAPH 7: PURPOSE OF LOAN



Source: Primary Data

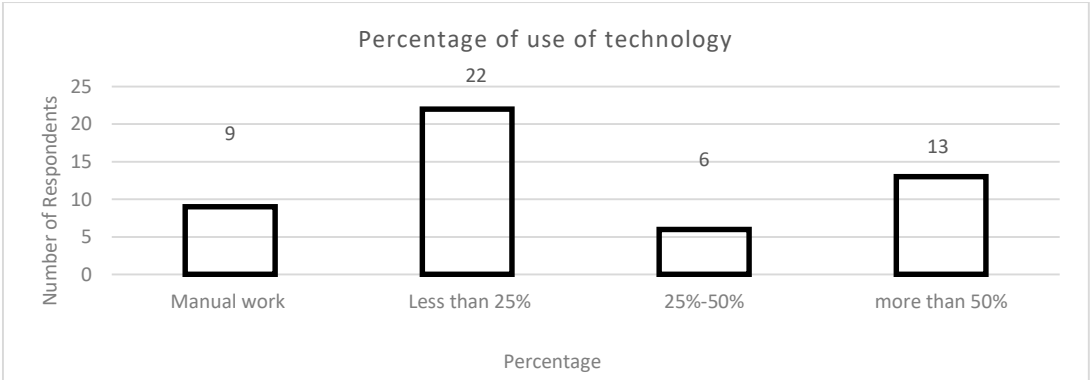
54% of the respondents said that they require additional fund for day-to-day business operations. This indicates that MSMEs suffer from liquidity crisis and they survive in Hand to Mouth situation.

Purchase of plant & machinery and adoption of new technology ranked as second important purpose.

Research & development is still a farthest dream of MSMEs because their cash flow is not sufficient to meet their immediate business needs. They can focus on research & development only when they can generate sufficient surplus fund from their operating activity.

USE OF TECHNOLOGY IN BUSINESS

GRAPH 8: USE OF TECHNOLOGY

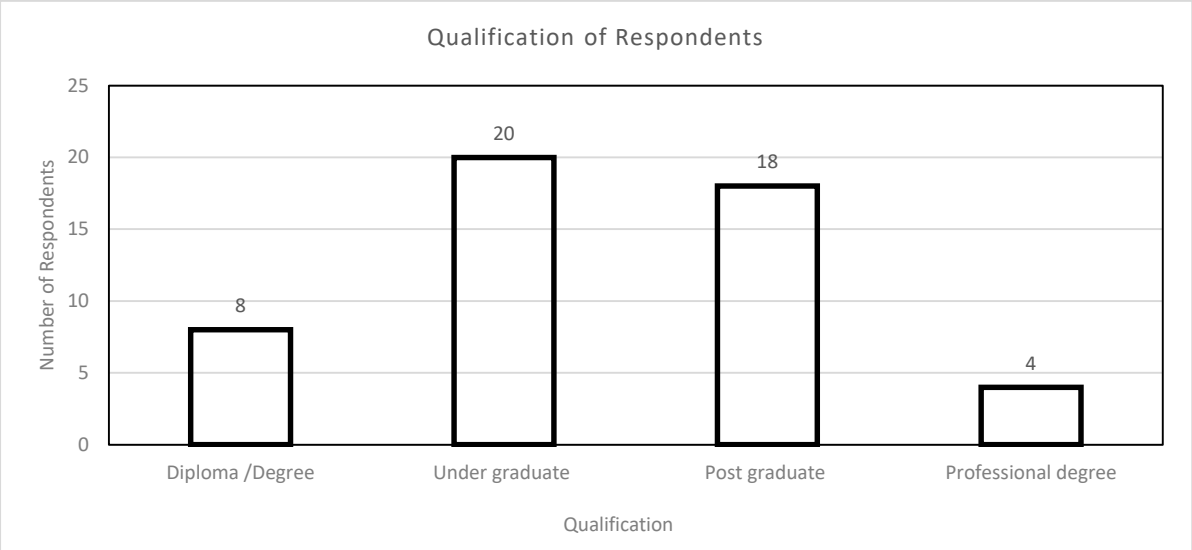


Source: Primary Data

The survey reveals that 31 out of 50 respondents are dependent on manual process and remaining 19 respondents are using technology largely.
In the present age of artificial intelligence, data analytics, and smart business process, MSMEs are yet to adopt new age technology. Up skilling and handholding is required for MSMEs for leveraging the benefit of technology

QUALIFICATION OF RESPONDENTS

GRAPH 9 : QUALIFICATION OF RESPONDENTS



Source: Primary Data

40% of the respondents are undergraduate and 36% are postgraduate. The respondents with professional degree is almost negligible.

SUGGESTIONS

Introduction of simplified registration process: Presently MSMEs have to do multiple registration of different purpose with multiple authority such as GSTN, Udyog Aadhaar Portal, and NSIC etc., which is time consuming, and complex process. It is recommended that a single unique number in similar line of "Legal Entity Identifier (LEI)' may be introduced and the same can be mapped with PAN number or Aadhar Number of the entity and it should be used for all purpose by the MSMEs. This initiative will reduce duplication of process and it will bring more MSMEs into the formal business network.

Leveraging technology for assessment of credit worthiness: We understand from the survey that MSME sector suffers from the problem of lengthy loan process and demand of collateral security. The problem originates because of challenge of information asymmetry and lack of financial data to underwrite the applicant. Presently banks rely heavily on the balance sheet and financial statements for credit assessment but it is the time to think differently.

Several new age fintech lending companies are leveraging digital tools to Underwrite the applicant. Alternate sources such as social media data, utility data (telecom, internet, vehicle registration etc), transaction data (e.g. Point of Sale, credit card trails) and financial data trails are giving new dimension to credit assessment process.

Banks must adopt such tool to make the credit underwriting process simple and easy.

Introduction of cash flow based lending schemes: It is time to introduce more and more cash flow based lending schemes in place of security obsessed lending schemes. Repayment schedule must align with the payment settlement process and business cyclicity of the borrower. The MSME borrowers must be given the liberty to select their repayment terms. It will reduce the credit risk and monitoring cost of the lender.

Appointment of bank approved loan arrangers: It is observed that MSMEs fall prey to several "so-called loan arrangers" for getting access to formal credit. The loan arrangers misguide the MSMEs and take undue advantage of their ignorance. In order to reduce such fraudulent activity, individual banks must appoint loan arrangers after rigorous selection process; each one of the loan arranger must have a unique identity number and must function within well-defined code of conduct of the bank. The Loan arrangers must source MSME loan leads and assist the applicant in getting the loan.

Co-lending: In order to mitigate the credit gap in MSME sector both new age fintech companies and traditional lenders like banks can come together and lend. It will be one of the innovative measure to bring more and more unstructured small business entity into the umbrella of formal banking system. Fintechs has the ability to reach out to the informal sector and unbanked areas. Banks on the other hand, have the necessary infrastructure and wide deposit sources to deploy it for lending activity. When both Bank and NBFCs work together, it will be Win-Win situation for all the stakeholders.

Line of credit for MSMEs: These borrowers suffer from problem of shortage of working capital. It may happen that due to foreseen situation there may be sudden requirement of fund. In order to support the borrowers in such critical situation, banks may sanction loan with line of credit facility i.e borrower can draw additionally beyond the normal limit but within an overall limit of loan for a short duration of time without undergoing a fresh process of sanction.

Tie-ups with new age business hubs: Several MSMEs are working with different ecommerce giants like amazon, myntra, OYO, Trivago, airbnb etc. Banks can collaborate with such ecommerce business entity and provide financial assistance to the MSMEs who deal with them.

It will be win – win situation for both lenders and the borrowers. Lenders can lend to MSMEs based on the undertaking of the business hubs and on the other hand, MSMEs can get loan at a lower cost.

Developing MSME cluster: Though several SME cluster exists in India, but they suffer from lack of adequate institutional support. They are not uniform in nature, some clusters are small, and some are big, leading to wide disparity. The private industrial bodies must be encouraged to come forward and contribute for the growth of the cluster. Incentive may be provided to deserving business entity in the cluster and recognition & reward mechanism may be adopted to motivate the cluster development. In Italy, Cluster work with the theme "Competition by Cooperation". Each cluster is specialised in specific activity and cooperate with each other in a flexible framework in terms of types of production to execute any contract.

Developing Entrepreneurial skills: Government of India have introduced several initiatives like, GeM portal for procurement of products from MSME by Government Organisation. It is observed that only 17% of the registered sellers in the GeM portal belong Micro & Small segment. This may be due to lack of awareness and requisite professional competencies that MSEs fail to make efficient use of such support programmes. It is prerequisite to organize some specialized "On boarding program" for Entrepreneurs as soon as they register for Udhyog Aadhar Memorandum.

The several industrial association across nation must organise seminars and workshop from time to time in collaboration with local District Industrial Centers(DICs) to create awareness about the latest trends in industry, new Government initiatives etc.

Market linkages: Several reports suggest that 30-35% of the MSMEs lacks sales, marketing, and accounting skills.

They are mostly unaware of the world market scenario, demand and supply trend of their products. Thinking beyond traditional marketing process and adopting new age tools such as social media can help small enterprises to promote their products and services.

Training, Workshops and Seminars are some of the important tools that can help the MSMEs in tackling the challenge.

District level development centres, Industry associations, may organise such events for creating awareness about new age marketing tools. Success stories of fellow SME entrepreneurs may also be broadcasted to motivate and boost confidence of the forum.

Linkage to global value chain: MSMEs are capable of participating in global markets but due to several constraints like scarcity of working capital, lack of awareness and technical skills they are bound to limit their operations to limited area. It is necessary to facilitate these MSMEs to become part of global value chain.

Model similarly to E commerce giants Alibaba may be adopted for assisting the MSMEs. Alibaba focuses on being a platform for suppliers to sell products world-wide.

In India E commerce players like Amazon, Flipkart have started providing platform to artisans & craftsmen's to sell their products in the online platform. It will add impetus to their empowerment.

Change in definition of MSME: The definition of MSME sector was introduced in the MSMED act 2006 and it is based on investment limits in plant & machinery and equipment. The worldwide definition of MSMEs sector is mainly based on three major parameters – Sales turnover, employment, and total assets.

MSMEs due to their informal and small scale of operations often do not maintain formal books of accounts and find it difficult to get classified as MSME as per definition of MSMED act.

Government of India has proposed to classify MSMEs based on turnover as mentioned below:

i. A micro enterprise will be defined as a unit where the annual turnover does not exceed five crore rupees;

ii. A small enterprise will be defined as a unit where the annual turnover is more than five crore rupees but does not exceed seventy-five crore rupees;

iii. A medium enterprise will be defined as a unit where the annual turnover is more than seventy-five crore rupees but does not exceed two hundred and fifty crore rupees.

Introduction of tax incentives: One of the biggest cause of concern for investors in India is the tax liability. Progressive tax regime is required for encouraging flow of capital. In Singapore, the corporate tax rate is 17% against 30% in India. Due to high taxation rate, the business entities prefer to shift their base to other country especially when they reach the mature stage of business.

Establishment of MSME focussed banks: In India, commercial banks provide services to all the customer segment viz-Personal banking, commercial banking, MSME banking etc.

Most of the time it is observed that due to varied customer base, focussed attention, and customized services could not be given to MSME.

Specialised bank for MSME will help in providing customized and better handholding to the clientele base.

Equity Bank in Kenya, which is catering mainly to the SME sector. It was named African SME bank of the year. The Bank's core business and services are focussed towards SME. Approximately 70% of the loan book and 77% of the total deposit comprises of SME portfolio.

Establishment of such specialised bank is necessary to increase the reach of banking service and development of the sector.

Facilitate in diversification: Customer list of SMEs has 80/20 rule. 80% of their sales is from 20% of the customer base. As a result, they lack bargaining power, they fear – what if the customer switch to another supplier? The solution to this problem is "diversification of products". SMEs that are not focussed enough in their quest for diversification often fall flat on their faces, eventually having to retreat from their venture prematurely.

Sachetise loan: The credit model for nano enterprise is much different from a structured business entity. In order to tailor the terms suitably, it is necessary to sachetise the credit products. We often see that consumer goods such as shampoo, creams are sold in sachet to make it convenient and cost effective to consumers at large. Lenders may implement similar measures to reach unbanked customer base. Moreover, such sachet credit products may be offered to borrowers' in-group lending scheme as borrowing as a part of group reinforces the strong incentives to repay. Default by one borrowers, when all others in a group are repaying leads to a stigma.

CONCLUSIONS

Despite several initiatives and measures taken by the regulatory body and Government of India, the growth of MSME sector is not uniform. It is necessary to connect the dots.

The entrepreneur and Industry bodies have a significant role to play in linking, maintaining, and sustaining the borrower-banker relationship. This could be in handholding, enabling, and capacity building of the new entrepreneurs. The industry associations must also spread awareness about various facilities available/guidelines issued by the regulators to bridge the information asymmetry.

Purpose of loan delivery must be simple, less time consuming and customised based on the needs of the MSME sector.

Isolated reform measures by different entity will not be successful. It is in collective interest that these entities can thrive.

LIMITATIONS OF THE STUDY

1. The present study is based on data collected through questionnaire from 50 MSME unit. It based on the limited sample size and the perception of the respondents.
2. Generalisation of the findings may be restricted because of the size of the sample and the composition of the respondents.

SCOPE FOR FURTHER RESEARCH

- Effort can be made to study financial challenges of MSMEs sector in context to leadership skills.
- There is vast scope to study the impact of technological skills in financial empowerment of the MSMEs.

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DETERMINANTS OF CHOICE OF ENERGY SOURCES FOR COOKING IN INDIA AND THEIR IMPACT ON WOMEN WORKING DECISION

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ABSTRACT

This paper discusses the factors that determine the type of energy source to be chosen for cooking and their respective impact on the women decision regarding their employment. Using multinomial logit model on Indian Human Development Survey – I, this paper finds out the determinants of choice of different source of energy for cooking and the marginal effects of household and individual specific variable. Furthermore, linear regression model is used for determining the women working decisions and it has been found that females belonging to households who use LPG for cooking purpose have higher annual working hours than those females whose households do not use LPG for cooking purpose.

KEYWORDS

LPG, energy source, firewood, logit model.

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1. INTRODUCTION

Today, India is one of the fastest growing economies in the world. But despite of this high GDP growth India is not good in social indicators like education and health as compare to developed countries and even among BRICS countries. There has been increase in women labor force participation rate across globe in 21st century. But in India WLFPR has decreased despite of high GDP growth and increased wages and income. This trend is quite puzzling. The first objective of this paper is to find out the factors that determine the type of energy source to be chosen for cooking. This one is related to health. 1.3 million People died every year on average because of indoor pollution from biomass energy (OECD/IEA, 2006). This figure in fact higher than death attributed to malaria estimated at 1.2 million per annum. The following table reveals that majority of the households use traditional methods of cooking i.e. use of firewood and dung cake for cooking. In fact, the percentage of use of these two sources has increased from 2004-05 to 2011-12 (IHDS).

TABLE 1

Type of source of energy for Cooking	IHDS-I (2004-05)	IHDS-II (2011-12)
Firewood	47.85	52.37
Dung Cake	28.15	34.41
Kerosene	15.51	10.43
LPG	30.03	39.18
Crop Residue	8.02	17.29

Source: IHDS and IHDS-II data sets

It has two negative effects. First one environmental effect and second one is health effect. Therefore, it will be interesting to see the variables that determine the choice of different energy sources for cooking

There has been increase in women labor force participation rate across globe in 21st century. But in India WLFPR has decreased despite of high GDP growth and increased wages and income. Empirically, it is found that various social and economic factors affect WLFPR in India. Some major factors are as follows:

1) Increase wage of male in the household. When income of male member in a household increases then it is found that WLFPR decreases. It happens because higher earnings of males encourage women to take care of their children at home.
2) Fertility rate or the number of children in a household.
3) Educational level of head of household and Women's educational level are other factors that affect WLFPR.

There have been various studies that worked on WLFPR and their determinants in the Indian Context. But there is no study that finds the impact of use of different energy source used in cooking on WLFPR. Therefore, second objective of the present study is to look at the impact of type of energy source for cooking on women working hours so that some policy conclusions can be drawn from the results.

2. LITERATURE REVIEW

F. Mwaura et al. "Determinants of household's choice of cooking energy in Uganda" (2014) used a multinomial probit model (MNP) to estimate coefficient of determinants of energy choices. Consumption expenditure welfare, household size, residing in urban or rural areas, achievement of education levels beyond primary level and regional location of a household were the determinants that affect the households' choice of cooking energy.

Fidelis O. Ogwumike et al. "Household Energy Use and Determinants: Evidence from Nigeria" (2014) used 2004 Nigeria Living Standard Survey data to examined household energy use and its determinants in Nigeria. Using multinomial logit models, they found that educational levels of father and mother, per capita expenditure and household size are the determinants for choice of energy use.

Barnes et al.(2010) found that the use of both traditional as well as modern energy sources for cooking improve household consumption and income. They found that the return on modern sources is 20 to 25 times higher than that on traditional sources. They also found that 45% of household were below poverty line while 58% of the household are energy poor. The study concluded that reducing energy poverty helps in reducing income poverty as well.

Farjana Afridi et al. "Declining female labour force participation in rural India: The supply side**"** (2017) found in their paper that over period of time married women are shifting out of market over time in rural India. They found that women LFPR declined from 55% to 44% from 1987 to 2011. They also found that women LFPR also decline because of their increased enrolment in higher education.

Farjana Afridi et al. "Why Are Fewer Married Women Joining the Work Force in India? A Decomposition Analysis over Two Decades" (2016) used parametric and semi-parametric decomposition techniques and found that changes in individual and household attributes fully account for the fall in women's labour force participation rate in 1987-1999 and account for half of the decline in this rate in 1999-2009.

3. DATA AND METHODOLOGY

3.1 Data

Data for our study is taken from IHDS-I (Indian Human Development Survey). IHDS-I was conducted in year 2004-05. It covered 41554 households and 1503 villages with 971 neighbourhood urban villages. Data was taken for variables types of energy sources used for cooking, number of Children and number of Adults in a household, Income of the household, number of total working hours in a year by an individual, highest education by adult male and female in the household.

3.2 Methodology to find out the determinants of choice of source of energy for cooking in India

We have used multinomial logit model and logit model to find out the determinants of choice of different source of energy for cooking.

Multinomial Logit Regression

Fuel Type=f(INCOME, No. Of Adults, No. Of Married Females, Highest Education of Adult Female, Highest Education of Adult Male, URBAN

Where, Fuel type=1 if Firewood, 2 if Kerosene, 3 if dung cake, 4 if LPG, 5if crop residue URBAN is a dummy variable and URBAN=1 if Urban household, 0 otherwise.

We incorporated urban dummy in our multinomial logit model because there is huge difference in use of energy sources for cooking in urban and rural areas in India. It can be seen in the following table.

TABLE 2: PERCENTAGE OF HOUSEHOLDS USING DIFFERENT SOURCE OF ENERGY FOR COOKING

Type of source of energy for Cooking	IHDS-I	
	Rural	Urban
Firewood	59.89	24.02
Dung	36.53	11.54
Kerosene	15.39	15.76
LPG	18.79	52.29
Crop Residue	11.31	1.50

The advantage of multinomial logit is that it fixes base or benchmark category and it tells us about the change in the ratio of the probability of choosing one outcome category over the probability of choosing the baseline category.

We also used the logit model to find the marginal effects of household and individual specific variable.

3.3 Methodology to find out the impact of different energy sources for cooking on women working decision

We use following linear regression models:

1. Total working Hours in a $year_i = \beta_0 + \beta_1 * firewood_t + \beta_2 * INCOME_i + \beta_3 *$No. Of $Teen_t + \beta_4 *$No. Of $CHILDREN_t + \beta_5 *$Highest Education of Adult $Male_t + \beta_6 *$Highest Education of Adult $Female_t + \mu_t$
2. Total working Hours in a $year_i = \beta_0 + \beta_1 * firewood_t + \beta_2 * INCOME_i + \beta_3 *$No. Of $Teens_t + \beta_4 *$No. Of $CHILDREN_t + \beta_5 *$Highest Education of Adult $Male_t + \beta_6 *$Highest Education of Adult $Female_t + \mu_t$

Where, i= i^{th} female, t= t^{th} household

4. OBJECTIVES OF THE STUDY

The study of this paper are focusing on following objectives:

1. To examine the factors that determine the choice of different energy sources for cooking in India.
2. To know the effect of using LPG on number of working hours of women in India.

5. RESULTS

5.1 Multinomial logit regression

Fuel Type = f(INCOME, No. of Adults, No. of Married Females, Highest Education of Adult Female, Highest Education of Adult Male, URBAN

Where, Fuel type=1 if Firewood, 2 if Kerosene, 3 if dung cake, 4 if LPG, 5 if crop residue We get,

TABLE 3

Multinomial logistic regression				Number of obs		=	164971
LR chi2(24)						=	88839.13
				Prob >	chi2	=	0.0000
Log	likelihood	=	-197103.48	Pseudo	R2	=	0.1839

TABLE 4

fueltype		Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1		(base outcome)					
2							
	INCOME	4.35e-06	3.26e-07	13.33	0.000	3.71e-06	4.98e-06
	NADULTS	.0208687	.0113131	1.84	0.065	-.0013046	.0430421
	NMARRIEDF	-.1934065	.0219894	-8.80	0.000	-.2365048	-.1503081
	HHED5F	.0285907	.0028	10.21	0.000	.0231029	.0340786
	HHED5M	.0165541	.0026292	6.30	0.000	.011401	.0217071
	URBAN	1.144921	.0239876	47.73	0.000	1.097906	1.191936
	_cons	-1.34618	.0260889	-51.60	0.000	-1.397313	-1.295047
3							
	INCOME	2.52e-06	2.53e-07	9.99	0.000	2.03e-06	3.02e-06
	NADULTS	-.0968049	.0084069	-11.51	0.000	-.1132823	-.0803276
	NMARRIEDF	.4887981	.01539	31.76	0.000	.4586342	.5189619
	HHED5F	-.0869222	.0022622	-38.42	0.000	-.0913561	-.0824884
	HHED5M	.0264833	.0019105	13.86	0.000	.0227389	.0302278
	URBAN	-.094305	.021061	-4.48	0.000	-.1355837	-.0530263
	_cons	-.0831463	.0177397	-4.69	0.000	-.1179156	-.0483771
4							
	INCOME	.0000132	2.35e-07	56.28	0.000	.0000127	.0000137
	NADULTS	-.1938556	.0086607	-22.38	0.000	-.2108303	-.1768809
	NMARRIEDF	.0275664	.0165752	1.66	0.096	-.0049205	.0600533
	HHED5F	.1289203	.0020975	61.46	0.000	.1248093	.1330313
	HHED5M	.120841	.0020677	58.44	0.000	.1167885	.1248936
	URBAN	1.593179	.019114	83.35	0.000	1.555716	1.630641
	_cons	-1.583027	.0213693	-74.08	0.000	-1.62491	-1.541144
5							
	INCOME	7.25e-06	2.67e-07	27.20	0.000	6.73e-06	7.78e-06
	NADULTS	-.0433887	.0101297	-4.28	0.000	-.0632426	-.0235348
	NMARRIEDF	.3397962	.0185766	18.29	0.000	.3033866	.3762057
	HHED5F	-.0410508	.002725	-15.06	0.000	-.0463917	-.0357099
	HHED5M	.0293402	.0024023	12.21	0.000	.0246317	.0340486
	URBAN	-1.129274	.0351761	-32.10	0.000	-1.198218	-1.060331
	_cons	-1.127471	.021775	-51.78	0.000	-1.17015	-1.084793

Firewood is the benchmark category. The likelihood ratio chi-square of 88839.13 with a p- value<0.0001 tells us that our model as a whole fits significantly. From the above result we can clearly see that if income increases by 1000 rupees then the odds of LPG increases relative to firewood by 0.0132 significantly. This result is obvious as income increase people tend to shift toward efficient source of energy. If number of Adult increases by 1 then the odds of LPG decreases relative to firewood by.193 significantly. The possible explanation for this is that if number of adult increase in a household then there is need of more fuel and this increases the odds of firewood relative to LPG. With the increase in the number of married women in a household increases the odds of LPG relative to firewood by 0.027. The intuition behind this is that with the increase in number of married women in a household there is a possibility of increasing number of kitchen and with the increase in the number of kitchen connections of LPG also increases. Increase in the highest level of education by adult male and female both in a household increase the odds to LPG relative to firewood. This result is quite obvious as level of education increases individual tend to shift towards efficient source of energy. The odds of LPG are higher relative to firewood of those who live in urban areas.

5.2 Logistic regressions

5.2.1 Determinants of use of firewood for cooking

TABLE 5

Logistic regression	Number of obs	=	215722
	LR chi2(7)	=	35852.43
	Prob > chi2	=	0.0000
Log likelihood = -131401.39	Pseudo R2	=	0.1200

TABLE 6

firewood	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
INCOME	-2.82e-06	8.80e-08	-32.09	0.000	-3.00e-06	-2.65e-06
NADULTS	.0555396	.0049442	11.23	0.000	.0458492	.0652301
HHED5M	-.036727	.0011751	-31.26	0.000	-.0390301	-.0344239
HHED5F	-.0585164	.0012084	-48.42	0.000	-.0608848	-.0561479
URBAN	-1.203072	.0114357	-105.20	0.000	-1.225485	-1.180658
NMARRIEDF	.143035	.0092543	15.46	0.000	.1248969	.1611732
buffallo_cow	.0036461	.0023373	1.56	0.119	-.0009348	.008227
_cons	.5817858	.0111903	51.99	0.000	.5598533	.6037183

The above logit model result tells us about the direction but it cannot tell about the coefficient. To find out the coefficient we need to find out the marginal effects. Income significantly reduces the probability of using firewood. This result is obvious as with an increase in the income, people tend to shift toward efficient source of energy. Increase in the number of Adults in a household increase the probability of using firewood. The possible explanation for this is that if number of adult increase in a household then there is need of more fuel and as a result use of firewood increases. Increase in the highest level of education by adult male and female both in a household decrease the probability of using firewood for cooking. This is because as education level increases people tend to shift towards cleaner and efficient source of energy. Probability of using firewood is lesser in urban areas as compare to rural areas.

Conditional marginal effects Number of obs = 215722
Model VCE : OIM
Expression: Pr(firewood), predict()
dy/dx w.r.t. : INCOME NADULTS HHED5M HHED5F URBAN NMARRIEDF buffallo_cow at:
INCOME = 59663.68 (mean)
NADULTS = 3.271623 (mean)
HHED5M = 7.168768 (mean)
HHED5F = 4.720645 (mean)
URBAN = .3354595 (mean)
NMARRIEDF = 1.454974 (mean)
buffallo_cow = -.0196364 (mean)

TABLE 7

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
INCOME	-7.02e-07	2.19e-08	-32.12	0.000	-7.45e-07	-6.60e-07
NADULTS	.0138171	.0012299	11.23	0.000	.0114065	.0162277
HHED5M	-.0091369	.0002924	-31.25	0.000	-.0097099	-.0085639
HHED5F	-.0145576	.0003005	-48.45	0.000	-.0151466	-.0139687
URBAN	-.2992986	.0028376	-105.48	0.000	-.3048602	-.293737
NMARRIEDF	.0355841	.0023023	15.46	0.000	.0310716	.0400965
buffallo_cow	.0009071	.0005815	1.56	0.119	-.0002326	.0020467

The above table shows the marginal effects of the variables. Increase in 1 member of adult in a household increase the probability of firewood use for cooking by.014. Increase in the highest level of education by adult male reduces the probability of using firewood by.009. Similarly, Increase in the highest level of education by adult female reduces the probability of using firewood by 0.0145. Leaving in the urban area reduces the likelihood of use of firewood for cooking by.30. Increase in number of married female in a household increases the probability of firewood use for cooking by
.035. Number of cows and buffalos has no significant impact on use of firewood collection.

5.2.2 **Determinants of use of LPG for cooking**

Logistic regression
Number of obs = 215722
LR chi2(7) = 59908.88
Prob > chi2 = 0.0000
Log likelihood = -101887.94
Pseudo R2 = 0.2272

TABLE 8

lpg	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
INCOME	4.59e-06	9.41e-08	48.82	0.000	4.41e-06	4.78e-06
NADULTS	-.0661461	.0055589	-11.90	0.000	-.0770414	-.0552509
HHED5M	.0913566	.0014195	64.36	0.000	.0885744	.0941387
HHED5F	.1110085	.0013219	83.98	0.000	.1084176	.1135993
URBAN	.9574549	.0123873	77.29	0.000	.9331763	.9817335
NMARRIEDF	-.0703017	.010772	-6.53	0.000	-.0914145	-.0491889
buffallo_cow	-.0404674	.0030173	-13.41	0.000	-.0463813	-.0345536
_cons	-2.534011	.0150343	-168.55	0.000	-2.563477	-2.504544

Income significantly increases the probability of using LPG. This result is obvious as with an increase in the income, people tend to shift toward efficient source of energy. Increase in the number of Adults in a household decreases the probability of using LPG. The possible explanation for this is that if number of adult increase in a household then there is need of more fuel and as a result use of firewood increases. Increase in the highest level of education by adult male and female both in a household increase the probability of using LPG for cooking. This is because as education level increases people tend to shift towards cleaner and efficient source of energy. Probability of using LPG in urban areas is higher than rural areas. Increase in the number of married females in a household decreases the probability of using LPG. Increase in the number of cows and buffalos reduce the probability of LPG as people use dung cake.

Conditional marginal effects
Number of obs = 215722
Model VCE: OIM
Expression : Pr(lpg), predict()
dy/dx w.r.t. : INCOME NADULTS HHED5M HHED5F URBAN NMARRIEDF buffallo_cow at:
INCOME = 59663.68 (mean)
NADULTS = 3.271623 (mean)
HHED5M = 7.168768 (mean)
HHED5F = 4.720645 (mean)
URBAN = .3354595 (mean)
NMARRIEDF = 1.454974 (mean)
buffallo_cow = -.0196364 (mean)

TABLE 9

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
INCOME	8.70e-07	1.81e-08	47.94	0.000	8.34e-07	9.06e-07
NADULTS	-.0125313	.0010537	-11.89	0.000	-.0145964	-.0104661
HHED5M	.0173073	.0002642	65.51	0.000	.0167895	.0178251
HHED5F	.0210303	.0002506	83.91	0.000	.0205391	.0215216
URBAN	.1813879	.0023347	77.69	0.000	.1768119	.1859638
NMARRIEDF	-.0133185	.0020408	-6.53	0.000	-.0173185	-.0093186
buffallo_cow	-.0076665	.000572	-13.40	0.000	-.0087876	-.0065453

Increase in the number of Adults in a household significantly decreases the probability of using LPG by 0.012. Increase in the highest level of education by adult male and female both in a household increase the probability of using LPG for cooking by.017 and.021 respectively. Probability of using LPG in urban areas is higher

than rural areas by.18. Increase in the number of married females in a household decreases the probability of using LPG by 0.013. Increase in the number of cows and buffalos reduce the probability of LPG by 0.077.

5.3.1 Impact of firewood for cooking on total working hours of females

Total working Hours in a year$_i$ = β_0 + β_1*firewood$_t$ + β_2*INCOME$_i$ + β_3*No. of Teen$_t$ + β_4*No. of CHILDREN$_t$ + β_5*Highest Education of Adult Male$_t$ + β_6*Highest Education of Adult Female$_t$ + μ_t . reg WS8ANNUAL firewood NCHILDREN NTEENS INCOME HHED5F HHED5M if RO3==2 & RO5>22

TABLE 10

Source	SS	df	MS
Model	4.5984e+12	6	7.6640e+11
Residual	2.8278e+12	11053	255837045
Total	7.4262e+12	11059	671506888

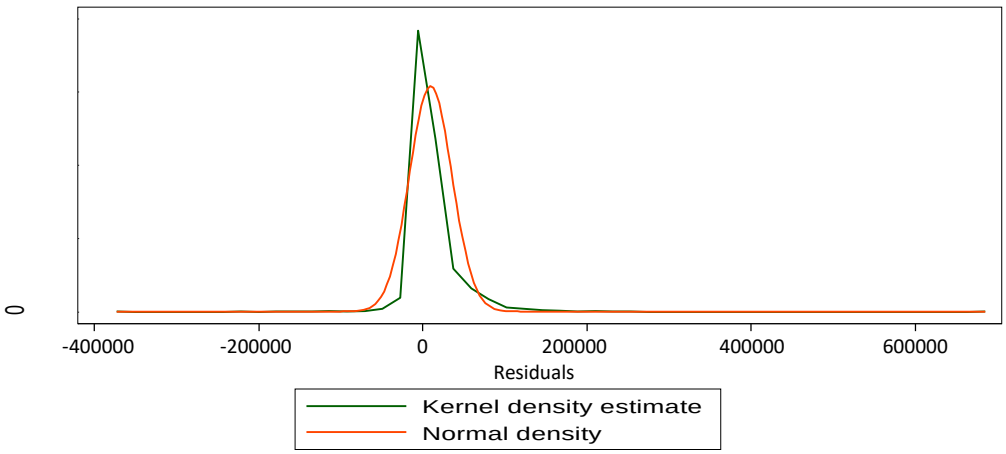
Number of obs = 11060
F(6, 11053) = 2995.67
Prob > F = 0.0000
R-squared = 0.6192
Adj R-squared = 0.6190
Root MSE = 15995

TABLE 11

WS8ANNUAL	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
firewood	-2469.04	318.6922	-7.75	0.000	-3093.733	-1844.346
NCHILDREN	-1229.515	96.87754	-12.69	0.000	-1419.412	-1039.618
NTEENS	-1301.514	163.5421	-7.96	0.000	-1622.085	-980.9421
INCOME	.2548607	.0028248	90.22	0.000	.2493235	.2603979
HHED5F	1123.846	42.61488	26.37	0.000	1040.314	1207.379
HHED5M	-262.289	37.0662	-7.08	0.000	-334.9454	-189.6327
_cons	4189.909	361.356	11.59	0.000	3481.586	4898.231

To find out the determinant of annual working hours for female, we regress the above model and found the result above. Before interpreting the coefficient, we checked for the normality of error term and found that error term is normally distributed. Following is the graph for the normality of error term.

GRAPH 1: KERNEL DENSITY ESTIMATE



kernel = epanechnikov, bandwidth = 1.1e+03

After checking normality of error term, we checked for multicollinearity and hetroscedasticity. We found no multicollinearity among explanatory variables. But we found that there is problem of hetroscedasticity. It can be seen below the result of test for hetroscedasticity.

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance

Variables: fitted values of WS8ANNUAL

chi2(1) = 51996.48

Prob > chi2 = 0.0000

We used weighted least square model to take care for hetroscedasticity. We have found the following results.

TABLE 12

Variance-weighted least-squares regression	Number of obs	= 1577
Goodness-of-fit chi2(728) = 65140.08	Model chi2(6)	= 38365.50
Prob > chi2 = 0.0000	Prob > chi2	= 0.0000

TABLE 13

WS8ANNUAL	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
firewood	-1547.009	12.8651	-120.25	0.000	-1572.224	-1521.794
INCOME	.0519129	.0004663	111.34	0.000	.0509991	.0528268
HHED5M	-23.57471	1.464981	-16.09	0.000	-26.44602	-20.7034
HHED5F	-106.3632	1.945895	-54.66	0.000	-110.177	-102.5493
NCHILDREN	-234.6288	4.267288	-54.98	0.000	-242.9926	-226.2651
NTEEN	-591.5767	12.17926	-48.57	0.000	-615.4476	-567.7058
_cons	3760.278	17.05956	220.42	0.000	3726.842	3793.714

Firewood collection or use in a household reduces 1547 annual hours of a female (Those females whose age is greater than 22). Increase in the annual income of the household by rupees 1000 lead to increase 52 hours in a year. Highest education of adult male and female reduces annual working hours of female in that household. The explanation for this is that if the same female has highest education then she will have high wage rate and income effect dominates substation effect in that case. If male member has highest income, then there is strong chance of getting good job and he can earn enough so that female of his household reduces the working hours. Increase in the number of children and teen reduces the total number of working hours annually for a female.

5.3.2 Impact of LPG and firewood as source of energy for cooking on total working hours of females

Total working Hours in a year$_i$ = β_0 + β_1*LPG$_t$ + β_2*firewood + β_3*INCOME$_i$ + β_4*No. of Teen$_t$ + β_5*No. of CHILDREN$_t$ + β_6*Highest Education of Adult Male$_t$ + β_7*Highest Education of Adult Female$_t$ + μ_t

. vwls WS8ANNUAL lpg firewood INCOME NCHILDREN NTEEN HHED5M HHED5F if RO3==2 & RO5>22

TABLE 14

Variance-weighted least-squares regression		Number of obs	= 1540
Goodness-of-fit chi2(712) = 62880.21		Model chi2(7)	= 38847.20
Prob > chi2	= 0.0000	Prob > chi2	= 0.0000

TABLE 15

WS8ANNUAL	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lpg	2137.659	67.07786	31.87	0.000	2006.189	2269.129
firewood	-1532.387	12.88577	-118.92	0.000	-1557.642	-1507.131
INCOME	.0506391	.0004671	108.41	0.000	.0497236	.0515546
NCHILDREN	-237.4587	4.272092	-55.58	0.000	-245.8318	-229.0855
NTEEN	-575.9226	12.20956	-47.17	0.000	-599.8529	-551.9923
HHED5M	-20.80988	1.468312	-14.17	0.000	-23.68772	-17.93204
HHED5F	-112.3693	1.957346	-57.41	0.000	-116.2056	-108.533
_cons	3759.864	17.09295	219.97	0.000	3726.363	3793.366

After correcting for hetroscedasticity, we found that females belonging to households who use LPG for cooking purpose have higher annual working hours than those females whose households do not use LPG for cooking purpose. Females belonging to households who use firewood for cooking purpose have lower annual working hours than those females whose households do not use firewood for cooking purpose. With the increase in Income of household, working hours annually also increases for female. Increase in the number of children and teen reduces the total number of working hours annually for a female. Highest education of adult male and female reduces annual working hours of female.

6. CONCLUSION

Till 2011, the main source of energy for cooking in India was primarily traditional especially in rural India. Pradhanmantri Ujjwala Yojna has been started since 2016 to provide subsidized LPG. The impact of Ujjwala yojna is yet to see. We found that use of LPG increases with the increase in income of the household, increases with the educational level of households and decreases with the total number of livestock. Use of LPG should be encouraged because it has dual positive effects i.e. reduces indoor pollution and saves time by not collecting firewood. We also found that with the increase in the use of LPG, working time hours in a year also increases for female who are more than 22 years.

7. POLICY IMPLICATIONS

In last 10-15 years' women LFPR has been reduced. This is because of many factors like increased rural wage for males, increased enrolment of girls in higher education. India brought time use survey in 1999-2000 for only one time. There should be survey of time use in India so that we can take a closer look at the change in the daily activities among women due to change in the energy sources for consumption.

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