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From the EDITOR IN CHIEF's Desk……..

"You don't write because you want to say something; you write because you have got something to say", ruminating on these words I am proud to present to you the second issue of the fifth volume of our Bi-Annual management journal ACUITAS. Our objective is to provide platform to all those authors who would like to share their research work on varied aspects of management.

I duly acknowledge the support, proper assistance, motivation received from our patrons, advisory board and editorial board. I also duly acknowledge all the contributors of research papers included in the journal.

Out motive is to publish the most excellent research papers in management and we wish to provide 'ACUITAS' as a vehicle for the same. Your suggestions for further improvement of our journal are always welcome. We strive for increased accountability and all concerns and suggestions can always be directed to me.

Looking forward for a long term association with you all!

Thank you.

Warm Regards,

Dr. SudhirFulzele

Director, DAIMSR

FOCUS

It gives me immense pleasure to articulate that our journal-ACUITAS is well adorned by the internationally acclaimed academician, industrialists, researchers, scientist and academic administrators as members of the Editorial advisory board.

We present the second issue of the fifth volume of our bi-annual management journal 'ACUITAS' with great joy. This issue consists of four papers and one case study. The papers are from the fields of Financial Management, Marketing Management and a case study from Operations Management.

The first paper, '**Envy Affects Job Performance and Achievement Motivation with Moderating Effect of Self Esteem by Dr. Sangeeta Malik',** provides a unique perspective on how performance appraisal systems induce envy within employees and the impact it may have upon their performance.

Our second paper titled, '**Effects Of Devaluation & Floatation Of Currency On Financial Industry:(A Case Study Of Indebank Malawi Limited In Malawi)' by Prof. (Dr.) Ashish Gadekar, Mrs. Rimalini Ashish Gadekar,** analyzes how the country's relative price structure between tradable and non-tradable goods affect the overall level of domestic prices.

The third paper, '**Competitiveness of Silk and Hand Loom Paithani Saree Segment in India: A Literature Review by Dr. Charulate Londhe and Dr. Rajani Gupte',** is an in-depth review of how the real estate market at Ahemdabad is working.

'**Measure of Central Tendency: A Monograph, by Prof. Vijaya Hake**' is a monograph by a respected faculty of Vishwakarma Institute of Management, Pune which explains the various advantages and disadvantages of the measures of central tendency and discusses the various methods to calculate them.

CONTENTS

ENVY AFFECTS JOB PERFORMANCE AND ACHIEVEMENT MOTIVATION WITH MODERATING EFFECT OF SELF ESTEEM

Dr. Sangeeta Malik*

ABSTRACT:

The experience of envy in organizational life is believed to be relatively common (Dogan and Vecchio, 2001; Foster,1972;Miner 1990; Vecchio,1999).Within organization there are various work based scenarios like promotions, pay increase, performance appraisal, group or team based work, are likely to increase feelings of envy among employees. Organization often uses systems that implicitly induce envy in order to motivate employees to higher levels of performance (stein, 2000). An attempt has been made through this present study to see the impact of envy on achievement motivation and job performance with moderating effect of self esteem. The significant result are observed (P<.05).

Key words – Envy, Job performance, Achievement motivation, self esteem

INTRODUCTION:

Why do we pull away from colleagues we envy? Perhaps we experience this emotion more intensely with people who are close to us. No one likes to admit they're jealous or envious of their co-worker. People at all levels in a firm are vulnerable to envy. Envy is generally considered by everyone, a socially undesirable emotion and has been commonly experienced by most of the people regardless of their culture. Envy is an emotion that occurs when a person begrudges another for having or receiving something that he or she does not have, and perceives with displeasure the other's prosperity or advantage. It is not surprising that when one's accomplishments, talents, and possessions are perceived to compare poorly with those of another individual, who is not at par with them in any respect. When others' successes in the workplace bother you, you become ruminative. You obsess over interactions with rivals, compare your rewards, and over analyze even the fleeting praise the boss bestows on others. Envy damages relationships, disrupts teams, and undermines organizational performance.

When we're obsessed with someone else's success, your self-respect suffers, and we may neglect our own performance and possibly your career. Repressed envy inevitably resurfaces, stronger than ever .Our discomfort causes us to conceal and deny our feelings, and that makes things worse. Some people become so fixated on a rival that they lose their focus on their own performance. People also tend to distance themselves from the objects of their envy.

Though friendly competitors challenge each other, enviers have difficulty learning from and collaborating with others. That can lead to disruptions or oversights at work. People are indeed unhappier when a close friend succeeds in a personally relevant domain than when a stranger does. People want to learn more about ideas that come from other companies than about ideas that originate with rivals in their own organizations. This dislike of learning from inside rivals has a high organizational price.

The superior work achievements of another may also result in envious social comparisons between one self and a colleague (Tesser &Campbell, 1990). Bedeian (1995) notes, any situation in which employee obtain an advantage at the expense of another employee may provoke coworker envy. Despite the fact that little systematic research examining the antecedents and consequences of envy at the workplace has been conducted (see Vecchio, 1995, for an exception). An attempt has been made to highlight these gaps in management as how envy affects job performance and achievement motivation together with the moderating effects of self esteem.

REVIEW OF LITERATURE:

A precise, simple definition of envy is difficult because the term is used in multiple and conflicting ways. People tend to use the words "envy" and "jealousy" interchangeably, but the terms used to different experiences. Negative emotion is a common experience for many employees. Envy damages relationships, disrupts teams, and undermines organizational performance..

Envy, a pervasive and normal human emotion, has important implications for understanding workplace behavior. Ironically enough, the management discipline and social science researchers (George, 1990, 1992a) have ignored this topic. This neglect is particularly noteworthy because envy is especially common in business, professions, and the academic world. The, interest in the study of negative emotion and its consequences is growing as researchers recognize the cumulatively negative effects of these emotions have on rganizational outcomes such as performance, employee with-drawal, sabotage, and turnover (e.g., Ashforth & Lee, 1990). Though scarcely researched, the experience of envy has a long, colorful history, including the infamous story of Mozart and his contemporary, Salieri. Vecchio, 2000; Wert & Salovey, 2004).

However, reviews of envy research have not documented any productive effects (Miceli & Castelfranchi, 2007; Smith & Kim, 2007).Many studies have reported more destructive

effects have been documented in the literature currently (Duffy & Shaw, 2000; Parks, Rumble, & Posey, 2002; Schaubroeck & Lam, 2004; Smith et al., 1996; Smith, Parrott, Ozer, & Moniz, 1994; Van Dijk, Ouwerkerk, Goslinga, Nieweg, & Galluci, 2006; Vecchio, 2000; Wert & Salovey, 2004). Still, various scholars have pointed out that envy might spur a strong motivation to improve one's own situation as well (Aristotle, 350BC/1954; Kant, 1780/1997; Neu, 1980; Parrott, 1991; Rawls, 1971; Smith et al., 1994; Taylor, 1988). Aristotle, for example, claimed that ambitious men tend to be more envious than are others. Recent empirical work has confirmed that envy can contain the seeds of the motivation to improve (Cohen-Charash, 2009; Van de Ven, Zeelenberg, & Pieters, 2009). On the one hand, theory and research emphasize the importance of self-esteem in the development of envy (Barth, 1988). On the other hand, research findings about this role are mixed, and surprisingly, not too many studies examine the issue. Ryff found that those high in self-esteem were high in environmental mastery. Using Ryff's (1989) measure of psychological wellbeing, Paradise and Kernis (2002) found that high stable self-esteem individuals were higher in environmental mastery and autonomy than those with unstable –but still high – self-esteem. So far the researches have done in this areas are less and mostly empirical. Therefore, limited study is available on the effect of envy and on the relationship between achievement motivation, job performance and self-esteem. This is the focus of this study as it tries to fill this gap.

Keeping in mind the above gap in the research, this study attempts to explain as how envy, affects job performance and achievement with a moderating effect of self-esteem. It will potentially helps us to focus on as how envy helps us to become more productive at work place, and will help us how to recognize potentially destructive thoughts and behaviors; refocus them into more generous, productive ones; and make our self more open to others, more receptive to change, and more fulfilled at work.

RESEARCH METHODOLOGY:

Hypothesis

- The correlation between envy, job- performance, achievement & self esteem is positive.
- Self-esteem do not moderates the relationship between envy, job performance and achievement.

MEASURES:

A quantitative research method (survey) was employed to collect data from 100 teachers working in different private management institutes of Delhi and NCR. However, after data cleaning, data of 70 teachers were used for the analysis. Stratified sample used keeping their age, experience and educational background control. Data were analyzed using descriptive statistics and hierarchical regression.

A 10 item self assessment envy scale was developed .The responses were taken on a five point scale. An exploratory Factor analysis was performed on these item scales. Through an analysis of the principal components using varimax rotation, the aim was to identify the number of components. Items having low factor loadings were excluded from the analysis .The final scale consists of 9 items. The KMO and Bartlett's test is .566 for all the scale and the Bartlett's test of sphericity is 80.886. Rosenberg Self-Esteem scale was adopted for the measurement of self esteem. Silber and Tippett (1965) found a test retest reliability coefficient for the Rosenberg Self-Esteem scale was of .85 and concurrent validity coefficient ranging from .56 to .83.A 14 item Ray achievement Motivation scale was adopted for the measurement of achievement in the subject having reliability for over .70 .Job performance grades were obtained from their respective work institutions based on their yearly appraisals. The row data computed in SPSS.

RESULT AND DISCUSSION:

The first step to hierarchical, multiple regression models is to see the output which is being set by the researchers to predict the outcome. We can see from Table 1 of Descriptive statistic that mean and standard deviation for confounding variable job-performance is 32.63 and 4.192 is higher than other confounding variable Achievement motivation (30.71 and 3.494) and predictive independent variable self-esteem(21.56 and 3.614).

Table 1

Descriptive Statistics			
	Mean	Std. Deviation	N
Envy	1.60	.493	70
Achievement	30.71	3.494	70
Job-Performance	32.63	4.192	70
Self-Esteem	21.56	3.614	70

Table 2

Correlations					
		Envy	Achievement	jobperformance	selfesteem
Pearson Correlation	Envy	1.000	-.748	-.171	-.231
	Achievement	-.748	1.000	.337	.235
	jobperformance	-.171	.337	1.000	.172
	Selfesteem	-.231	.235	.172	1.000
Sig. (1-tailed)	Envy	.	.000	.079	.027
	Achievement	.000	.	.002	.025
	jobperformance	.079	.002	.	.078
	Selfesteem	.027	.025	.078	.
N	Envy	70	70	70	70
	Achievement	70	70	70	70
	jobperformance	70	70	70	70
	Selfesteem	70	70	70	70

In Table 2 of Correlations all the three variables have negative correlations with the predictive variable envy, where achievement variable magnitude is stronger predictive capacity than other variables like job performance and self esteem. The hypothesis1 is rejected. We reject the null hypothesis, which says that there is a positive relationship between Envy, achievement and job performance. The alternative hypothesis is accepted.

Which indicate that there is negative correlation between envy, achievement and job performance & self esteem. There observed a negative significant relationship P<.05 .

We go to the model summary table first, we have R^2 and Adjusted R square and R value for each step for both the block these are the controlling confounding variable. In the table below, block l, we get an R of .753 and R^2 is .567 means we get 57% variability by the independent variable Envy. The Adjusted R^2 is .554, which is not a big change from R^2, the R^2 change in the block1 .567 which is same as R^2 value which do not predict any change. The F Value 43.904, df1=2, df2=67 is significant (p=<.05) which means that R^2 and R^2 change is statistically significant. In the II block the R^2 values include all the variables (block 1 & II) we can observe the effect of the variables altogether in II block (the predictive and control)

So now to find out how much overall variance is explained by the inclusion of the third moderating variable self-esteem The R^2 change output for model II is the independent moderating variable is additionally 4% of variance in the outcome, when the job performance and self-esteem have been statistically controlled. The R = .756, which has an increase of .3% of the model 1a,R=.753, it can be interpreted that with the inclusion of one more variable i.e., self- esteem in the model 2 the R value increased to.3% . The R^2 value from .567 to .571 has increased a bit of 4%.The adjusted R^2 for the model 2 did not changed much. The R^2 change is .567 to .004 that indicates a big leap due to the inclusion of new variable in the model i .e.,self- esteem .The difference in R^2 and R^2 change is quite big and shows the predictive capacity of the inclusion of third variable self esteem. The F value= .656 with df1=1, df2=66 is significant at P=<.05, observed for the model II, indicated that adding one predictive variable exerts the moderating effects on the outcome of envy. Thereby the hypothesis II is rejected, which say that the self esteem do not moderate the relationship between envy, achievement and job performance. whereas practically self esteem do moderate the effect of envy, achievement and job performance.

Table 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change

1	.753[a]	.567	.554	.329	.567	43.904	2	67	.000
2	.756[b]	.571	.552	.330	.004	.656	1	66	.421

a. Predictors: (Constant), jobperformance, Achievement

Table 4

Anova Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.529	2	4.765	43.904	.000[a]
	Residual	7.271	67	.109		
	Total	16.800	69			
2	Regression	9.601	3	3.200	29.338	.000[b]
	Residual	7.199	66	.109		
	Total	16.800	69			

a. Predictors: (Constant), jobperformance, Achievement

In ANOVA table 3, the f calculated for the model 1,f= 43.904 with df=2,67 ,P<.05 is statistically significant. For the Model 2,f=29.338, df=3,66, p<.05 is also proved statistically significant.

Table 5

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	4.628	.405		11.415	.000		-.744	-.733
	Achievement	-.110	.012	-.779	-9.126	.000	-.748	.130	.086
	jobperformance	.011	.010	.092	1.073	.287	-.171		
2	(Constant)	4.741	.430		11.032	.000		-.734	-.707
	Achievement	-.108	.012	-.766	-8.779	.000	-.748	.140	.092
	jobperformance	.012	.010	.099	1.146	.256	-.171	-.099	-.065
	selfesteem	-.009	.011	-.067	-.810	.421	-.231		

a.Dependent Variable:

Envy

In Table 5 of Coefficient the two variables have negative predictive capacity (achievement and self esteem) and one variable (job performance) have positive predictive capacity, where job performance seems to be stronger predictive value of envy than other variables like achievement motivation and self esteem. In the table 1, the model predicts the negative coefficient between achievement and envy estimated to be -.779 and positive coefficient between job performance and envy.091Which indicates that a change in one SD in the independent(achievement) results in -.779 decrease in the dependent variable (Envy) ,P<.05, signifies that achievement is the strong negative predictor of envy. Whereas change in one SD in job performance brings increase .092 increases in outcome variable, thereby job performance seems to be the strong positive predictor of envy.

Similarly, in model 2, of table -5 of coefficient, change in one SD in achievement variable brings decrease in-.776 in outcome variable envy. Whereas change in one SD in job-performance brings.099 increase in outcome variable i.e., envy. The change in one SD in

Predictive variable (self esteem) brings negative decrease by -.067 P<.05, seems to be the marginal negative predictor of Envy.

CONCLUSION:

We can summarize the findings that envy affect achievement motivation and job performance (Aristotle, 350BC/1954; Kant, 1780/1997; Neu, 1980; Parrott, 1991; Rawls, 1971; Smith et al., 1994; Taylor, 1988) and it is also significant with the moderating effect of self esteem. The achievement and self esteem have negative correlation with envy, further indicates that envious people do not have achievement orientation and high self esteem, Instead they tend to be on low achievement orientation and low self esteem on the envy scale. The job performance seems to be high when people are more envious..

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EFFECTS OF DEVALUATION & FLOATATION OF CURRENCY ON FINANCIAL INDUSTRY:(A CASE STUDY OF INDEBANK MALAWI LIMITED IN MALAWI)

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ABSTRACT

The Malawi Government was a British colony and after independence the local currency the Malawian Kwacha (MWK) up to 1973 played to the same level with the British Pound (GBP).From that time the authorities used many policies for proper management of the economy. These include and not limited to the devaluation, floatation and exchange rates adjustments with the view of creating conducive environment for economic growth. The authorities tried to manage the devaluation and floatation of the currency most importantly because its results have widespread effects on the whole economy.

In a country like Malawi, where the exports are not at par with the imports and the equation being in favor of the latter it can be disastrous to leave these instruments uncontrolled. These things affect the country's relative price structure between tradable and non-tradable goods and later the overall level of domestic prices. The devaluation and floatation of the currency are among the most important tools in management of the economy and price stabilization in most developing countries. Some economics think tanks have argued that by devaluing and making the currency float makes imports relatively more expensive and exports relatively cheaper which means the foreign reserves will improve.

Keywords: devaluation, floatation, exchange rates, foreign reserves, relative price structure

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INTRODUCTION:

However, other research in support of empirical evidence showed that a devaluation of the nominal exchange rate can result in a contractionary impact on output. In the study done by, Gupta et al. (2003) by the use pooled data show that nearly half of all devolutionary episodes experienced in developing countries during the last decades have had a contractionary effect, furthermore to that, Magenzo (2002), after controlling for factors that determine large devaluations, found no significant and evident statistical correlations between devaluations and output. These assumed results are at all odds with the standards in Mundell- Fleming framework which states that the nominal devaluations have an expansionary impact on output, economists have for the period started to review the manner in which they understand the transitory mechanisms through which devaluations affect output and economic development and lives of local Malawians.

Malawi kwacha exchange rate has registered a number of devaluations since 1980 and its major floatation being in 1994 and 2012, by December the Malawi Kwacha was at 330.4570 per United State Dollar while in December 2011 it was 156.5285per US$ according to Reserve Bank of Malawi (RBM).In the year 1994 up to 2004 the kwacha was left to freely float by authorities to accommodate IMF's Structural Adjustment Facility. However the new leadership which took over the government from 2004 started fixing the MWK against the US$, banks were being told the rates by the authorities through the central bank (Reserve Bank of Malawi).There were arguments for the affirmative and the negative on the topic between this country's technocrats

backed by the IMF and the government taking a solo stand. The technocrats and IMF were of the view that Malawi was maintaining a currency which was overvalued in relation to other major trading currencies and because of this Malawi was losing out in trade hence the visible sluggish economy.

The government however was of the view that Malawi's consumption is heavily dependent on the imports therefore devaluing the currency will hurt the economy by among other things influencing the inflation and increasing commodity prices. By 2009 Malawi was off track with the IMF programme and major donors

suspended their aid which was a recipe for the deep economic crisis. In April 2012 there was a new administration and in May the major devaluation (about 50%) occurred and the Malawi kwacha was left to float freely according to markets dictates according to announcement by the Reserve Bank of Malawi (RBM) on 8th May 2012. Some schools of thought has argued that due to devaluation the consumers are expected to slow down on expenditure, which will lead to improvements on the country's balance of trade thereby leading to improvements in an economy's trade balance.

It is from this point of view that this study will look at how the recent devaluation which is being considered as the major one has affected the IndeBank, bearing in mind that their performance depends on the consumer's behavior towards expenditure and savings. In most cases devaluation goes with inflation which eludes the purchasing power of the consumer and there is reduction in savings. In developing countries Malawi inclusive, devaluation is done to match with the Structural Adjustment Programme which is prescribed by International Monetary Fund (IMF) with the purpose of correcting the balances of trade by making the exports cheaper and imports expensive. This is in line with The Malawi Economic Growth Strategy policy which was published in 2004, which state that the country must move from being a predominantly importing country to a predominantly exporting country, while at the same time the authority was against the devaluation contradicting the same policy which they developed. However there have been trade imbalances from 1994 regardless of the fact that the Malawi kwacha was devalued and left to float freely and respond to the market dictates. It could be against this background that some authorities were against the devaluation of the currency.

RESEARCH METHODOLOGY:

Research Problem Identification:

Malawi is a landlocked country with Tanzania bordering to the north, Mozambique to the south and Zambia to the west, with a population of about 15 million people and country's economy heavily depends on agriculture. According Malawi growth strategy paper agricultural products accounts for 38.6% of the total GDP employing

about 84.5% of the total labour force accounting for 82.5% of the foreign currency earnings. Tobacco alone counts for 65% of the total foreign currency earnings. Though the country heavily depends on agriculture but very little has been done to increase production, so far production is done for a period of about four months this is because the country depends on rains for farming leaving the rest of the season unproductive. The rain fed agriculture has got two major setbacks. The first one is that country is being denied the much needed revenue due to small production, also is very difficult to predict nature.

Sometimes when rains fails to come in good times this will mean no revenues and also she will have to import some foods for her people which means instead reserving the forex for importing materials for production it will use the same for consumption. The country should also consider irrigation to boast productivity. With abundant water resources irrigation farming will indeed increase the foreign currency earnings. This makes the country to struggle to earn the much needed foreign currency.

The needs foreign currency to import materials for production and for technology development from other countries. For the country to have enough reserve must export more than what it import which can be done by devaluing the local currency which makes it cheaper.

The most interesting question is whether devaluations have a negative or positive impact on banking industry in Malawi and Inde Bank in particular. To date most studies have concentrated on devaluation and with the impact on (of) trade balance. Owen (1997) wrote that international monetarist views the impact of devaluation as a means of by which relative price of traded and non-traded goods change enabling devaluing nations to increase the number of prospective exports goods resulting in an improved trade balance. Also Just and Chambers (1981)found in study based on 1967-1997 export data that agricultural products from United States appear to conform to the elasticity's hypothesis following devaluation that occurs in early 1970s and switch to exchange rates in 1973.It can be deduced that devaluation has been linked into trade balance in terms of import and exports. Little has been said on the impact to the citizens and service industry like banks.

Research Questions:

Several people even those in the street have spoken about devaluation either positive or negative, but some of the questions to be asked and answered are;

- Why were the authorities not in favor of devaluation or floatation of the currency?
- To what extent did devaluation affected the banks' profits
- To what extent were people affected with devaluation
- To what extend was Inde Banks liquidity position affected after devaluation
- How does monetary measures by the Reserve Bank of Malawi assisted after devaluation.

Research Objectives:

This thesis would like to examine the impact of devaluation which happened in 2012 if had any impact in the banking industry in Malawi on the assets appreciation and profitability.

Generally the objectives of the study will be as follows:

- To find out if devaluation had an immediate and direct impact on the livelihood of people.
- To find out if Inde Bank's profit growth margin increased or decreased after devaluation.
- To find out if loan repayment, access to loan facility or cost of capital fluctuated with the period after the devaluation.
- To find out the impact of devaluation on deposits.
- To find out the impact of central bank policies in the banking industry and Inde bank after devaluation.

Limitation of The Study:

Malawi being a agricultural economy and dependent on donors for about 40% of

the national budget the issues of devaluation and exchanges rates are very important on the whole economy. Having this in mind it is the aim of this study to cover areas like the ordinary people, companies and banks as well. The performance of the financial institutions banks in particular largely depends on the performance of other sectors in the economy. It is believed that when the industry is doing well economically the banks will give good performance. However there are contrary views to this school of thought, in the period between 1999 to 2002 the economy was bad, interest rates were very high, treasury bills yields were around 63%(RMB) but banks managed to show good performance. With those facts it is considered to cover some areas which are associated with banking.

Assumption of The Study:

Several schools of thoughts have come up with different have come up with different views those in favor of devaluation thinks that it improve the trade balance and restore domestic competitiveness. However its side effects mostly on the employment and economic output is the subject of consideration on the economy in poor countries. After devaluation companies has been forced to reduce the work force due loss agitated by high cost of materials. Banks and Inde Bank inclusive hasn't been spared, though some banks have made profit it is yet to be seen that it is the result of devaluation. Another factor is to consider is the real value; after devaluation it is considered that the real value is lost and the profits are assumed not to take this into consideration therefore it can be assumed that the real profits are not what is declared.

Significance of The Study:

Looking at the prior arguments and counter arguments for currency devaluation of whether the economy will benefit from the devaluation or not, this makes it an interesting topic to study. Analyzing the effect of devaluation on the profitability of the banks, and also how it has affected the livelihood of people and the economy in Malawi will be useful tool on assessing how best the authorities manage devaluations in order to avoid any undesirable effects to the economy. The authorities can formulate best policies with an aim of reducing negative factors and encourage and strengthen the positive ones.

Most the studies have shown that results concerning the effects of devaluation on output are quite mixed. It has been assumed that in the short run devaluation has caused misery on the face of many people, therefore this study will assist authority how best to manage devaluation.

Given the prior justifications for currency devaluation in a small economy like Malawi whether the economy will benefit from a devaluation or not, this does not only make the effects of high levels devaluations of value and make this topic a very interesting topic to study and also provide an interesting and a natural leverage where the effects of depreciation on national economic performance can be monitored and be in general state of adhering to economic policies. Summing the effect of exchange rate subsequently devaluation on output and inflation in Malawi will be useful in deciding how best the exchange rate should be managed in order to avoid any recommended effects to the economy and living standard of people.

In appropriate policies for an economy can then be formulated, put in place and are implemented to reduce negative factors and strengthen the positive ones. Studies that were done and reviewed by other different writers show that results concerning the effects of devaluation in an economy on output are a mix fortune. Those that believe in the econometric studies that support the contractionary devaluation hypothesis do use the pooled time series and derivatives also time series data from a large number of heterogeneous countries for comparison.

In the example of Morley (1992) he used pooled data from 27 developing countries and found support for the contractionary devaluation hypothesis in his studies, Edwards (1989) used panel data regressions for 13 developing countries in the world and found that devaluation and inflation were contractionary in the medium and short term period. In general terms the effects of devaluation on output and increase in general price level is always not in uniform across all developing countries, and a study of the individual experience of Malawi can be of importance value in general understanding of devaluation. The relationship in a small economy like that of Malawi between exchange rate and inflation in relation to that between exchange rate and output will also be

useful in assessing the potentials of economic governing policies.

Sensitive relationship between exchange rate, inflation and output in an economy is generally vital for any policy formulation and understanding in a particular set of economic principles and rates that affect general price level and economic trends.

RESEARCH FINDINGS:

Deposits:

The research find out that there was a decrease in deposits with about 4.97% compared to the previous year, 60% of the respondents attributed the drop in deposit to the devaluation of the Malawi Currency. Evidently they felt that the devaluation brought many miseries to the livelihood of the common people where by the prices of a basket of good marginally rose while their salaries were not increase and those who had the salaries increased did not feel the impact of the increase on a basket of good because of the effect of devaluation. *"....one of the banks employee said, imagine I was receiving the same salary which I was getting before devaluation and when I asked my employers they say the business is not doing fine how we can increase the salaries, where are we going to get the money if we are not making profit, imagine we get such answers from our employers This happened until the 2012 financial year."* Many responded argued that with nothing or very little take home it was possible to make deposits for future use and said that the situation was hand to mouth. The research also find out that despite IndeBank introducing deposits promotions the results were not encouraging, since the customers did not have enough for the savings.

The respondents also confined that most corporate customers complained of receiving late payments from their customers which they linked with the poor earnings for their customers. This forced them forced them to seek overdrafts from the banks which also depleted their profits.

The Profit:

The research found out that the bank made a significant profit; the respondent felt that the 119.15% increase in profit margin from last year was mainly due to devaluation of the local currency. The local currency lost its market value within a short period. With the same figures of 2011 and its exchange rates, the bank would be in loses, which the researcher can comfortably say that the profits recorded was a negative profit in reference to the year under review. One of the interviewee responded that *"..... they could not increase the salary immediately in response to devaluation because they were not sure of the economic trends of the money markets and Central banks upcoming regulations since the central bank controls the flow of money and have direct interest in the operations of the economy for the common good of the local Malawians"*.

The researcher also noted that The Central Banks was implementing the Basel II accord which requires that all banks increase its liquid capital to meet the central banks requirement, since this requirement affects directly to the banks profit and the uncertainty of the money market, the researcher noted that the banks management was noncommittal to effecting any salary increase to employee though the effect of devaluation was felt by them as employees. As reported by one employee *".....look the basel 2 has affected us in terms of getting additional monies to our salaries, management said normal increments due to cost of living will be added to our salaries but any other additional adjustment will have to be pended due to requirement of the basel 2 which the bank need to meet as per central banks directives...."*. 56% of the respondents at senior management level were of the same opinion and conclusively said Basel 11 had a direct impact.

Loan Repayment:

The research found out that a number of loans were not serviced as agreed stipulated by the bank due to devaluation, most customers complained that non repayment was due to devaluation and the increase in costs of goods and services that could not match with the planned business operation to assist and repay the loans. Due to the devaluation customers were made to pay more from their pockets and in some cases

even failed to meet the cost of such items. The research find out the cost of the loans repayment immediately after devaluation went up. In respond to the devaluation the bank raised the base lending rates from 23.5% to 37.0% which increased the cost of borrowing.

The Liquidity Squeeze:

The study found out that 62% of the respondents were of the views the banks faced liquidity problems after devaluation. This is evident by the Reserve Bank of Malawi discount window borrowing which went up as far as 37% from the previous 25% which the banks were paying before devaluation. The respondent also had the view that the heavy borrowing and high interest rates by the banks to meet the liquidity problems affected the customers since these costs were passed to them, the banks base lending rates were adjusted upwards to 36%.The research found out that the liquidity squeeze correlated with the decline in deposits which affected most of the banks. There is a rule of thumb that banks give loans to their customers basing on the value of the depositors money, so if the bank cannot generate enough deposits the loans to be given out will be affected and this will contribute to the bank's profitability.

Soon after devaluation the donors pumped in some foreign currencies to the government which the central bank sold to the commercial banks since there was huge backlog invoice which the importers already put the funds in their respective banks. In simple terms the liquid was transferred to the Reserve of Malawi, which later started lending to the banks. Since these were backlog payments the goods were already sold on the market and there was no flesh generation of cash to counter these transfers to the central bank.

Inflation:

On the inflation 52% of those interviewed strongly agreed that devaluation contributed to the rising of the inflation during the 2012 financial year "……*imagine there was a 10 % devaluation around October in the year 2011, because of this the market experience a rise in inflation and the same happened in 2012 when the*

authorities devalued the currency the inflation responded to that" There is strong relationship in Malawi economy between devaluation and inflation. Most of the respondents were of the view that since when the currency is devalued prices of the goods rise up which makes the inflation to rise.

Looking at the data on the inflation rates table below for the years 2010 and 2011 the average rates were at 7 % and this was time when the Malawi Kwacha was closely monitored by the authorities however for the year 2012 the annual average inflation rate moved to 21% which happened after the authorities left the local currency to respond to the market forces.

The inflation was around 10% from January 2012 to April and fast tracked to 34% in the month of December. This was a quick response to the weakening of the Malawi Kwacha which by December 2012 was at 332 per 1 USD from 164 per USD in the month April of the same year. The inflation also contributed to cost of living for the citizens making difficulties for the business and IndeBank inclusive.

Table 5 Inflation Rates for year 2010 to 2012

Month	2012	2011	2010
January	10.3	6.6	7.8
February	10.9	7	8.2
March	11.4	7.2	8.3
April	12.4	7.1	8.1
May	17.3	7	7.8
June	20.1	7	7.5
July	21.7	7.4	7.3
August	25.5	7.6	7.2
September	28.3	7.7	7
October	30.6	8.1	6.7
November	33.3	8.9	6.4
December	34.6	9.8	6.3

Source: Malawi Government National Statistics Office

Exchange Rates:

In April 2012 the authorities devalued and allowed the currency to respond to the market conditions, this made the exchange rates to move freely but in most cases it was an upwards trends. 60 % of those interviewed strongly agreed that the movement of exchanges rates affected not on the customers but also the bank when doing business. The research found out that the exchange rates movement affected the bank in pricing of the products like when trading in forex currency. One of the interviewee said that it was difficult to make deals for the forward contracts since the exchange rates could anytime. To the customer's side the study found out that they were badly affected because the time they apply to the bank for remittance and when the actual remittance happen the exchange rate would have gone up, now being the backlog settlement whereby the goods are already sold basing on the application rate and yet the settlement rate is higher which brings losses to the customer.

LIMITATION OF THE STUDY:

Basing on the time constraints and limitations it is difficult to conduct a research on all of many banks hence Inde Bank has been sampled to represent the banking industry in Malawi. Even if one bank has been singled it can be said that not all information will be reviewed for this study. Time constrains and human resource shortage to give such information posed as a big challenge. There are also some limitations in the process in obtaining from some of the targeted population like the banks customers. Naturally not all people are ready to freely give information mostly
where finances or monetary issues are concerned therefore this resistance from some bank's customers and members of staff will be some of the study limiting factors.

CONCLUSION:

Banks and currency exchange rates are very important part of the economy. Studying on how devaluation affects them is not only interesting but also creates an opportunity on how to manage and have a balanced economy.
Malawi's economy largely depends on agriculture and donor community, it can be

comfortably said that listening to IMF and devaluing the currency was a right decision. Indeed when the local currency is overvalued against the major trading currency the economy or country tend to loose in trade balances. However one has to bear in mind the bad side of devaluation as in the short run tend to increase the prices, encourages high inflation and many job losses among others. Most third world countries has failed to balance the two hence they look at devaluation and exchange rates as a bad economic tool as it brings misery to citizen. Mostly devaluation is done with the forces of donors and International Monetary Fund (IMF) of course with some resistance.

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COMPETITIVENESS OF SILK AND HAND LOOM PAITHANI SAREE SEGMENT IN INDIA: A LITERATURE REVIEW

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Abstract:

Study of Competitiveness of any entity is a challenge. Majorly the formal study of competitiveness deals with the firm competitiveness, industry competitiveness or national competitiveness. Competitiveness in textile industry is also majorly focused on powerloom textiles and readymade garments. The handloom sector is very limitedly studied from the aspect of Competitiveness.

Handloom sector in developing countries like India play very significant role the economy of the country. Apart from development of huge employment generation for skilled and semi-skilled people at local level, it is looked as a medium of traditional knowledge, skills, artistic and aesthetic value of the country. Handlooms in India have a key role to perform in every state due to its specialized and unique textile manufacturing. Every state in India is known for its special type of handloom textile, sari, its unique method of weaving and mostly silk handloom textiles of India are in demand in the domestic and international textile markets. This proves the need to study of competitiveness of handlooms in India.

The paper is focused to review various models which are used to study the competitiveness at different levels. The paper also collects the review of literature which deals to see how the level of performance and competiveness of textile industry, silk and handloom sector and handloom Paithani saree segmentin India are studied. The competitiveness study deals with the factors like competition faced by handloom from emerging power loom textile sector and many other significant and critical issues faced by overall handloom sector and handloom Paithani segment specially. Also the paper wishes to gather the product information, product competitiveness, historical aspects, development of the handloom Paithani saree across times and the changes the product has seen and made in terms of competitiveness. The paper also looks for the literature survey about the threats of the handloom sectors from power loom sector and other competitors which affect the competitiveness of the Paithani saree segment. The literature is also collected on the tools to increase the competitiveness and core

competency so that to make it more sustainable and to save it from threats by increasing core competency of the sector.

Keywords:
Competitiveness, Indian Textile Industry, Handloom Sector, India, Paithani Saree Segment, Literature Review

Introduction:

Indian textile industry is very significant in the characteristics. It is the ancient industrial and trade activity of India. Despite the unorganized nature of industry, it plays a significant role in the economy through its contribution to industrial output, employment generation and export earnings. The textile industry is also significant in economy in terms of employment generation of own industry and other ancillary sectors which is more than 45 million people. Thus the growth and sustainable development of the industry will directly affect the improvement of the economy of the nation and the livelihood of many citizens.

India's textile industry comprises four important categories as shown below:
•Modern textile mills
•Independent Power looms
•Handlooms
•Garments
The area of focus of our research is on handloom sector.

The Handloom industry, being a part of the Indian culture and tradition, it is one of the oldest cottage industries in India. The handloom sector plays a vital role in the country's economy. It is one of the largest economic activities providing direct employment to over 65 lakh persons engaged in weaving and allied activities. The Government of India has since independence been following a policy of promoting and encouraging the handloom sector through a number of programs and schemes. Due to various policy initiatives and scheme interventions like cluster approach, aggressive marketing initiative and social welfare measures, the handloom sector has shown positive growth and the income level of weavers has improved.

Silk and Handloom Paithani Saree Segment:

Handloom sector is further divided into

1. Silk handloom – Silk handloom category can be further divided into
    a. Traditional silk handloom saree
    b. Silk handloom clothing etc
2. Cotton handloom
3. And other fibers

All major states of India possess the traditional art of silk and handloom saree weaving. Tanchoi, Patola of Gujarat, PochampallyIkat of Andhra Pradesh, Kancheepuram of Tamil Nadu, Narayan Peth&Ilkal of Karnataka, Ikat of Orissa, Jamdani and Sambalpuri of Orissa and West Bengal, Chanderi and Maheshwari of Madhya Pradesh, Paithani of Maharashtra and many more.

In India, there are a number of silk weaving centres spread all over the country, known for their distinct and typical style and products. Please see Table 1.

Table 1. Famous Silk Centres in India

No	State	Silk Centre
1	Andhra	Dharmavaram, Pochampalli, Venkatagiri, Narainpet
2	Assam	Sualkuchi
3	Bihar	Bhagalpur
4	Gujarat	Surat, Cambay
5	Jammu & Kashmir	Srinagar
6	Karnataka	Bangalore, Anekal, Ilkal, Molakalmuru, Melkote, Kollegal
7	Chattisgarh	Champa, Chanderi, Raigarh
8	Maharashtra	Paithan
9	Tamil Nadu	Kanchipuram, Arni, Salem, Kumbhakonam, Tanjavur
10	Uttar Pradesh	Varanasi
11	West Bengal	Bishnupur, Murshidabad, Birbhum

(Source: http://www.csb.gov.in/silk-sericulture/silks-of-india/)

Paithan is the famous silk center in Maharashtra known for 'Paithani' saree. Saree is a garment, consisting of a long piece of cottonor silk wrapped around the body with one end draped over the head or over one shoulder (over the body) traditionally worn by women from

India and other countries of South Asia. Paithani is the silk and handloom wedding brocade of Maharashtra state of India. It is being woven on handlooms at Paithan (Aurangabad district) and Yeola (Nashik district) of Maharashtra state of India. Refer to the maps below:

Map of India

Map of Maharashtra State.

(Source: https://www.google.co.in/)

The crucial role of Indian handloom sector and textile industry shows the need to review the literature before the study the competitiveness of handloom Paithani saree segment.

Review of Literature:

To understand the growth scenario and competitiveness of Paithani segment a wide spectrum of literature on the topic was studied as below:

1. Economic history of India for ancient trade and commerce
2. Gazetteers for historical records of Paithani and related literature
3. Informal Sector
4. Textile industry and Handloom sector of India
5. Literature on Paithani
6. Models of competitiveness
7. Competitiveness of Textile industry
8. International Laws and Agreements on Textile
9. National Policies for Textile
10. Cooperative Societies in the handloom textile industry and others
11. Geographical Indications in Textiles in India

The review of literature is as given:

1. Economic history of India for ancient trade and commerce

The literature studied under the sections is the material on the economic history of India and the economy of the handloom and textile industry of India.

British India - The 'exploitative' nature of Britain's commercial relationship with India during the period of 19th and early 20th century has had great impact on the Indian village economies and mainly on the handloom and handicraft sectors. (Charlesworth, 1982).Historical account on craftsman's social and economic position in India in 20th century is also discussed by KamaladeviChattopadhyaya (1963). Economic situation of Maharashtra in 19th century was studied by B R Sunthankar (1993), where he lays emphasis on the exploitative nature of the British rule, the effects on handicraft industry, effects of industrialization on handloom and handicraft industry in India and Maharashtra. The attempt to study the trade and commerce of the Ancient India during the period of 200 BC to 650 AD

(HaripadaChakraborty, 1966) helped to find the roots and origin of the Paithani saree in Maharashtra and the contribution of the ancient trade canter like Paithan to the national and international trade and commerce.

2. Gazetteers for historical records of Paithani and related literature

The various Imperial gazetteers of India, Gazetteers of Princely states and State Gazetteers show authentic records of historical aspects of Paithani. Historical references of Paithan, Yeola, trade of Paithan and Yeola in silk, Paithani and other silk brocades, it's social and economics accounts are observed in the above gazetteers from the early gazetteer of 1883 to the latest one of 1977.

The Gazetteer of the Bombay Presidency, Ed. James Campbell, Vol. XVI (1883), the Gazetteer of the Bombay Presidency, Vol. I, Part I on History of the KonkanDakhan and Southern Maratha Country, 1896, The Gazetteer of the Bombay Presidency, Vol. I, Part II on Early Historical Times to The 'Musalman' Conquest of 1318 AD (1896), The Imperial Gazetteer of India, The Indian Empire, Vol. III, Economic (1907) gives data about Yeola and its trade in silk for the period since establishment of Yeola, in later part of 17^{th} century. The Gazetteer of the Nizam's Dominions, Aurangabad District (1884), The Imperial Gazetteer of India, Provincial Series, Hyderabad State, (drafted by MirzaMehndy Khan) (1909), The Aurangabad District Gazetteer (1977) talk about the Paithan as being a part of Hyderabad State since early 18^{th} century.

3. Informal Sector

The evolution of the Informal Sector as an important segment of the economy in the urban areas and the surrounding areas in the developing countries has some special role for handloom and handicraft industry to play.

The nature of the informal sector, concentration, employment pattern, wage level and working conditions, investment, pattern of ownership, technology employed, energy requirement, nature of the markets for the goods produced in the informal sector and the size of the population depending on informal sector is investigated by Hariharan and Benjamin (1991) and Harold Lubell (1991). The unprotected nature of the sector as wages and conditions of work of employees, regular and small scale level investments, economic and

social functions of the sector and the special feature of entrepreneurship of informal sector gives the limitations and advantages of the sector which helps us to understand the manufacturing and market of the handloom industry in India. The informal sector is anticipated as the next growth engine for the Indian Economy (Mukherjee, 2009). The study by Mukherjee has also discussed the extremely heterogeneous nature of the sector and its transitional state in the urban migrants, which is also observed in the newly migrated craftsmen of the weaving activities. The author has also observed the newly created horizons of the handloom sector and the newly created opportunities which attract the new people many times.

4. Textile industry and Handloom sector of India

This category of literature focuses more on the technical aspects and economics of textiles to understand the textile industry as a whole and handloom sector in particular. It elucidates the benefits, advantages and competitiveness of the handloom silk industry of India.

An historical account, detailed profiles and characteristics of the various handloom saris of India is given by KamaladeviChattopadhyaya (1963). The significance and contribution of Indian handicraft and various regional handloom saris in Indian rural economy is also discussed. It also compares the technical and weaving styles among different saris of India. A detailed information on history of textiles, fibers, silk and handicraft weaving in India and world, technical terms of handloom and handloom weaving are described in The Encyclopedia of Textiles edited by Vidyasagar, Vol I to V (2000), Encyclopedia of Textile Technology by W.S. Murphy, Vol I to VIII, (1999), Encyclopedia of Textiles, Fibers and Non woven Fabrics, edited by M. Grayson (1984), Handbook on Textiles (2004) etc.

A targeted perspective towards the textiles of India, their history, origin, manufacturing, market and other features is given by many authors. All major traditional Indian textiles have been focused by John Gillow and Nicholas Barnard (1991). While talking about the textiles of the North, Gillow and Barnard mentioned the brocades of Varanasi, 'Kinkhab' of Ahmedabad, Surat, Paithan and Hyderabad. They further say that, 'The guaze-like saris of Paithan, near Aurangabad, are woven of heavy gold brocade where in reverse of the usual brocading practice, the metal zari threads form the background, and the pattern details are in silk.'The introduction to many hand woven fabrics of India is given by JasleenDhamija

(1989). The study also defines Paithani as a form of weaving of non-continuous weft in interlocked tapestry technique. The study of *Saris of India* by Singh and Chisti (2010) gave an account of introduction of the sari as a product, its type and method of weaving. It also talked about the growth of powerlooms and mills in Maharashtra by early 20th century however it also mentioned the continuation of handloom industry in Maharashtra. The study has stated that, 'The silk saris of Yeola in Nasik district and parts of Vidarbha reveal a yet finer silk range, possibly because they were saris that were sold in other parts of India as well …. Paithan – Interlocked tapestry / brocade saris: The culminating centre of cotton and silk ground saris with heavy gold borders and end-pieces adorned with interlock patterning, often woven without the aid of any mechanical device. The Paithani has exerted its influence not only in the vicinity and in Yeola, but it also initiates a colour, texture and patterning influence, especially in the borders, in the silk centres of Andhra Pradesh, Karnataka and Tamil Nadu. However the tapestry elements are restricted to the environs of Paithan and reappear at times in Andhra Pradesh.' In addition to that, the study also discussed the weavers' challenges like decrease in demand, decrease in income, decreased ability to invest in silk and gold due to their high prices post independence with decreasing patronage. 'The Joy of Hand weaving' by Tod (1964) gives various definitions like Indian loom, tapestry technique which is specialty of Paithani. The author has explained the tapestry weaving used in Paithani weaving as the interlocking of two different and adjacent weft threads between the gap of warps. Here, instead of reversing around the same warp, two weft threads pass around each other when reversing and the interlocking occur between the two adjacent warp threads.

Varadrajan and Amin-Patil (2008) have also attempted to trace the ethno-historical evolution of the loom and saris of India. They have discussed many traditional saris of India including weaving methods of Kanchipuram fabric of Tamil Nadu and the Paithani range of Maharashtra. Authors also discussed the reasons of decline of Paithani weaving, 'Ultimately the death-knell was to be rung, not by political authority but by the revolution in fibre technique after 1930's. This was the era of velvets, lace, chiffons and georgettes …. There was no place for the Paithani repertoire in this new orientation in taste.' Theauthors also have discussed various old patterns of Paithani weaving sources from many museums of India, they found many instances of similarities of Paithani motifs with Ajanta cave paintings and designs from 'BibiKaMaqbara' at Aurangabad, also the paintings of Raja Ravi Varma which are influenced from beauty of Paithani. The study also talks the growth of Yeola as silk

weaving centre because of 'intermittent state of warfare between the Peshwa and the Nizams of Hyderabad, boundaries were constantly shifting and Paithani remained a possession of the Asafjahi dynasty of Hyderabad for considerable stretches of time. The development of Yeola as a centre for the production of Paithanis was an outcome of these circumstances'. The spread of Paithani repertoire in the territories of Maratha feudatories like Burhanpur, Ahmednagar, Pune, Chanderi, Maheswar, Nagpur and Tanjavur etc. and the special weaving which developed at those places over period of time were also discussed in detail including Ilkal, Narayan pet, Khan, Dharmavaram, Gadwal etc.

Specialty of Ikat is described in the study 'Ikat Textiles of India'. These are known for brilliant colors and complex patterns and designs which have history since sixth century at major centres of Ikat weaving at Gujarat, Orissa and Andhra Pradesh. Chelna Desai (1987) Many textile terms are discussed by Chisti and Sanyal (1989) on Madhya Pradesh Saris of India. Historical account on Tapi collection by Barnes, Cohen and Crill (2002) gave references of weaving history of India and textile trade of India with Greece, Rome etc.. The authors mainly focus on double Ikat silk Patola and mordant and resist-dyed cotton fabrics from Gujarat traded to South-East Asia since 13th to 18th century. Proofs of Radio-Carbon dating (measurement of C-14/ Carbon 14) of textiles are also discussed to determine the age of the textiles. Taraporevala (1970) refers the hand spun and hand woven fabrics as masterpiece of Indian textiles which includes a survey of India's traditional fabrics and textile crafts like embroidery work of Gujarat, phulkari work of Punjab, Banarasi brocades (Kinkhabs). The author has an opinion that Paithani and other saris are reproduction of Banarasi brocades. **'**The brocades of Banaras are also produced in Ahmedabad, Aurangabad, Delhi, Lucknow, Bhopal, Murshidabad, Thanjavur, Tiruchirapalli, Madras and Surat……..But the spiritual home of Indian brocades remains Varanasi.**'** While talking about saris of India, the author mentioned the lovely Patola, silk Ikats of Orissa, cotton Ikats of Pochampalli and saris of Paithan with their elaborate gold-embroidered pallavs and borders.

Many studies were found on handloom weavers of Banaras. The notable few are as follows: Singh and Naik (2009) wrote on status of Banaras Weavers. Banarasi silk sari being an 'Indian Sun' in the world of fashion, which used to enjoy the benefit of ready market both at home and overseas. Weavers' challenges like socio-economic conditions, marketing practices, illiteracy, financial constrain, marketing bottleneck and other factors are studied by

the authors. The paper concludes that the traditional weavers are in pitiable conditions due to poor socio-economic conditions. The weavers were seen to be mere wage earners who earn minimal wages in spite working more than 10 hours a day. Provision for raw materials at reasonable price, special training to improve existing weaving technology, knowledge about scientific and low cost techniques of weaving, dyeing and finishing, financial assistance and other necessary inputs was seen to be the need of the day as expressed by the weavers. Showeb (1994) dealt with Banaras silk handloom industry and problems of the Muslim weavers engaged in the silk handloom industry of Varanasi relating to supply of silk yarn, poor working conditions, unsatisfactory wages, health hazards, exploitation by middlemen and big dealers in the industry. The study reveals the failure of weaver's cooperatives and various unsatisfactory results of government welfare schemes for poor weavers. The study emphasizes the fact that the economic structure of the industry as is prevalent today is disadvantageous to the weavers. Moreover, the socio-religious characteristics of the Muslim community are also accountable for their educational and economic backwardness. The study recommends major policy changes regarding the procurement of yarn / raw materials, standardization of the product, better working conditions and marketing facilities to improve the lot of common weavers. The overall position and challenges of handloom sector by Agwan (2014) gives us the competitive study of various regional textiles and handloom sector of India. The competitiveness of the Ichalkaranji handloom and overall handloom industry over the powerloom and mills textiles in India is given by Kulkarni (1959) in the Ph.D. thesis submitted to University of Pune, Venkatraman (1934) in the thesis submitted to Gokhale Institute of Politics and Economics. The research period is of 20th century till the mid of the century. This span of 50 years is observed for the origin of mills and powerlooms in India, the analytical aspects of labour cost and product price and productivity and compares the handloom textiles with the powerloom for coarse as well as fine cloth.

The aspect of the women weavers, their contribution to weaving, the issues, problems and challenges of women weavers in various states of India is looked into by Parikh, Garg and Menon (1991). The focus is also on structure, the role taken by the functionaries, their inter linkages in terms of tasks, functions and roles, product wages, marketing and the problems or strengths related to the weaving activities. The study was conducted in Tamil Nadu, Andhra Pradesh and Kerala, but the authors assure that the situations are such that they relate any part of the country.

5. Literature on Paithani

There is very limited literature available on Paithani silk brocades manufactured in Paithan and Yeola. Historically significant record is found in 'The Natural History' written by Pliny. Gaius PliniusSecundus (23 – 25 August 79 CE), generally known as Pliny the Elder, writing c. 77 CE, left probably the most important account of India and its trade with Rome that has survived in Classical literature. Another ancient account is 'The Periplus of Erythrian Sea' which are the written notes of the travel and trade in the Indian Ocean by a Merchant of the First Century. It is translated by Wilfred H. Schoff, Secretary of the Commercial Museum, Philadelphia (1912). Both records mentioned Paithan ('Paethana') the city of silk trading centre. Most of the recent studies (Marwade, N. 1991) are available on historical, social, technical and weaving aspects of Paithani. Marwade being a former Paithani weaver gives more authentic information of the raw material, handloom, weaving tools and techniques, the social life in Maharashtra under the Peshwas, which is the period of royal patronage to Paithani from mid 18^{th} to end of 18^{th} century (Desai Sudha, 1980). This also gives references of Paithani and Pitambar. In chapter 'Daily Life' the author writes, "Pitambara and Patava represented a peculiar variety of pure silk saris which were used at the time of performing some religious rites. The textiles of Paithan were highly prized. Paithani was the name for a sari of peculiar pattern and design, essentially rich in gold zari work that was woven at Paithan. ……Places like Paithan, Chanderi and Banaras were particularly known for their fabrics of silk and cotton, richly embroidered with gold or silver zari" (pg, a59, 161)

6. Models of competitiveness

The Review of literature also examined models of competitiveness to identify the model that could be useful for the study of the Paithani saree segment.

Competitiveness

A dictionary meaning of competitiveness is '*an aggressive willingness to compete.*'

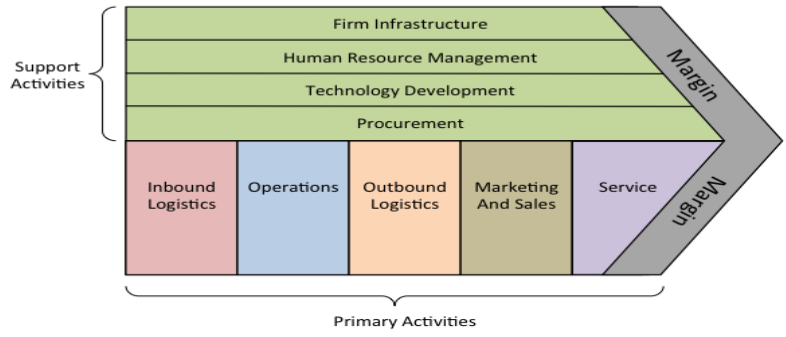
The Business Directory defines competitiveness as 'Ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them. Haider (2012) defines competitiveness as 'a comparative concept of the

ability and performance of a firm, sub-sector or country to sell and supply goods and/or services in a given market in relation to the ability and performance of other firms, sub-sectors or countries in the same market'. As defined, Competitiveness pertains to the ability and performance of a firm, sub-sector or country to sell and supply goods and services in a given market, in relation to the ability and performance of other firms, sub-sectors or countries in the same market.

The competitive analysis is understood as the strategy of any business in relation to the competition. The purpose of defining competitive analysis is to determine the strengths and weaknesses of the competitors within a market to formulate business strategies to provide an advantage to the business. Competitive advantage is generally known as the strategic advantage that any business entity has over its competitive business entities within its competitive industry. A core competency is a specific and central factor of the business. Core competencies are particular strengths relative to other organizations in the industry which provide the fundamental basis for the provision of added value. The core competency is that which makes imitation by competitors difficult.

The 'value chain' is a systematic approach to examining the development of competitive advantage. It was created by M. E. Porter in his book, Competitive Advantage (1980). The chain consists of a series of activities that create and build value. They culminate in the total value delivered by an organization. The 'margin' depicted in his diagram is the same as added value. (as shown in the exhibit 2.1) The organization is split into 'primary activities' and 'support activities'.

Exhibit 1. Porter's Value Chain diagram



Source: Porter (1980)

At firm level, competitive analysis, as the name implies, is an exploration of the companies in a given industry sector. The competitive analysis at firm level is done with the tools like SWOT (Strength, Weakness, Opportunity and Threat) or TOWS (Threat, Opportunity, Weakness and Strength) analysis, BCG (Boston Consulting Group) matrix for growth-share portfolio analysis, GE 9 cell matrix, Porter's Five Forces model etc.

Blunck (2006) states that, 'at the industry level, competitiveness is the ability of the nation's firms to achieve sustained success against (or compared to) its competitors, again without protection or subsidies'. Measures of competitiveness at the industry level include overall profitability of the nation's firms in the industry, the nation's trade balance in the industry, the balance of outbound and inbound foreign direct investment, and direct measures of cost and quality at the industry level. Competitiveness at the industry level is often a better indicator of the economic health of the nation than competitiveness at the firm level. Value Chain Analysis is helpful at Industry level. Ambastha and Momaya (2004) give a review of theories and Models of Competitiveness. They say, Competitiveness is a multidimensional concept. It can be looked at from three different levels: country, industry, and firm level. Competitiveness originated from the Latin word, '*competer*', which means involvement in a business rivalry for markets. It has become common to describe economic strength of an entity with respect to its competitors in the global market economy in which goods, services, people, skills, and ideas move freely across geographical borders. Competitiveness involves "a combination of assets and processes, where assets are inherited (natural resources) or created (infrastructure) and processes transform assets to achieve economic gains from sales to customers". Outcomes can be achieved through competitive potentials through the competitiveness process (Berkely et al, 1988), similar to the *Asset-Process-Performance* (APP) framework. (Momaya, 2000) They further say that, some authors view competitiveness with the competency approach. They emphasize the role of factors internal to the firms such as *firm strategy, structures, competencies, capabilities to innovate*, and other tangible and intangible resources for their competitive success (Bartlett and Ghoshal, 1989; Doz and Prahalad, 1987; Hamel and Prahalad, 1989, 1990). This view is particularly among the *resource-based approach* towards competitiveness (Prahalad and Hamel, 1990; Grant, 1991; Barney 2001, 1991; Peteraf, 1993; Ulrich, 1993). Ability to develop and deploy capabilities and talents far more effectively than competitors can help in achieving world-class competitiveness (Smith, 1995). *Productivity* has also often been termed as a surrogate of competitiveness and good indicator of long-term competitiveness of a firm by many

authors. Porter defined competitiveness at the organizational level as productivity growth that is reflected in either lower costs or differentiated products that command premium prices. The generic strategies given by Porter also emphasize these criteria (Porter, 1990). It has been said the company, industry, or nation with the highest productivity could be seen as the most competitive (McKee and Sessions-Robinson, 1989). In today's turbulent business environment, dynamic capabilities, flexibility, agility, speed, and adaptability are becoming more important sources of competitiveness (Barney, 2001; Sushil, 2000). O'Farell et al (1992, 1989, 1988) focus on sources of competitiveness and firm performance, *price, quality, design, marketing, flexibility, and management.* Competitive strategies usually fall into these five areas: Product, Distribution, Pricing, Promotion and Advertising. Hence these factors can also be added to the above APP framework.

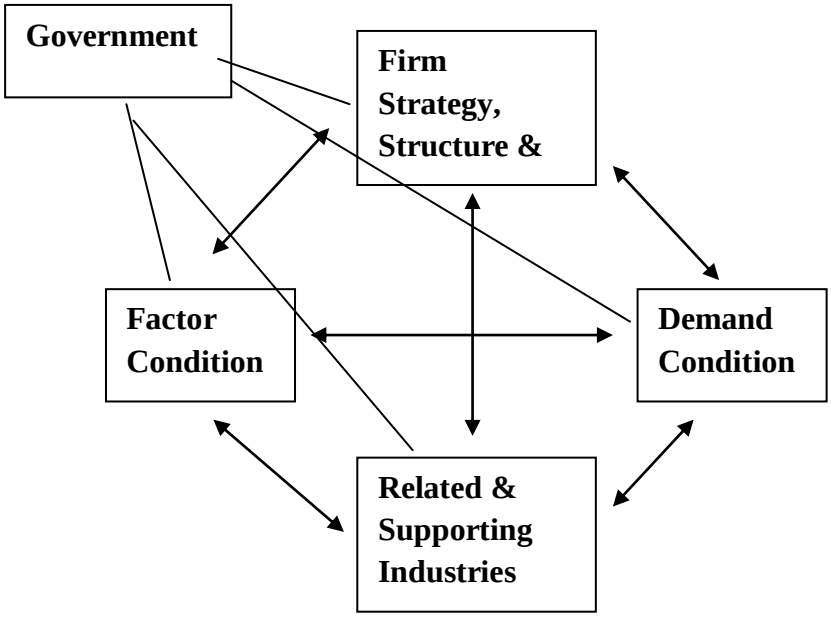
Models of Competitiveness

The popular models of competitiveness study are Porter's 5 Forces model used for product and industry competitiveness (Competitive Strategy: Techniques for Analysing industries and Competitors, 1998), Porter's Diamond model (The Competitive Advantage of Nations, 1990) used for firm and national competitiveness, Balassa's Index to study Revealed Comparative advantage for industry and national competitiveness, Global Competitiveness Index etc. Exhibit 2.2 and 2.3 shows the diagrams of Porter's 5 Forces model and Diamond Model to measure competeiveness respectively.

Exhibit 2. Porter's 5 Forces Model

Source: Porter (1998)

Exhibit 3. Porter's Diamond Model



Source: Porter (1990)

Measurement of Competitiveness can broadly be categorized as below:

i. Product Competitiveness
ii. Firm Competitiveness
iii. Industry Competitiveness
iv. Nation's Competitiveness

The table 2 is formulated (author compilation) and shows the categories of competitiveness, definitions, factors affecting and the popular models used for the measurement of competitiveness.

Table 2 Types of Competitiveness, Factors affecting the competitiveness and popular models used to study the competitiveness.

No	Category	Factors affecting competitiveness	Popular models
1	Product	Price, Value, Quality, Service etc	Porter's 5 Forces Model
2	Firm	Asset, Leverage, Liquidity, Investment, Size, age and location of firm, Export and Profit	Porter's Diamond Model
3	Industry	Employment, Production, Export, Efficiency, Growth, Innovation	Porter's 5 Forces Model, Balassa's RCA
4	Nation	(Diamond model):Factor conditions (labor& infrastructure), Demand conditions (product & services), Supporting industries(suppliers and other related industries), Firm strategies, Government policies, Export and micro and macro-economic factors	Porter's Diamond Model, Balassa's RCA & GCR Ratings

(Author Compilation)

The national competiveness is also explained by World Economic Forum (WEF) in The Global Competitiveness Report (GCR) every year.

Global Competitiveness Index (GCI)-

The Global Competitiveness Report (GCR) is being published by World Economic Forum for more than three decades and has studied and benchmarked many factors of national competitiveness. It defines competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country. The report of 2013/14 has published report for 148 economies with comprehensive analysis and detailed profile of each economy along with rankings of Global Competitiveness Index (GCI) covering over 100 indicators. Competitiveness is measured on 12 pillars to calculate the GCI. The GCI rankings are adjusted for the score in social and environmental sustainability and the revised 'Sustainability Adjusted GCI' is measured.

The Global Competitiveness Report (GCR) 2014-2015 assesses the competitiveness landscape of 144 economies, providing insight into the drivers of their productivity and prosperity. The report remains the most comprehensive assessment of national competitiveness worldwide, providing a platform for dialogue between government, business and civil society about the actions required to improve economic prosperity. Competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be earned by an economy.

The different aspects of competitiveness are captured in 12 pillars, which compose the Global Competitiveness Index. This 35th edition emphasizes innovation and skills as the key drivers of economic growth. While these increasingly influence competitiveness and the global economy tentatively recovers from the economic crisis, significant risks remain, resulting from a strained geopolitical situation, rising income inequality and the potential tightening of financial conditions. It is therefore crucial to address these structural challenges to ensure more sustainable and inclusive growth. More than ever, cooperative leadership among business, government and civil society is needed to re-establish sustainable growth and raise living standards throughout the world.

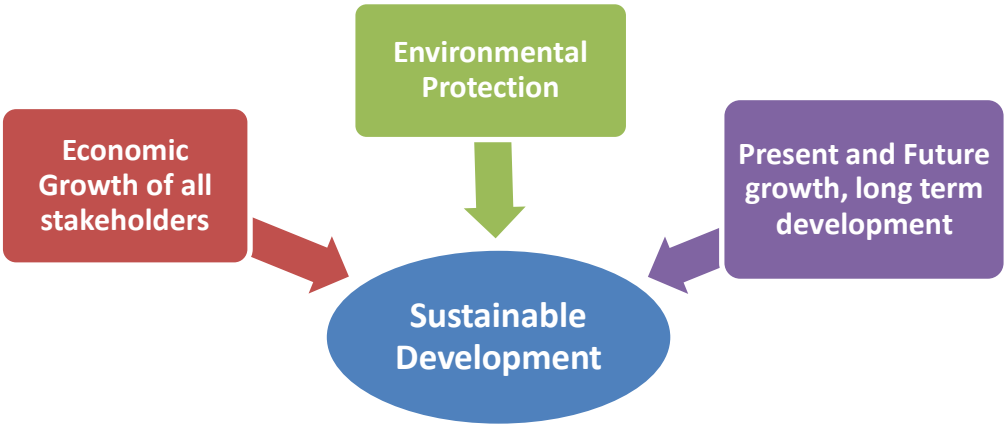
Competitiveness, Sustainability

Sustainable Development, as defined by the Brundtland Commission in 1987, 'is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Economic growth and development have to be guided by the compulsion of sustainability, because none of us has the luxury, any longer, of ignoring the economic as well as the environmental threat that a fast-deteriorating ecosystem poses to our fragile planet. (12^{th} FYP, volume 1, point 4.1)

As in GCR, competitiveness is measured along with sustainability; it is chosen to measure the competeiveness of Paithani along with sustainability. For that the pillars (Determinants) and indicators (parameters) of competitiveness are to be identified in the study.

The Exhibit 4 shows the factors of sustainable development.

Exhibit 4. Factors of Sustainable Development



(Author Compilation)

National Competitiveness of India:

Institute for Competitiveness the Indian knot in the global network of the Institute for Strategy and Competitiveness at Harvard Business School has initiated the India Council of Competitiveness. The Council created in collaboration with the **U.S. Council on Competitiveness**; is based in Gurgaon, India and is an association of distinguished members from industry, academia, think tanks, media and researchers. The mission of the India Council is to set an action agenda to drive Indian competitiveness, productivity and leadership in world markets to raise the standard of living for all Indians. 7 pillars of Competitiveness have been identified for Indian Competitiveness.

i. Global Economy
ii. Equality
iii. Infrastructure
iv. Science and Technology
v. Risk
vi. Skills
vii. Sustainability

7. Competitiveness of Textile industry

There are numerous business and competitive analysis techniques practiced in the industry. Textile industry mainly the powerloom industry and readymade garment segment is often studied for their competitiveness. However the handloom industry does not imitate the powerloom industry when analysis of competitiveness is considered.

While studying the competitiveness of the textile industry, we need to comprehensively use the models of both firm competitiveness and industry competitiveness. The models of firm competitive analysis will help us to understand the product profile, production process and the market aspect of the competitiveness. The models of industry competitiveness will help us to understand the value chain, challenges of all the stakeholders of the industry, its potential and chances of sustainable development, competitors, threat of substitutes etc.

Various studies are observed for the competitiveness in textile and apparel industry in India and the world. Various determinants of competitiveness observed as below:

- Supply & Demand sides (Raw material & buyer behavior)
- Labor cost & Product Price
- Productivity -Total Factor productivity, Labor Productivity & Unit Labor Cost
- Dependency on Natural Resources &Labor
- Operational Factors - Quality Management, Strategy planning, Marketing
- Government Policies &related industries infrastructure
- Size of Market share, Profitability & Growth (BCG Matrix)
- Export
- Other skills like Design, Technique

The determinants of competiveness are observed separately in the studies below:

'Decentralized nature of handloom sector, difficulty in procuring finance, raw materials and marketing, low wages of weavers and competition from cheap, power loom made imitation products' are the parameters of overall competitiveness of the industry which is analyzed by the Textile Committee in the report (June 2008, p.7) Small scale nature of internal markets, a cluster of village economies and no opportunity for broad commercial and industrial expansions were described as the reasons of decline of handlooms in India in 18th century (Charlesworth,1982, p.14). He states, "Eighteenth-century India was not sunk in some primeval 'Asiatic' stagnation. Some of its handicraft production of textiles, notably the muslins of Dacca, was sold widely for export, and in commercial centers, like the western port of Surat, wealthy merchant groups existed. Perhaps India's fundamental problem, however, was the small-scale nature of most internal markets: 'largely a cluster of village economies', as Matsui describes the economy of 1800 [13:19]. This meant that merchant

enterprise and capital and credit resources remained cramped within isolated confines, so that there was no opportunity for the spontaneous emergence of a broadly based commercial and industrial expansion and the infrastructure necessary to support it."

"A close correspondence between the increase in mill goods during the 19th century and the decline in hand woven cloths of more or less the same types with perhaps slight difference in finish "were referred as the factors of competition of handlooms by Venkatraman (1934). Rise in Labor cost, market instability, numerous SKUs in a season, subjective evaluation criteria, limited automation and computerization as features of the industry were identified as the reasons of decrease in competitive advantage, of the Apparel Industry in East Asian Countries (Jin, B. (2004). On similar lines Nayak, A. (2009) referred to the challenges of competitiveness of the Indian textile industry reeling under the pressure of the global financial crunch and the appreciation of the Rupee since January 2007. High inflation rates and slow industrial growth were discussed as the reasons for the textile exporters being in a dire state. The key variables of competitiveness in the textile and apparel industries were identified as 'productivity, supply-side and demand-side determinants to measure enterprises' by Lau, C. K., Zhang, Z., To, K. M., and Chen, J. (2009).

Innovation is one of the factors of competitiveness. Gunjan, M., and others (2009) studied the demand and supply for the innovative textile product of Bamboo fabric in India. The challenges to the European Textile sector and its competition with the exports of new industrialized countries whose 'low wages and social charges' give them a considerable competitive advantage were discussed by Bilalis, N., et.al (2007) The analysis is based on an industrial excellence (IE) model developed by INSEAD. Quality, flexibility, supply chain management, strategy formulation and strategy implementation were observed as key indicators of the textile sectors. Wages, as one of significant factors of competitiveness, is also studied by Papola, T. S. (2003) and Tewari, M. (2006). This review will be helpful in the present study to analyze the wage patterns of the Paithani weavers and hence to examine the wages of weavers as the factor of competitiveness for weavers. The latter further argued that, while cost-competitiveness is important, several additional, non-price and institutional factors are keys to the competitiveness of textile and apparel producers going forward.

'Quality Management – Cost of Quality'

Mukhopadhyay, A. R. (2004) shows that given global competition, reduction of the cost of non-conformance strengthens one's competitive position by focusing on customer orientation, hence reduction of cost of non-conformance is much more preferable to increasing the volume of sales turnover, especially in a competitive market or a recession.

Various **models of competitiveness** related to textiles are also studied. Porter's Diamond model is used by Kathuria (2008) and Jin and Moon (2006) to study Indian clothing export sector and Korean apparel industry. IEA model is used to study the benchmarking of competitiveness in Textile industry by Bilalis (2007). Kathuria also used the Balassa's Index of RCA to compare the competitiveness of textile industry of India and China.

Kathuria, L. M. (2008) in 'An Analysis of Competitiveness of Indian Clothing Export Sector Using Porter's Model' discussed that from January 1, 2005, the Multi-Fibre Arrangement (MFA) has been replaced by the Agreement on Textiles and Clothing (ATC), under which the world trade in textiles and clothing has become free without the restriction of quotas. In the post-MFA phase-out era, Indian clothing exporters are likely to face tough competition from countries like China, Bangladesh, Vietnam, and Mexico in the international market. Hence, the paper examines some of the general implications of MFA phase-out and undertakes an analysis of competitiveness of Indian clothing export sector with the help of Porter's Diamond Determinants of National Advantage, namely, 'Factor Conditions', 'Demand Conditions', 'Related and Supporting Industries' and 'Local Rivalry'. Jin, B. and Moon, H. C. (2006) in 'The diamond approach to the competitiveness of Korea's apparel industry: Michael Porter and beyond' tried to explore what constitutes a country's competitiveness in the global apparel market after losing its labour competitiveness and how a country effectively achieves it with reference to the Korean textiles and apparel-related industry. This study employs two competitiveness models, Porter's diamond model and a generalized double diamond model, as a theoretical framework. Along with two theoretical models, this study employs extensive literature reviews, examples of successful firms, and four interviews with field practitioners in the Korean apparel industry. Beginning with Porter four determinants (factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry), new sources of competitive advantage factors are suggested for the evolving industry. The generalized double diamond model incorporates

international activities, which may occur either within a country or outside a country. Utilizing generalized double diamond model, the future directions and solutions for the industry with the identified new competitive factors were suggested. Bilalis, N., et.al (2007) aimed to present a clear methodological path for assessing the competitiveness of a specific industrial sector with the use of the Industrial Excellence Award (IEA) model developed by INSEAD Business Schools. The IEA model identifies four basic business processes as the fundamental pillars of IE: 1. Supply chain; 2. Product development; 3. Process development; and 4. Operations strategy formulation and deployment and the supporting components of Management Quality. Kathuria (2013) studied the export competitiveness of clothing of India and Bangladesh. He also focuses on the constraints restricting the growth of export share of India in world market and offers suggestions. The paper highlighted various parameters of cost competitiveness of the Indian clothing export industry. India has a cost disadvantage due to higher labour cost, power cost, transaction cost, low labour and technology productivity over its competitors (due to outdated machinery) in garment and made-ups manufacturing.

Tewari, M. (2008) focused largely on external drivers of adjustment: Notably, the 'disciplining' pressures of trade liberalization, insertion of firms within global value chains, the role of foreign buyers, global standards and preferential trade agreements in shaping export performance. The case of Indian apparel, and the history of its recent export growth, was used to highlight the domestic dimensions of export competitiveness. The role of the state, contradictory institutional legacies of India's Import Substitution Industrialization, contested shifts within local regulatory regimes and the changing structure of the domestic market were studied for their central importance to shaping the incorporation of a shielded industry into the global economy and the nature of its export trajectory.

Various International Trade Laws related to textile industry are studied by Kathuria (2008) on replacement of Multi-Fibre Agreement (MFA) by Agreement on Textiles and Clothing (ATC) since 1 January, 2005 and Datta (2006) on regional trade pacts like NAFTA.

Export is considered as one of important factor of competitiveness and competitiveness can be measured by measuring export of any item or of any country (Balassa's RCA). In case of export of handloom textiles in India there are many governing bodies that look after export.

The Handloom Export Promotion Council (HEPC)

It is a statutory body constituted under the Ministry of Textiles, Government of India to promote the export of all handloom products like fabrics, home furnishings, carpets and floor coverings, etc. HEPC was constituted in the year of 1965 with 65 members and its present membership is around 2000 spread all over the country

Kathuria (2013) has predicted that India will get a significant share of the world textile and clothing trade due to the advantage of cheap labor and other factor resources but India's slower growth rate, as compared to other low cost competitors, indicates otherwise. India has certain advantages in the T&C sector because of its excellent multi-fibre raw material base, with a wide range of count composition; a well-developed network of research and development (R&D), design, and testing institutes, and a surplus labor force. India is the second largest producer of cotton (23 per cent share of the world market), the largest producer of jute (63 per cent), the fifth-largest producer of synthetic fibre/yarn (6.5 per cent), the second largest producer of cellulose fibre (13.5 per cent), and among the top nine producers of wool. Many studies predict that India, China, and Bangladesh will be the emerging players in the world clothing trade in the post-MFA phase-out era, the gap between the growth rates of these countries is widening at a faster pace. It is feared that India may forego its market share to other low-cost countries like Bangladesh, Vietnam, and Turkey etc.

He also discusses the significant factors influencing India's competitiveness in the world clothing trade. Unit labour cost is one of the most commonly used indicators of cost competitiveness. In a real multi-country world which allows for less than full employment of resources, exports of a labour-intensive product from one country would lose market share to producers from other countries having advantage in labour cost competitiveness. Indian T&C manufacturer-exporters incur additional costs on account of non-refund of state level taxes and duties, an anomaly in duty drawback rates as the rates are insufficient to neutralize the incidence of all duties and high transaction costs. International competitiveness is a matter largely of costs, i.e. which country is able to deliver the product to the market most cheaply. Transportation and communication costs and trade barriers and trade strategy may all play a role. Also, for India, higher cost of power and steam further reduce India's competitiveness. Another distinguishing feature restricting the competitiveness of this industry is the presence of small units mainly dominating the fragmented clothing industry, thus denying the benefits

of economies-of-scale. This fragmentation and small-scale of the industry is the result of government policies that favoured rigid labour norms, tax benefits given to small-scale units that motivated industrial units to maintain low capacity levels. The majority of the total employment in the industry is in small firms.

Using the above parameters as the basis, the present research work has incorporated in the context of Handloom industry, in addition to the productivity, the significant parameters of 'quality' and 'art and aesthetic value'. Hence the definition of Paithani Segment Competitiveness Index (PICI) considers mainly three characteristics – Assets, Operations (Productivity and Efficiency) and QIS (Quality, Innovation and Sustainability). The Competitiveness is measured along with three sub-indices, 14 Determinants and finally they are evaluated for 41 separate parameters. Additionally 2 more sub indices with two Determinants and ten parameters are evaluated and the PICI is adjusted for these sub indices.

There is no clear-cut definition of competitiveness. Thus it is necessary to identify and limit the concept of competitiveness in respect to our study which lies in the field of Traditional Handloom Silk Textile Industry.

8. International Laws and Agreements on Textile

International Agreements on Textile Industry are important to study. Ganguli (2007), Desai (2009) and Nair (2011) have discussed the legal aspect of various international agreements related to textile industry and Geographical Indications.

General Agreement on Tariffs and Trade (GATT), 1947 and updated GATT 1994.

The General Agreement on Tariffs and Trade (GATT) was a multilateral agreement regulating international trade. According to its preamble, its purpose was the "substantial reduction of tariffs and other trade barriers and the elimination of preferences, on a reciprocal and mutually advantageous basis." GATT was signed by 23 nations in Geneva on October 30, 1947 and took effect on January 1, 1948. It lasted until the signature by 123 nations including India on April 14, 1994 of the Uruguay Round Agreements, which established the World Trade Organization (WTO) on January 1, 1995.

World Trade Organization (WTO), 1995

In the Uruguay Round of GATT, 1994, creation of WTO was one of the most significant changes. WTO came in to existence on 1 January 1995. The World Trade Organization (WTO) is an organization that intends to supervise and liberalize international trade. The WTO expanded its scope from traded goods to include trade within the service sector and intellectual property rights.

- **Intellectual Property Rights (IPRs):** Trade Related Aspects of Intellectual Property Rights (TRIPS) - As a founder signatory of WTO and member of GATT, India was obliged to implement a fully TRIPS compliant Intellectual Property (IP) system before the end of transitional period, 1 January 2005.
- Agreement on Anti-Dumping - Imports of a product at a price below its "normal value" is called dumping. It leads to material injury to a domestic industry.
- Bilateral and Regional Trade Agreements – WTO allows bilateral and Regional Trade Agreements (RTAs) like Asia Pacific Trade Agreement (APTA), South Asian Free Trade Area -- (SAFTA), US-India Strategic Partnership, India-China & India-EU relationship

Multi Fibre Agreement (MFA) 1974 to 2004

MFA governed the world trade in textile and garments from 1974 to 2004 which imposed quotas on the amount developing countries could export to developed countries. The MFA expired on 1 January 2005. The MFA intended to allow developed countries to adjust to imports from the developing world. Developing countries have an absolute advantage in textile production because it is labor-intensive and they have low labor costs. At the General Agreement on Tariffs and Trade (GATT) Uruguay Round (1994), it was decided to bring the textile trade under the jurisdiction of the World Trade Organization. The Agreement on Textiles and Clothing provided for the gradual dismantling of the quotas that existed under the MFA. This process was completed on 1 January 2005.

9. National Policies for Textile Industry

The Textile Policy of India

Agnihotri (1989) has discussed the textile policies of India. The 1978 Textile Policy listed a number of steps to enable the handloom sector to fulfill the role assigned to it in the industrial employment policies of government. One of the objectives of the 1981 Textile Policy statement was to achieve the maximum possible growth of the handlooms sector. One of the

objectives of the 1981 Textile Policy was to achieve maximum possible growth of handlooms in the decentralized sector, for generating employment and raising the standard of living of small weavers. The textile policy of 1985 recognized the distinct and unique role of the handloom sector and proposed a number of measures for the preservation and growth of this sector as one of the priority. One of the most important of these is the introduction of technical innovations in the looms used by the weavers, so as to increase the productivity and improve the quality of the product. The weaving of Janata cloth for the poorer sector of the population will also, to a large extent to be carried out through handlooms. The Parliament has passed a new legislation as 'The Handlooms (Reservation of Articles for Production) Act, 1985' by which 22 items have been reserved for handloom sector. Three regional enforcement offices have been created so far in Delhi, Pune and Coimbatore for implementation of the legislation effectively. Agnihotri (1989) also further discussed the other supportive measures taken by the government like active program of supply of raw materials, work sheds, common facilities etc. to be carried out through State Corporation and co-operatives. Further it recommends training and up gradation of the technical, managerial and administrative skills of personnel employed in the development and marketing of the sector.

After 1995, the government initiated serious efforts to restructure the textile industry in anticipation of growth through exports, as promised by the trade negotiations at global level and the Agreement on T&C. The challenge as seen then was to raise productivity through gains in efficiency that would still allow the industry to compete at home and abroad in the face of higher cotton prices resulting from policy adjustment to WTO rules and demand pressures. Given the various linkages to the industry from cotton production, technology, labour and investment aspects, the government appointed a Committee of Experts to recommend the best possible course for Indian textile industry. Based on the report submitted by this Committee in 1999, a National Textile Policy (NTP) was announced in 2000.

Handloom Sector - the Spinning Wheel of Indian Economy

The Textile Committee report (June 2008, p.7) writes about 'Post Independence Policy on Handlooms and Handicrafts' as 'in the post-independence era, despite the thrust on heavy and medium industries for economic development of the country, due importance was also given to village and cottage industries because of the large employment potential. Handlooms and

handicrafts sectors were the major sectors in terms of providing employment next only to agriculture. The report of the steering committee on handlooms and handicrafts constituted for the 12th Five Year Plan (2012-2017) has stated the significance of handloom sector in the economy of India. The dispersed and decentralized handloom and handicrafts sectors embody the traditional wisdom, cultural wealth and secular ethos of our polity. They are not just a source of livelihood for lakhs of weavers and artisans, but also environment friendly, energy and capital saving and labour-intensive forms of art that have secured India's presence in millions of homes across the globe. This sector is also special due to use of Indigenous raw material, low technology, local labour, labour intensive work and employment generation at rural level. Draft of XI Five Year Plan, Volume 3, Chapter 5, (Point 5.17) stated about the Socio-economic significance of Handloom Sector. Today, the handloom industry directly and indirectly provides livelihood to 124 lakh people, out of which 60% are women, 12% SC, and 20% ST (Ministry of Textiles, 2001). While the exact numbers are not available, a chunk of the handloom weavers belong to minorities. Health and environment-friendly hand woven fabrics have a huge international demand and have the potential to generate domestic demand as well. In the post-Multi-Fibre Agreement era, weavers can capture new markets. It (XI Five Year Plan, 5.29) has further alarmed that, 'with the phasing out of quota and the opening up of markets, 'Handloom' cloth and designs are being produced cheaply by mills and powerlooms both in India and in China. As the market is shrinking, weavers are becoming manual laborers or in extreme cases committing suicide. This has led many to label this industry as a ***sunset sector***.' XII five year plan has identified Handlooms as the '***Priority Sector***' that will create large employment. It is also particularly significant as it provides low-cost and green livelihood opportunities to lakhs of families, besides supplementing incomes in times of agrarian distress, checking migration and preserving the traditional economic relationships between different sections of the society.

Many challenges of the Handloom sector are mentioned in the Five Year Plans. 'This sector in India is heterogeneous, dispersed, and mostly unorganized. It includes diverse types of production units ranging from traditional crafts to high-tech industries. Segments such as powerlooms, handlooms, handicrafts, food processing, coir, sericulture, khadi, village industries, and wool, which are mostly unorganized, are fragmented across various ministries and often seen only as rural livelihoods. Due to the unorganized nature of the sector, entrepreneurs and artisans/workers face difficulties in accessing government schemes.

Consequently, the workers engaged in the MSE sector—and these are often the most vulnerable and poor—have very little bargaining power and are exploited by the middlemen, and big business houses. Unable to take up aggressive marketing, like big industries, they cannot find markets despite good quality and competent prices. The dispersed, unorganized nature of the industry also raises issues of quality, bulk production, and inability of meeting big orders. As a result, markets, especially for traditional MSEs, are shrinking and workers are experiencing a dip in wages. Handloom sector in some parts of country is in miserable state due to myriad problems sustaining continuous losses. The problems are improper supply of raw material, price hike in yarn, lack of proper marketing facilities, lack of market awareness and promotion, lack of proper financial resources, involvement of middlemen, competition from mill and power loom products, lack of modern technology, lack of prompt and timely support from the government and other allied agencies and so on. The standard of living of the weavers is significantly low and they are leading miserable and pitiable life due to unemployment and under-employment.' (XI Five Year Plan) Other studies (Agwan, 2014) and researches on handloom sector in India have characterized various problems. These problems include improper supply of raw material, price hike in yarn, lack of proper marketing facilities, lack of market awareness and promotion, lack of proper financial resources, involvement of middlemen, lack of modern technology, lack of prompt and timely support from the government and other allied agencies, obsolete technologies, unorganized production system, low productivity, inadequate working capital, conventional product range, overall stagnation of production and sales and, above all, competition from power loom and mill sector. It is a well-known fact that the handloom weavers in some parts of the state are starving to death and even commit suicides, due to lack of facilities as well as disproportionate earnings corresponding to their labor, in the weaving activity. The standard of living of the weavers is significantly low and they are leading miserable and pitiable life due to unemployment and underemployment. This situation prevails everywhere in our country.[1]

Need of micro Credit for informal Sector is referred as the priority issue in the Xth Five Year Plan (Chapter 5, Volume 1, 5.52) It says, 'A major problem in all developing countries is that the formal banking system is ill suited to meeting the credit needs of the informal sector. The banking system must be encouraged to reach out to the enterprises in the informal sector

[1] http://shodhganga.inflibnet.ac.in:8080/jspui/bitstream/10603/9841/19/19_synopsis.pdf

through innovative means. The cooperative credit structure can play a major role in extending credit to the informal sector but it has become very weak in most States. (X Five Year Plan, 5.53) The important mechanism through which banks can meet the credit needs of the informal sector is the self help groups (SHGs), which provide micro credit for informal sector activities. (Point 5.55) The need of Micro Finances of unorganized sector is significant because the handloom weavers are trapped in the clutches of private moneylenders who charge usurious interest rates, their needs are small but often arise at unpredictable times and usually of an emergent nature and mainly dependent of the production cycle of weaving, such micro finances also affect the bargaining power of the weaver while selling.

10. Cooperative Societies in the handloom textile industry and others

The significance of the co-operative structure of operations in Textiles and other sectors, in India and elsewhere were explored to understand the role of the co-operatives in the handloom sector. Studies on weavers' co-operatives and other co-operative are reviewed.

Kar (2012) studied the case of 'SambalpuriBastralaya Handloom Cooperative Society Limited' (SBHCSL) or known as 'Bastralaya' which is a rural community based co-operative enterprise from the state of Odisha. The study uses a unique qualitative research method called 'narrative enquiry'. A traditional knowledge based intensive community enterprise (CE) is studied as an example of one of the largest production cum sales, primary weavers' cooperative society (PWCS) in India. The management, operations and the significance of the society is studied in detail. Bromwich (2012) has studied the case of farmer cooperatives in Shandan County, Gansu Province, China focusing on enterprise management and training, and monitoring and evaluation issues and outcomes. Kapoor (2011) has studied a TQM journey of 'MilkFed', a major milk producing cooperative in the state of Punjab to demonstrate how TQM principles have been used to create an organization-wide environment of continuous improvement in a cooperative sector organization Lalvani (2008) has looked with a political and economic perspective at Sugar Cooperatives in Maharashtra. The origin of powerful sugar lobby and the cooperatives being an instrument for rural development with local initiative since 1950s was studied.

Legislations for cooperatives

The Co-operative Act 1904, The Co-operative Societies Act 1912, Bombay Co-operative Societies Act 1925. The Pravaranagar Sugar Cooperative was the first known successful

example of sugar cooperative in Maharashtra became nucleus for socio-economic rural transformation. Since 1961, different types of cooperatives besides primary agricultural service cooperatives came into existence. They are Cooperatives of cane growers, cotton growers, milk farmers, forest laborers, tribal, village artisans, fishermen and many.

Economic benefits of cooperatives

Cooperatives are effective as an ideal instrument for bringing about socio-economic change. The benefits of cooperatives from various studies are as below.

1. Cooperatives increase the community income through collectively improving members' production and marketing capabilities. For individual members (farmers) of a cooperative structure offers increased economic of scale by lowering unit cost in production, processing and distribution. Collective marketing results lower transaction cost and higher prices for farmers. (Bromwich, 2012)
2. Growth of cooperative credit, generation of employment and education are some of the indicators of success of cooperative societies.

Challenges of Co-operatives

Various studies have noted the shortcomings and reasons of failure of cooperatives in India. Economists have failed to recognize political dimension of cooperative policy. The gap between economic principles and political reality has worked two ways. Development of powerful sugar 'lobby' and rise of leaders as sugar 'barons' has played an important power structure in State shaping socio-economic fabric of Maharashtra. However on the other side four committees have been appointed by government of Maharashtra (Gulabrao, Shivajirao, Godbole and Rane Committees) to study the sickness of Sugar Cooperatives since 1980. (Lalvani, 2008) Frequent incidences of rise of leadership (like protest by RajuShetty for minimum rate per tonne of sugarcane in 2013) dealing with the problems of cane growers are the indicators of the status of the significant political role of sugar sector and its economic impressions on the farmer level. Cooperative limited to only agricultural service, non-viable in existence, limited effective coverage and difference in membership and loan disbursement ratio due to poor financial state and incapacity to give credits to members and absence of professionalism.

11. Geographical Indications in Textiles in India

A study of textiles would be incomplete without incorporating the literature on Geographical Indications (GI) of Textiles in India. Literature Review of GI is mainly conducted on two streams – GI registration of Textiles in India and GI infringement and effective usage of GI with protection practices.

(Raju&Choudhary, 2013) give a comparative state profile of Odisha as leading example with nine items of textile products registered for Geographical Indications till January 2013. Issues and challenges of GI infringement in India (Nanda, 2013) talk about the legal framework of GI in India, India's experience with GI protection and some case studies to see impact of GI registration like Muga silk of Assam, Banaras brocades and saris, Malabar Pepper and Vazhkulam Pineapple. The study of legal protection of GI in India and the study of international agreements of TRIPS, WTO and IPR to see if enough international standard for GI protection is in place in most of the counties (Nair, 2011) is studied. The international trade laws like GATT, WTO, IPRs, TRIPS (Trade Related Aspects of intellectual Property Rights) and Geographical Indications (GI) in Indian perspective are also reviewed. (Desai, 2009).Bagade& Mehta (2014) studied the challenges of GI in India and the study of the functions of GI, historical development, prominence of GI, challenges and problems of GI act, infringement and protection of GI. Use of GI and other IPs as strong determinant of economic growth and the impact of a strong IP regime on the economic development of a nation have been emphasized and with the growing recognition of IPR, instances of infringements of IPR in developing nations are visible and hence the importance of worldwide forum on IPR has been realized. (Rai, Singh & Sharma, 2009) Similarly (Gautam&Bahl, 2010) gave the historical development, socio-economic implication of GI in developing countries, and the issues and concerns of GI. Marie-Vivian, 2010in 'The Role of the State in the Protection of Geographical Indications: From Disengagement in France / Europe to Significant Involvement in India' states that 'post- TRIPS Agreement (the Agreement on Trade-Related Aspects of Intellectual Property Rights) India shows a state and its agencies which are very active in the process of filing GI applications, including being themselves the applicant and eventually the proprietor', due to lack of strong producer organization in India. The significance of GI is studied in various studies. The Indian Ministry of Commerce (2001) has stated that 'by protecting the cultural diversity of a country, GIs also play role in the protection of its national identity against the fear of its

dilution by the internationalization of the culture.' A consumer survey done in Europe (WTO, 1999) revealed that 40 percent of consumers surveyed were willing to pay a premium of 10 percent for origin-guaranteed products.

The challenges of GI implementation are important to study. The key socio-economic issues relating to geographical indications relevant to developing countries include misappropriation, protecting traditional and indigenous knowledge, improving market access, creating niche market, protection of reputation, potential income effect and rural development. Unless a geographical indication is protected in the country of its origin, there is no obligation under the TRIPS agreement for the other countries to extend reciprocal protection. (Gautam and Bahl, 2010) To get all the commercial benefits of the GI, an effective post-GI mechanism is essential to protect the GI. GIs are understood by consumers to denote the origin and the quality of products. Many of them have acquired valuable reputations which, if not adequately protected, may be misrepresented by dishonest commercial operators. False use of geographical indications by unauthorized parties is detrimental to consumers and legitimate producers. The former are deceived and led into believing to buy a genuine product with specific qualities and characteristics, while they in fact get a worthless imitation. The latter suffer damage because valuable business is taken away from them and the established reputation for their products is damaged. With GIs increasingly influencing trade both at the national and international level; harnessing trade benefits depends on the degree of protection enjoyed by the owners of the GI. Protection of Geographical Indication (GI) has, over the years, emerged as one of the most contentious IPR issues. Given its commercial potential, legal protection of GI assumes enormous significance. Without suitable legal protection, the competitors who do not have any legitimate rights on the GI might ride free on its reputation. Such unfair business practices result in loss of revenue for the genuine right-holders of the GI and also misleads consumers. Moreover, such practices may eventually hamper the goodwill and reputation associated with the GI.

FAQs on GIs published by Textile Committee throw light on it. GI can be protected legally. GIs are protected in accordance with national laws and under a wide range of concepts, such as laws against unfair competition, consumer protection laws, laws for the protection of certification marks or special laws for the protection of GIs. In essence, unauthorized parties may not use geographical indications if such use is likely to mislead the public as to the true

origin of the product. Applicable sanctions range from court injunctions preventing the unauthorized use to the payment of damaged and fines or, in serious cases, imprisonment. GIs are protected at the international level too. GI protection is granted by the TRIPS Agreement. There are various international agreements (The Paris Convention for the Protection of Industrial Property (1976). The Madrid Agreement for the Repression of False or Deceptive Indications of Source (1981), Lisbon Agreement for the Protection of Appellations of Origin and International Registration of (1958) grant some kind of protection for GIs as an intellectual property right. The WTO TRIPS Agreement of 1994 is currently the principal international instrument for protecting and defending GIs. This agreement provides two levels of protection. A basic protection fixed in Article 22 is for all products which are determined by an act of misleading the public or unfair competition. India, in compliance with its obligation under TRIPS Agreement, has enacted the Geographical Indications of Goods (Registration and Protection) Act, 1999. This act seeks to provide for registration and better protection GIs relating to goods. It excludes unauthorized persons from misusing GIs. This would protect the interest of producers, manufactures and thereby consumers from being deceived by the falsity of geographical origin to economic prosperity of the producer of such goods and promote goods bearing GIs in export market. The act provides registration of GIs (part A) and registration of authorized users / proprietors such as names, addresses and descriptions (part B).

The TRIPS Agreement provides for two levels of protection for GI. What Article 22 provides is the basic level or a minimum standard of protection whereby all GI must be offered protection against use which would deceive the public or constitute an act of unfair competition. Under Article 22 of the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement, the scope of protection is composed of three aspects:

- Protection against the use of indications that mislead the public or are deceptive
- Protection against the use of indications in a manner that are acts of unfair competition
- Refusal or invalidation of trademarks that contain or consist of indications, where it may mislead the public.

Article 23.1 of TRIPS prohibits the use of translations of GI or attachment of expressions such as ‘kind’, ‘type’, ‘style’, ‘imitation’ to products not originating from the place indicated,

even where the true origin is clearly indicated. Thus, 'Champagne style sparkling wine, Made in the USA' would be prohibited even though this is evidently not misleading. (TERI, 2013) In case of Paithani it is intended to investigate whether such expressions are in use leading to infringement of GI.

Many studies have described the strengths of the Indian GI act in terms of Economic Growth, Rural Development, Originality of the product, Quality and Competitiveness of product. From the perspective of a developing country, one of the best features of the Indian Act is the comprehensive definition given of GI, whereby agricultural, natural and manufactured goods all come under the ambit of GI. This is especially important in the Indian context considering the wide variety of goods that is deserving of protection ranging from agricultural products like Basmati, Darjeeling tea to manufactured goods such as Banarasi sari, Kolhapurichappals, Chanderi silk etc. (TERI, 2013) The IPR framework in India is stable and well established from a legal, judicial and administrative point of view and is fully compliant with the Agreement on Trade-Related Aspects of Intellectual Property Rights. India is committed to wide range of international treaties and conventions relating to intellectual property rights. Simplified procedure for filing, E-filing facilities and incentives for SMEs are some of the other initiatives in the area of intellectual property rights in India. The government of India has admitted the importance of establishing vibrant IP regime in the country by efficient processing if IP applications, adopting best practices of IP processing, strengthening public delivery of IP services with high transparency and user friendliness.[2] The development of Intellectual Property Rights (IPR) over the years has invariably brought an upsurge in the outlook of nations towards the aspects of societal and cultural growth, this being said with the preliminary assumption that economic growth has been the most affected realm.' Hence Intellectual Property is a 'power tool' for economic development and wealth creation particularly in the developing world. IPR could be called the 'Cinderella' of the new economy. (Rai, et al. 2009) It is believed, that the IPR Protection of unique textiles products of the country with a predetermined market linkage strategy would help in brand building of the product, providing market linkages, generating more employment opportunities and enhanced income to the stakeholders. Geographical Indications are generally granted for traditional products, produced by rural communities over generations that have gained a reputation on the markets for their specific qualities.

[2] http://www.makeinindia.com/policy/intellectual-property-rights/

GI as an instrument of rural development shall promote the registered products which could be considerable benefit to the rural economy by improving the incomes of farmers or non-farmers. GI operates as the indicators of origin from which the product is belonged to. Other than the authentic source of origin, GI allows the knowledge to remain in the public domain and the scope of protection is limited to controlling the class and/ or location of people who may use the protected indication and the rights can potentially be held in perpetuity as long as the product-place link is maintained. (Commission on Intellectual Property Rights, 2004) Holders of a GI do not have the right to assign the indication, thus, preventing its transfer to non-local producers. (Nanda, 2013) Consumers are often observed to pay high prices for the products with GI. It means that the products with GI display some added value of quality which is mostly assigned to place, culture and society where the product is produced. For GI registered 'Agricultural' products like Basmati Rice, Nagpur Oranges, Mahabaleshwar Strawberries etc, the soil, climate, weather, water are the factors which contribute to the quality of products. For 'Manufacturing' products like Mysore Sandal soap, Goa Feni, Nashik Valley Wine, Kanuaj Perfumes etc, the factors affecting the quality of products are the raw material available at the particular geographical areas and the method of production. 'Non agricultural' goods registered for GI are mainly of textile, handicrafts and jewellary. Ex. Silk sarees and Banaras Brocade of Varanasi, cotton sarees of Madurai Sungudi, SolapurChadar and Kullu woolen shawls have particular local or specific raw material, designated method of weaving and some designs, motifs which give identity to the particular product which is nothing but a quality. Hence, GI identifies the quality, quality adds value and value forces the consumer to pay more, which is nothing but an added profit.

Creating Brand Value and Value Addition - GI leads to increase in the price of selling of the protected products. GI acts as a mechanism that helps producers differentiate their products from competing products in the market and enables producers to build a reputation and goodwill around their products that will fetch a premium price. A consumer survey undertaken in the European Union in 1999 found that 40 % of the consumers would pay a premium of 10 % for origin-guaranteed products (WTO, 2004). A UNCTAD (United Nations Conference on Trade and Development) study has revealed that GI registered agricultural products can fetch a price premium of 10–15 % whereas for non- agricultural products it would be of 5-10 per cent. (Das, 2009) Prevent Duplication and Entry Barriers of Fakes -

Producers maintaining the quality of their products are exposed to unfair competition from producers who sell lower quality products at the same price. This unethical practice of selling fake products in the name of reputed products to fetch better prices is rampant in the market. In India, for example, cheap Power loom saris are sold as reputed Banarsi handloom saris within and outside Banaras, harming both the producers and consumers of Banarsi handloom saris. While original producers suffer a loss of market for their goods, consumers end up paying inflated prices for fake goods. Consumers usually do not have perfect access to information regarding the prices of goods, and even less so to the quality of the goods. In a situation like this, GI protection has the potential to eliminate information asymmetry and benefit both the producers and the consumers (OECD, 2000). GI allows genuine producers to capture the market and creates entry barriers for 'fakes'. The GI tag attached to products acts as a signaling device that helps producers to differentiate their products from competing products in the market and enables them to build reputation and goodwill around their products, which allows them to fetch a premium price. (Bagade and Mehta, 2014)

Conclusion:

Snapshot of Review of Literature:

The existing Literature on Paithani is mainly in the main categories of historic, product manufacturing and social aspect of weavers. The literature can be divided in following categories in detail:

1. Historical achievements of the Paithani
2. Manufacturing of Paithani
3. Social development of the weaver community of Paithani
4. Weavers problems and studies of other products of Indian handloom silk sarees
5. The powerloom apparels and garment industry in the world and India

Gaps in Review of Literature:

The Gaps identified in the literature are as below:

1. There is limited systematic, scientific research literature on handloom Paithani Segment.
2. There is limited literature on measuring competitiveness of handloom sector.
3. The literature on competitiveness talks either about 'Product Competitiveness', 'Firm Competitiveness', 'Industry Competitiveness' or 'National Competitiveness'. When we need to measure competitiveness of handloom Paithani saree segment, we need to

consider some factors of product competitiveness, some factors of firm competitiveness and some of national competitiveness also. **The study focuses on the creation of competitiveness index to measure a *segment* of the Indian handloom sector**.

4. There is no existing model of competitiveness which enables study of competitiveness of Indian handloom industry. There is a need to develop specific model of competitiveness by **deriving determinants of competitiveness**.
5. The model enables to measure competitiveness of Paithani segment and similarly other handloom sarees which can collectively measure the competitiveness of overall handloom sector.
6. There are very limited studies on GI application and cooperatives in Paithani segment and overall handloom sector of India.

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MEASURE OF CENTRAL TENDENCY: A MONOGRAPH

Prof. Vijaya Hake

INTRODUCTION:

Examining the raw data is an essential first step before proceeding to statistical analysis. Thereafter, two key sample statistics that may be calculated from a dataset are a measure of the central tendency of the sample distribution and of the spread of the data about this central tendency. Inferential statistical analysis is dependent on knowledge of these descriptive statistics.

In the first article of this series, types of data and correlations were discussed. Different measures of central tendency attempt to determine what might variously be termed the typical, normal, expected or average value of a dataset. Three of them are in general use for most types of data: the mode, median, and mean.

Central Tendency: The concept of central tendency plays a dominant role in the study of statistics. In many frequency distributions, the tabulated values show a distinct tendency to cluster or to group around a typical central value. This behavior of the data to concentrate the values around a central part of distribution is called 'Central Tendency' of the data. If we find such a central value, it can be used as a representative value for the entire data set. This helps take many decisions concerning the entire set. It may be noted, however, that average may sometimes give strange and illogical conclusions if not used with a common sense. Mean: definition and calculation, General and mathematical properties of mean, Combined arithmetic mean, weighted arithmetic mean. Median: definition and calculation, Properties of median, Location of median, Partition values: Quartiles, Deciles, And Percentiles, Mode: Definition and calculation, properties of mode, Empirical relation of mean, median and mode. Central tendency is the middle point of a distribution. Measure of central tendency is also called measures of location. The central location of curve B lies to the right of those of curve A and curve C. Notice that the central location of curve A is equal to that of curve C.

A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within that set of data. As such, measures of central tendency are sometimes called measures of central location. They are also classed as summary statistics. The mean (often called the average) is most likely the measure of central tendency that you are most familiar with, but there are others, such as the median and the mode.

The mean, median and mode are all valid measures of central tendency, but under different conditions, some measures of central tendency become more appropriate to use than others. In the following sections, we will look at the mean, mode and median, and learn how to calculate them and under what conditions they are most appropriate to be used.

Properties of a Good Measure of Central Tendency

A good measure of central tendency should possess as far as possible the following properties.

1. Easy to understand
2. Simple to compute
3. Based on all observations
4. Uniquely defined
5. Possibility of further algebraic treatment
6. Not unduly affected by extreme values.

Common Measures of Central Tendency

There are three common measures of central tendency:

1. Mean : The average value
2. Median : The middle value
3. Mode: Most occurring value

Each one has its advantages and disadvantages. Here we discuss the definitions, concepts and methods of manual calculation. However these can be calculated very easily on computer by using MS discrete data and get faster as well more accurate results than by grouping of the data. When only grouped data is available we need to use formulae for grouped data.

There are three types of mean:

1. Arithmetic Mean (AM)
2. Geometric Mean (GM)
3. Harmonic Mean (HM)

Arithmetic Mean

Arithmetic Mean is again of two types, ‘Simple Arithmetic Mean’ and ‘Weighted Arithmetic Mean’.

Simple Arithmetic Mean

$$\mu = \frac{\sum x}{N}$$

$\sum x$ ← Sum of values of observation

N ← Number of elements in the population

Simple Arithmetic Mean for Ungrouped Data

It is the value obtained by dividing the sum of all the values in data by total number of such data points (observations) It is denoted by, X (X Bar) or μ depending on the data is a sample or population

$$\mu = \frac{X1+X2+X3+\ldots\ldots+Xn}{N} = \frac{n}{\sum_{i=1}^{N} Xi}$$

There is a short cut method for calculations based on a simple concept that if a constant is subtracted or added to all data points, the Arithmetic Mean (AM) is reduced or increased by that amount Thus,

$$\mu = A + = \frac{\sum_{i=1}^{n} di}{N}$$

Where A=arbitrarily selected constant value (assumed mean) this value is selected such that it simplifies the values in calculations when deviations of each observation is used instead of the data values. A is selected close to the expected or guess value of mean.

Calculations on deviation should be such that we should be able to do it orally.

D_i= Deviation of each observation from the assumed mean.

N = Number of observations.

Assume that when assumed mean 'A' is exactly equal to Arithmetic mean μ or X. algebraic sum of all deviations is equal to zero. Thus algebraic sum of deviations of all observations about Arithmetic Mean is zero. Or

About Arithmetic Mean

$$\sum_{i=1}^{n} di = 0$$

N

Sr No	Xi	Deviation di= (Xi-A)
1	3	-17
2	6	-14
3	24	4
4	48	28
N=4	∑ Xi =81	∑di=1

$$\mu = \sum_{i=1}^{n} Xi \frac{81}{4} = 20.25$$

This is a direct method or alternatively by short cut method.

$$\mu = A + \sum_{i=1}^{n} \frac{di}{N} \quad 20 + \frac{1}{4} = 20.25$$

This method is same as direct method

If we take assumed mean as arithmetic mean 20.25

Example

Find the arithmetic mean of 10,12,20,15,20,12,10,15,20,10

Solution

Arithmetic mean

$$\mu = \frac{X1+X2+X3+\ldots..+Xn}{N} = \frac{10+12+20+15+20+12+10+15+20+10}{10} = 14.4$$

Or

Frequency distribution of the data is,

Sl No	Xi	Frequency fi	xifi
1	10	3	30
2	12	2	24
3	15	2	30

4	20	3	60
N=4	∑xi=81	∑ fi =10	∑xifi=144

$$\text{Arithmetic Mean } \mu = \frac{\sum xifi}{\sum fi} = \frac{144}{10}$$

$$= 14.4$$

Using MS Excel

Finding Arithmetic Mean of an ungrouped data using MS Excel is very simple. Steps followed are:

1. Open Excel using commands [**Starts Programs MS-Excel**]
2. Enter all data in a row or column without leaving any blank cell in the array. The data can also be in matrix or a table (called as two dimensional array) form. You may have to format the cell using **[Home Format cells**] or **[Home Format Number]**command and then following the instructions of 'Formate cells' menu box e.g, [**Number Decimal places, use of separator etc**]

   You can then complete other cells by drag command or copy/paste command. To view the entire data in the cell you may have to use [**Formate column /rowAuto Fit Selection**]. There are many facilities that one must try and practice. (Reader is advised to refer a book or help menu for learning more about MS Excel.
3. Now to calculate 'Arithmetic Mean' select a cell where you want the result. Then select (click on) 'f' icon on the tool bar or select [Insert function] in office 97-2003. If you have office 2007 you can select it by clicking on icons [**Formulas Insert function)**Now, the **'Paste Function' Menu will appear.**
4. **Select 'Statistics'** under the function categoryand **'Average'** under function Name and press '**OK**' a dialogue box will appear.
5. Now click the 'Market' icon displayed against 'Number 1' box. The cursor shifts to the worksheet Select the required data cells and drag/block it with mouse. Again click the 'marker' icon on dialogue box (Alternatively we can achieve the same by

typing the addresses of starting and ending cells in 'Number 1' window separated by colon .

6. Number 2, Number 3, etc., are used in the same way for the data entered in noncontiguous cells.
7. Click **OK** button. The result will appear will appear in the selected cell.

Calculating the Mean from Grouped Data

A frequency distribution consists of data that are grouped by classes. Each value of an observation falls somewhere in one of the classes. Unlike the **SAT** example.

We do not know the separate values of every observation. Suppose we have a frequency distribution of average monthly checking account balances of 600 customers at a branch bank. From the information in this table, we can easily compute an *estimate* of the value of the mean of these grouped data. It is an estimate because we do not use all 600 data point in the sample. Had we used the original ungrouped data, we could have calculated the actual value of the mean, but only by averaging the 600 separate values. For ease of calculation, we must give up accuracy.

To find the arithmetic mean of grouped data, we first calculate the midpoint of each class. To make midpoints come out in whole cents.

Mean – Grouped Data

Example: The following data, compute Arithmetic Mean by direct method short cut method and step division method.

Number of order

Marks	No of students
0 – 10	5
10 – 20	10
20 – 30	25
30 – 40	30
40-50	20
50-60	10

Let the Assumed Mean be A =35 and step size h = 10

Calculation Table

Marks	**Class Mark (mi)**	**No of Students (fi)**	**mi-fi**	**Deviation Di=mi-A**	**Fi-di**	**Step Deviation di=(mi-A)/h**	**Fi-di**
0-10	5	5	25	-30	-150	-3	-15
10-20	15	10	150	-20	-200	-2	-20
20-30	25	25	625	-10	-250	-1	-25
30-40	35	30	1050	0	0	0	0
40-50	45	20	900	10	200	1	20
50-60	55	10	550	20	200	2	20
∑		**100**	**3300**		**-200**		**-20**

1. **Direct Method**

6

∑mif i

i=1330033

$$\mu = \frac{6}{\sum_{i=1} fi} \quad 100$$

2. Shortcut Method

6

∑mif i

i=1 =35 -200 35-2 = 33

$$u = A + \frac{\mu}{\sum_{i=1} fi} \quad 100$$

3. **Step Division Method**

$$\sum_{i=1}^{n} f_i d_i$$

$$\frac{}{u} = A + \frac{}{n} \times h = 35 + \frac{-20}{100} \times 10 = 33$$

$$\sum_{i=1}^{n} f_i$$

Effect of Shift of Origin and change of scale

To simplify the manual calculation we may sometimes use shift of origin and change of scale.

Shifting of origin is achieved by adding or subtracting a constant to all observation. In case of discrete data we add or subtract a constant to the individual observation. Whereas for grouped data, we add or subtract the constant to the class mark values. The effect is as follows. If a constant is subtracted or added to all data points. The Arithmetic Mean is reduced or increased by that amount. This principal is used in the short cut method, which has been explained earlier.

In this method we first subtract a suitable constant from all the observation. Calculate the mean and then add the same constant to the answer to get the actual value of the mean.

Change of scale is achieved by multiplying or dividing by a constant to all observation. In case of discrete data we multiply or divide by a constant to the individual observations. Whereas for grouped data we multiply or divide by the constant to the class mark values. The effect is as follows. If all data points are multiplied or divided by a constant, the Arithmetic Mean is multiplied or divided by that amount. This is the principle behind the step division method which was explained earlier. In this method we first subtract a constant, say A (called assumed mean) from all the observation or class marks and then divide all the observations by a suitable constant say h, usually the class interval for grouped data) and then calculate the mean Then we multiply the answer by the same constant h and then add the constant A to get the actual value of the mean. We can use both change of origin and change of scale together b ut we must correct the answers in the reverse order of the algebraic operations performed on the data points.

Using MS Excel

While using MS Excel we don't need the short cut or step division method. The procedure for solving the given example using MS Excel is as follows:

1. Open an MS Excel worksheet
2. Enter 'class marks' and 'frequencies' in two adjacent columns say 'class marks' are entered in cell C3 to C8 and 'frequencies (number of students) in D3 to D8.
3. In cell E3 enter formula '=C3*D3' and press enter.
4. Then 'Drag-paste the formula in cells E4 to E8 [Select E3, click the mouse on bottom right corner '+' marker and drag down the mouse to E8]
5. Select cell E9 and press icon " Or click on icons[formulas E] or [Formulas Insert Function] and then follow dialog box selecting [Math & Trig' SUM]
6. Select cell D9 and click the icon "or click on icons [Formulas ∑] or [Formulas Insert Function] and then follow dialog box selecting [Math & Trig SUM].
7. Select result cell 9 (any empty cell) and enter formula 'E9/D9'.

You may like to give heading and stubs for improving readability in the row above the data. During calculations. MS Excel does not consider the headings or stubs where alphabetic characters are used. The excel sheet and dialogue box of sum function are shown.

Merit of Arithmetic Mean

a. Easy to understand and calculate
b. Takes all values into account
c. Lends itself to further mathematical treatment
d. Since sum of all deviations from arithmetic mean is zero, it is a point of balance or centre of gravity.
e. Sum of the squared deviations from arithmetic mean is always the minimum.

Limitation of Arithmetic Mean

a. Affected significantly by extreme values.
b. Cannot be computed for open end class distribution without some assumptions.
c. May give fallacious conclusions if we depend totally on Arithmetic mean for decision making.

d. Cannot be determined by inspection or graphically.

Arithmetic Mean of combined Data

Arithmetic Mean is used often in business for calculating average sales, average cost, average earnings, etc. If there are two related data groups and their arithmetic means are known, we can calculate arithmetic mean of the combined data without referring to individual data points. If the first group of N1 items has arithmetic mean of μ the second group of N2 items has arithmetic mean of μ2' and so on. We can find the arithmetic mean of combined data as.

$$\mu = \frac{N1 \times \mu + N2 \times \mu 2 + \text{-----} + Nn \times \mu n}{N1 + N2 + \text{-------} Nn}$$

Example

The weekly average salaries paid to all employees in a certain company was Rs 600. The mean salaries paid to male and female employees were Rs 620 and Rs 520 respectively. Obtain the percentage of male and female employees in the company.

Arithmetic mean of combined data is:

$$= \frac{N1 \times \mu + N2 \times \mu 2 + \text{-----} + Nn \times \mu n}{N1 + N2 + \text{-------} Nn}$$

In this problem N1 = number of male employees N2 = number of female employees mean salary of male employees μ1=620, mean salary of female employees μ2 = 520 and combined mean μ = 600 Therefore,

$$N1 \times \mu 1 + N2 \times \mu 2 \qquad 620 \times N1 + 520 \times N2$$

= ---------- ⟹ 600 = ----------⟹ 20*N1=80

×N2

N1+N2 N1+N2

N1:N2=4:1

Thus percentage of male and female employees in the company is 80% and 20% respectively

Weighted Arithmetic Mean

There are cases where relative importance of the different items is not the samel. In such a case, we need to compute the weighted arithmetic mean. The procedure is similar to the grouped data calculations studied earlier, when we consider frequency as a weight associated with the class mark. Now suppose the data values are x1,X2,X3…..Xn and associated weights are W1,W2,W3,Wn then the weighted arithmetic mean is

Direct Method

$$\mu w = \mu w = \frac{W1 \times X1 + W2 \times X2 + \ldots\ldots Wn \times Xn}{W1 + W2 + \ldots\ldots\ldots\ldots + Wn} = \frac{\sum w1 \times Xi}{\sum Wi}$$

Shortcut Method

$$\mu w = Aw \frac{\sum W1 \times di}{\sum Wi}$$

Where Aw = Assumed weighted mean

Di = (Aw-Xi) Deviation of observation from assumed mean.

Utility of weighted Mean

Some of the common applications where weighted mean is extensively used are:

1. Construction of index numbers for example consumer price index BSE sensex etc where different weights are associated for different items or shares.
2. Comparison of results of the two companies when their sizes are different.
3. Computation of standardized death and birth rates.

Examples:

The management of hotel has employed 2 managers , 5 cooks and 8 waiters. The monthly salaries of the managers. The cooks and waiters are Rs 3000, Rs 1200 and Rs 1000 respectively.

Find the mean salary of the employees .

$$\mu w = \frac{W1 \times xi + W2 \times X2 + \ldots + Wn \times Xn}{Wi + W2 + \ldots Wn}$$

$$\mu w = \frac{2 \times 3000 + 5 \times 1200 + 8 \times 1000}{2 + 5 + 8}$$

$$= 1333.33$$

Geometric Mean

It is defined as Nth root of the product of 'N' values of data. If x1,X2……Xn are values of data then Geometric Mean.

GM= $\sqrt{x1^{\times X2 \times \ldots \ldots \times \times n}}$

Examples:

A person takes home loan with floating interest, on reducing balance of 10 year term. The interest rates as changed from year to year in percent are 5.5 , 6.25, 7.5, 6.75, 8.25, 9.5, 10.5,9,8.25 and 7.5. Find the average interest rate? Was it beneficial for him to take fixed interest rate on reducible balance at 7.5% per annum?

Solution

Average interest rate can be found out using G.M. as follows. First we find the index by dividing percentage rate by 100 and then adding 1. Then we take G.M. of this index as average index.

From this, we can find out the average interest rate.

Average Index (G.M.)

$10\sqrt{\ }1.055 \times 1.0625 \times \sqrt{\ }1.075 \times 1.0675 \times 1.0825 \times 1.095 \times 1.105 \times 1.09 \times 1.0825 \times 1.075$

$=10\sqrt{\ }2.137= 1.0789$

Thus average Interest Rate=7.89%

Hence it is beneficial for him to take fixed interest rate on reducible balance at 7.5% per annum.

Harmonic Mean(HM)

It is defined as the reciprocal of the arithmetic mean of theb reciprocal of the individual observation Thus Harmonic Mean is.

$$HM = \frac{N}{(1/x1+1+/x2+\text{-----}+1/Xn)} = \frac{n}{\sum_{I=1}^{n} \frac{1}{xi}}$$

Example:

A relay team has four members who have to drive four laps between two fixed points. Average speeds that the members can achieve in Km/hr are 280,360,380 and 310. Find average speed of the team to complete the event.

Solution:

The average speed can be calculated as Harmonic Mean (HM) Thus average speed of the team is,

$$HM = \frac{N}{(1/x1+1+/x2+\text{-----}+1/Xn)} \quad \frac{n}{\left(\frac{1}{280}+\frac{1}{360}+\frac{1}{380}+\frac{1}{310}\right)} = 327.69 \text{ Km/hr}$$

Weighted Harmonic Mean:

If weight is attached with each observation then the Weighted Harmonic Mean is

$$HM = \frac{W1+w2+\text{----------}Wn}{\left(\frac{w1}{\overline{x1}}+\frac{w2}{\overline{X2}}+\frac{wn}{\overline{Xn}}\right)} = \frac{\sum_{i=1}^{n} wi}{\sum_{I=1}^{} \frac{wi}{xi}}$$

Weighted Harmonic mean is useful in computing the average rate of increase in profits, average speed of journey, average price of articles sold, etc for example airplane travels distances w1,w2,w3 wn with speeds x1,x2,x3,xn km/hr respectively then the average speed is equal to

Weighted Harmonic Mean of speeds with weights as the distances w1,w2,w3 ---wn.

Example

An aircraft travels 200 Km upto border at speed 700 km/hr (economical) then 250 km upto the target in enemy territory at speed 950 km/hr then after dropping the bombs travels at runaway speed of 1700 km/hr upto our nearest border at 150 km and then at the speed of 800 km/hr to the base at distance of 300 km. Find the average speed of the sortie. Also find the mission time.

Solution:

For the average speed we need to find the weighted Harmonic Mean. Thus the average sortie speed is,

$$HM = \frac{W1+w2+\text{------}Wn}{\left(\frac{w1}{X1} + \frac{w2}{X2} + \text{-----} + \frac{Wn}{Xn}\right)} \qquad \frac{200+250+150+300}{\frac{200}{700} + \frac{250}{950} + \frac{150}{1700} + \frac{300}{800}}$$

Mission time 1.012= hr approx

Median (Md)

Median is the value, which divides the distribution of data, arranged in ascending or descending order, into two equal parts, Thus the 'Median'is a value of the middle observation.

Median for Ungrouped Data

When the series is arranged in order of size or magnitude, and if total number of observations are odd,

$$\text{Median Md} = \frac{N+1}{2} \quad \text{Observation}$$

If the number of observations is even, then the median is the arithmetic mean of two middle observations.

$$\text{Median Md} = \frac{(n/2)\text{th observation} + (n/2+1)\text{observation}}{2}$$

Example

Students of a class were divided in two groups and undergone tutorial training by different faculty members. There score in final examination are

Groups A 80,70,50,20,30,90,10,40,60

Group B: 80,70,50,20,30,90,10,40,60,100

Which group showed better performance based on Median?

Solution:

First we arrange the score in ascending order:

Group A: 10,20,30,40,50,60,70,80,90

Number of observation is 9(odd) Therefore,

Median Md $\left(\frac{n+1}{2}\right) = \frac{(9+1)}{2} = 5$ observation =50

Group B : 10,20,30,40,50,60,70,80, 90,100

Number of observation is 10 Therefore

Median Md= $\frac{(n/2)^{n}\text{observation} + (n/2+1)^{n}\text{observation}}{2} = \frac{50+60}{2} = 55$

Thus group B has better performance on median.

Median for grouped Data:

In case of grouped data we first find the value N/2 Then from the cumulative frequency we find the class in which the (n/2)th item falls. Such a class is called as Median class. Then the median is calculated by formula:

$$\text{Median } M_d = L + \frac{\frac{N}{2} - pcf}{f} \times h$$

L = Lower limit of Median class

N = Total Frequency.

Pcf = Preceding cumulatie frequency to the median class.

F= Frequency of median class

h= Class interval of median class

Let us understand the logic of the formula. Meduam is value of (n?2)th observation. But this observation falls in the median class whose lower limit is L. Cumulative frequency of class preceding to the "median class"is pcf .Thus the median observation is (n/2)-pcf)th observation in the median class (counted from the lower limit of the median class) Now if we

consider that all f observation in the median class are evenly spaced from lower limit L to upper limit L+h, the value of the median can be found out by using ratio proportion.

Example:

Calculate the median for the following data.

Age	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
No of workers	14	28	33	30	20	15	13	7

Solution:

Age	Frequency	Cumulative Frequency
20-25	14	14
25-30	28	42
30-35	33	75
35-40	30	105
40-45	20	125
45-50	15	140
50-55	13	153
55-60	7	160

Now N= 160

Or N/2 =80

80^{th} item lies in class 35-40

Hence pcf =75, f=30,h=5 and l=35

Therefore the Median is

$$M_d = L + \frac{N/2 - pcf}{f} \times h = 35 + \frac{160/2 - 75}{30} \times 5$$

= 35.83

Using Excel

MS Excel has a 'Median' function which calculates median for ungrouped data as follows:

1. [**Formulas→ Insert Function**] and then follow the dialogue box [statistical Median]

2. Follow the 'paste function'menu and'paste function' dialogue box for selecting the data range in 'Number 1' using a mouse'or by entering the range of cell numbers.
3. If the data is stored in different arrays we can use 'Number 2' 'number3' etc.
4. For a grouped data we need to use the formula for calculating cumulative frequency and then write the formula for Median with appropriate cell references. There is no direct paste function to use.

   We demonstrate calculation of median for the data of Example 9 above. We use the MS Excel for Group A part of the example.

   1. First open the MS excel worksheet and enter the data for group A in cells from c5 to c13.
   2. Select any other cell say C14. Click fx or select [Formulas→ Insert Function] and then follow the dialogue box [Statistical→ MEDIAN]
   3. Follow the 'Function Argument' dialogue box for selecting the data range in 'Number 1' using a mouse as c5 to c13 or by entering the range of cell numbers 'c5:c13'.
   4. Select 'OK' button in dialogue box. The cell C14 will show the result of median as 50.
   5. The dialogue box and excel sheet is shown.

Mathematical properties of Median

1. An important mathmaticla property of the median is the sum of the absolute deviation about the median is minimum ie $\sum |x-M_d|$ is minimum.
2. Median is affected by total number of observation rather than values of the observations.

Merits of Median

1. Easy to determine and easy to explain
2. Less distorted than arithmetic mean
3. Can be computed for open end distribution.
4. Median is the only measure of central tendency that can be used for qualitative ranked data.

Demerits of Median

1. Need to rearranged data for computer it is expensive operation
2. In case of even number of observation median cannot be exactly determined.
3. Can be computed for open end distribution.
4. Median is the only measure of central tendency that can be used for qualitative ranked data.

Demerits of Median

1. Need to rearranged data . for computer it is expensive operation.
2. In case of even number of observation median cannot be exactly determined.
3. Less familiar than average
4. Does not take into account data values and their spread. It is intensive.
5. Not capable of algebraic treatment.

Quantiles

Quantiles are related positional measures of central tendency. These are useful and frequently employed measures. Most familiar quamtiles are quartiles , Deciles, and Percentiles. We are familiar with percentile scores in competitive aptitude tests or examinations of few institutes. If your score is 90 percentile, it means that 90% of the candidates who took the test, received a score lower than yours. In incomes in your organization if you are 95percentile, you are in the group of gop 5% highest paid employees in your company.

Percentile:

Pth percentile of a group of observations is that observation below which lie p% observations. The position of Pth percentile is given by $(n+1)\times$~~p , Whe~~wre 'n' is the number of data points.

Example:

In a computerized entrance test 20 candidates appear on a particular day. Their scores are: 9,6,12,10,13,15,16,17,16,24,21,22,18,19,18,20,17 Find 80^{th} and 90^{th} percentiles of data.

Solution:

First we order the data in ascending order 6,9,10,12,13,14,14,15,16,16,16,17,17,18,18,19,20,21,22,24,80^{th} percentile of the data set is the observation lying in the position:

$(n+1)\times p \quad (20+1)\times 80 = 16.8$

$$\frac{}{100} = \frac{}{100}$$

The 16^{th} observation is 19 and 17^{th} observation is 20. Therefore 80^{th} percentile is a point lying, 0.8 proportion away from 19 to 20 which is 19.8.

Quartile:

Certain percentiles have greater importance than others because they break down the distribution of the data into four groups. These are the quartiles. The first quartile Q1 is the 25^{th} percentile. It is a point below which lie one fourth of the data. Similarly the second quartile Q2 is 50^{th} percentile. It is a point below which lie one fourth of the data.Similarly the second quartile Q2 is 50^{th} percentile. This is same as the Median. It is a point below which lie half the data. The third quartile Q3 is 75^{th} percentile point. It is a point below which lie 75 per cent of the data . 25^{th}, 50^{th}, and 75^{th} percentiles are also called the lower, the middle and the upper quartile.

Example:

In a computerized entrance test 20 candidates appear on a particular day. Their scores are 9,6,12,10, 13,15,16,17,16,24,21,22,18,19,18,20,17 Find the quartiles of data.

Solution:

First we order the data is in ascending order

6,9,10,12,13,14,14,15,16,16,16,17,17,18,18,19,20,21,22,24.

1. First quartile is the observation in position:

$$\frac{(n+1)\times 25}{100} = 5.25$$

Value of the observation corresponding to 5.25^{th} position is 13.25

2. Second quartile or median is the observation in position:

$$\frac{(n+1)\times 50}{100} = 10.5$$

Value of the observation corresponding to 10.5^{th} position is 16.

3. Third quartile is the observation in position:

$$\frac{(n+1)\times 75}{100} = 15.75$$

Value of the observation corresponding to 15.75 position is 18.75.

Deciles:

There are the values which divide the total number of observations in to 10 equal parts . Obviously there are 11 deciles(including 0^{th} and 10^{th}) Method of calculating deciles is same as percentiles . We can use the formula same as percentile by substituting P by 10,20,30, etc for 1^{st} ,2^{nd},3^{rd},etc., deciles

Computation:

For manual computation we can use a common formula of percentile as:

$$\text{Pth percentile} = \frac{(n+1)\times p}{100} \text{ observation}$$

If the value of this term is a fraction we need to interpolate the value.

For the first the second and the third quartile we use the value of P as 25, 50 and 75 respectively.

Note: or we use formula Q^{th} quartile $=\{\frac{(n+1)\times Q}{}\}$th Observation Q=0,1,2,3,& 4

Similarly for the first the second the third etc. decile we use the value . Value of P as 10,20 30, etc for the first ,the second ,the third --- etc decile respectively.

Note : Or we use formula $D\underline{th\ decile} = \frac{\{(n+1)\times D\}th}{10}$ observation D=0,1,2,3,4,5,6,7,8,9,&10

Computation for grouped data can be carried out using formula of percentile and use the value of k according to the quartiles (25,50 and 100) or deciles (10,20,30 etc) for median k=50.

The formula for percentile is given by,

$$\text{Kth percentile} = L + \frac{(K \times N - pcf)}{100} \times h$$

L= Lower limit of percentile

N= Number of observation

Pcf= Cumulative frequency up to previous class

F= Frequency of percentile class

H= Class which of percentile class

Using MS excel for quantiles

It is very easy to find percentiles, quartiles and deciles using MS excel for ungrouped data . Steps are arrary or multiple arrays.

1. Enter the data as an array (one dimensional or two dimensional ie, matrix) It could be a single array or multiple array.
2. Select the cell where you want the result
3. Click F_x icon on tool bar or select function from menu as [Formulas → Insert function]
4. From the 'Paste Function' dialogue box, select the function as **[Statistical → PERCENTILE)**
5. When function dialogue box appears, enter data range (either by typing or by clicking the marker icon and selecting cells by switching to worksheet).
6. Select the 'K value' as a fraction (eg. 90^{th} percentile as 0.9 or 37^{th} percentile as 0.37)
7. In case of quartile selectiongof 'function' should be quartile in place of percentile and use 'k value' as 0,1,2,3,or 4.
8. The result will appear in the selected cell.

Mode

The mode of a data set is the value that occurs most frequently./ There are many situation in which arithmetic mean and median fail to reveal the true characteristics of a data (most representative figure0, for example most common size of shoes, most common size of garments etc. In suchb cases mode is the best suited measure of the central tendency. There could be multiple model values, which occur with equal frequency. In some cases, the mode may be absent . For a grouped data, model class is defined as the class with the maximum frequency. The the mod eis calculated as

$$\text{Mode} = L + \frac{\Delta 1}{\Delta 1 + \Delta 2} \times h$$

Where

L= Lower limit of modal class.

$\Delta 1$ = Difference between frequency of the modal class and preceding class.

$\Delta 2$ = Difference between frequency of the modal class and succeeding class.

h= Size of the modal class

Using MS Excel for mode

It is very easy to find mode using MS Excel for ungrouped data steps are given below

a. Enter the data as an array (one dimensional or two dimensional ie, matriz) It could be a single array or multiple arrays.
b. Select the cell where you want the result
c. Click Fx icon on tool bar or select function from menu as [Formulas → Insert function]
d. From the 'past Function' dialogue boz, select the function as [Statistical → MODE]
e. When function dialogue box appears, enter data range (either by typing or by clicking the marker icon and selecting cells by switching to worksheet)
f. The result will appear in the selected cell.
g. Alternatively we can directly type the function in selected cell for result as '= MODE(Data cell ref numbers)

Example

In a computerized entrance test, 20 candidates appear on a particular day. Their scores are: 9,6,12,10,13,15,16,14,14,16,17,16,24,21,22,18,19,18,20,17. Find the mode of the data.

Solution:

Using manual calculations

Now the value 16 occurs 3 times which is maximum for any observation .Therefore Mode=16.

Using MS Excel

1. **Enter the diata as any array in cells say C5 to C4.**
2. **Select any cell say F6 where we want the result.**
3. **Click Fx icon on tool bar or select function from menuy as, [Formulas → Insert function]**
4. From the 'Paste Function' dialogue box, select the function as [Statistical → MODE]

5. When function dialogue b oz appears enter data range ‘c5:c24’ in ‘**Number 1**’box.
6. Click ‘OK’ button The result will appear as 16 in the selected cell F6.
7. The MS Excel screen and dialogue box for mode is shown below.

Relationship among Mean. Median and Mode

A distribution in which the mean the median , and the modecoincide is known as symmetrical bell shaped 0 distribution. Normal distribution is one such as symmetric distribution which is very commonly used.

If the distribution is skewed, the mean , the median and the mode are not equal. In a moderately skewed distribution distance between the mean and the median is approximately one third of the

Mean –Median=(Mean-Mode)/3

Mode =3*Median -2*Mean

Thus if we know values of two central tendencies, the third value can be approximately determined in any moderately skewed distribution. In any skewed distribution, the median lies between the mean and mode.

In case of right skewed (positive –skewed) distribution which has a long right tail.

Mode<Median<Mean.

In case of left skewed 9negative –skewed) distribution which has a long right tail.

Mean<Median,Mode.

Dispersion : Dispersion is the spread of the data in a distribution, that is, the extent to which the observations are scattered.

There are two other characteristics of data sets that provide useful information : skewness and kurtosis. Although the derivation of specific statistics to measure these characteristics is beyond the scope of this

Skewness:

Curves representing the data points in the data set may be either symmetrical or skewed. Symmetrical curves, figure 3.3 are such that a vertical line drawn from the center of the curve to the horizontal axis divides the area of the curve into two equal parts. Each part is the mirror image of the other.

Curve A and B in figure 3.4 are skewed curves. They are skewed because values in their frequency distributions are concentrated at either the low end or the high end of the measuring scale on the horizontal axis. The values are not equally distributed. Curves A is skewed to the right because it tails off toward the high end of the scale. Curve B is just the opposite. It is skewed to the left because it tails off toward the low end of the scale.

Curve A might represent the frequency distribution of the number of days supply on hand in the wholesale fruit business. The curve would be skewed to the right, with many value at the low end and few at the high, because the inventory must turn over rapidly similarly, curve B could represent the frequency of the number of days a real estate broker requires to sell a house. It would be skewed to the left, with many values at the high end and few at the low , because the inventory of houses turns over very slowly.

Kurtosis:

When we measure the kurtosis of a distribution, we are measuring its peakedness. In figure 3-5 for example, curves A and B differ only in that one is more peaked than the other . They have the same central location and dispersion , and both are symmetrical statisticians say that the two curves have different degrees of kurtosis.

A Measure of Central Tendency: The Arithmetic Mean

The main median & mode are all valid measures of central tendency. But under different condition some measures of central tendency became more appropriate to use than others. In the following section we will look at the mean,mode & median & learn how to calculate them & under what conditions they are most appropriate to be use.

When we have to calculate the average of something we are talking about its arithmetic mean. This is true in cases as the average marks of student at your class.

Table 3.1 present data describing the number of days the generators at a power station on lakh Ico are out of service owing to regular maintenance or some malfunction. To find the arithmetic mean, we can sum the value and divide by the number of observations.

$$\text{Arithmetic mean} = \frac{7+23+4+8+2+12+6+13+9+4}{10}$$

$$= \frac{88}{10} = 8.8$$

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