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TESTING THE RELATIONSHIP BETWEEN FINISHED STOCK TURNOVER RATIO AND RAW MATERIAL TURNOVER RATIO FOR EFFECTIVE INVENTORY CONTROL SYSTEM: A STUDY ON JSPL

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ABSTRACT

The fundamental reason for carrying inventory is that it is physically impossible and economically impractical for each stock item to arrive exactly where it is needed, exactly when it is needed. The activities of inventory management involves are identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status. Inventory management also demands a solid understanding of how long it will take for those materials to transfer out of the inventory to be established. But in practice very little research has been carried out that test the relationship between finished stock turnover ratio and raw material turnover ratio for effective inventory control system. Based on this gap this research paper is an attempt to investigate the effectiveness of inventory control system by establishing the relationship between finished stock turnover ratio and raw material turnover ratio. In this research paper the granger causality test has been implemented as the data collected based on a time series format.

Keywords: FSTR, RMTR, Inventory, Granger, Effectiveness

INTRODUCTION:

The fundamental reason for carrying inventory is that it is physically impossible and economically impractical for each stock item to arrive exactly where it is needed, exactly when it is needed. Inventory is generally considered to comprise in three main areas which are raw materials, work in progress and finished goods. Where these are held and in what quantities, and how they are managed will vary significantly from one organization to another. Therefore "Inventory" means physical stock of goods, which is kept in hands for smooth and efficient running of future affairs of an organization at the minimum cost of funds blocked in inventories. The activities of inventory management involves are identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status. Inventory management also demands a solid understanding of how long it will take for those materials to transfer out of the inventory to be established. By Knowing these two important lead key aspects makes it possible to know when to place an order and how many units must be ordered to keep production running smoothly. But in practice very little research has been carried out that test the relationship between finished stock turnover ratio and raw material turnover ratio for effective inventory control system. Based on this gap this research paper is an attempt to investigate the effectiveness of inventory control system by establishing the relationship between finished stock turnover ratio and raw material turnover ratio.

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LITERATURE REVIEW:

Saleemi (2007), An Ordering cost is referred to as the cost of placing an order and securing the supplies. It varies from time to time and also from industry to industry. Inventory Carrying cost refers to the cost of keeping the materials in the storehouse which includes capital cost, cost of storage and handling, cost of deterioration and obsolescence, and other kinds of expenses and losses during storage. Inadequate Inventory cost includes cost of expediting the purchases, cost of securing rush deliveries, cost of follow-up action and cost of keeping the inventory at its minimum irrespective of its larger requirements.

Phaniswara Raju (2006) has conducted a research study on materials management in Andhra Pradesh State Road Transport Corporation (APSRTC) in 2006. In his study, he examines the materials management practices and purchasing systems in APSRTC on the basis of various parameters like material consumption per vehicle, material consumption per kilometer, inventory per vehicle, inventory in terms of number of months consumption etc. He highlights some major problems in the procurement of materials. The study is primarily based on the secondary data collected from the published annual reports of APSRTC, the records of MIS, the reports on performance of National Road Transport Undertakings of CIRT, Pune etc., In addition to the personal discussions held with various officials of the corporation. The study reveals the increasing levels of materials consumption in APSRTC. As compared to other the heavy engineering industry. The method of investigation involves the As compared to other undertakings; The study points to the absence of the use of important analytical techniques like value analysis and network techniques in the purchasing system of APSRTC. The inventory control system in APSRTC is critically examined in respect of stock out pattern, reordering and review policies, Lead time patterns, stock out levels etc. He suggests the reclassification of stores stems based on the criticality, the refixation of reorder level and reorder quantities. The study has also indicated the wastage caused by maintenance of unnecessary stock records relating to stems which are not in use.

Inyama (2006), Production input like raw materials, human, financial equipment are included in the industry inventory. Other forms of inventory are partially finished goods (work in progress) and spare parts. Inventory is kept to meet reliability of operations, flexibility in production scheduling, change in raw material, delivery time an change in economic purchase order size.

Chen et. al. (2006) have proposed a multi criteria based classification using Dominance based Rough set approach (DRSA). The DRSA generates linguistic rules to classify inventory items incorporating the decision makers preferences. The rules generated are then used to classify new SKU's. The new approach was compared with the existing techniques of classification which includes DEA(R,ZF,Ng) and AHP techniques. The authors conclude that the results obtained were better than the DEA models and at par with the AHP techniques, thereby confirming the applicability of this approach.

Onwubolu and Dube (2006), when ABC analysis is applied to an inventory Situation, it determines the importance of items and the level of control placed on the items. The result of importance ranking is determined by two factors, the usage rate for an item and its unit value. These two factors can be multiplied to give the annual usage value (AUV), which is the total value of the annual usage. The bigger each factor, the more top ranking is the item. Therefore, close control is more important for fast moving items with a high unit value. To the contrary, for slow moving, low unit value items the cost of the stock control system may exceed the benefits to be gained and simple methods of control should be substituted.

Jainand Render (2006) pointed out In recent years, many of the firms have raised the bar yet again by coordinating with other firms in their supply chains. For instance, instead of responding to unknown and variable demand, they share information so that the variability of the demand they observe is significantly lower.

Onwubolu and Dube (2006), when ABC analysis is applied to an inventory situation, it shows the importance of items and level of control placed on the items.

Hakansson and Persson (2004) identifies three different trends in the development of logistics solutions within industry, one trend is concerned with the increased integration of logistics activities beyond organization boundaries with an aim to reduce cost items such as capital costs for inventory and handling costs of flows.

Braglia et al. (2004) proposed the use of AHP methodology as a decision making tool along with Reliability Centered Approach [RCM] used for spare parts classification and present a case study in a paper industry. The decision problem at each node of the diagram is supported / executed by using an AHP model. The authors conclude that AHP could be used as a valid alternative approach to solve the problems of decision making step in RCM procedure

Gopalakrishan and Sundaresan (2004), The Economy Order Quantity (EOQ) refers to the order size that will result in the lowest total of order and carrying costs for an item of inventory. If a firm place unnecessary orders it will incur unneeded order costs. If a firm places too few order, it must maintain large stocks of goods and will have excessive carrying cost. By calculating an economic order quantity, the firm identifies the number of units to order that result in the lowest total of these two cost.

Fitzsimmons (2004), Winston (1994) and Tanwari et al. (2000) reported that the basis for material management processes and help to define how stock is managed and is an appropriate technique for classifying inventory items according to the importance of their contribution to the annual cost of the entire system.

Ravindra Kumar, 2004 describes materials management as a truly creative, productive and profit centre.

Yusuf (2003), The Economic Order Quantity is that which can be secured at what is known as “the least unit cost”. It is not necessarily correct to buy materials at the lowest price obtainable. The object of effective store control is to purchase materials to the amount which secures an uninterrupted supply of the commodity at the least ultimate costs. It is the cost of the materials issued to the using department which is of prime importance, not the actual cost of the goods when received from the supplier.

Render (2003), vocally pointed out that an inventory is any stored resources that are used to satisfy a current or a future need.

Ghosh and kumar (2003), Inventories are basically stocks of resources held for the purpose of future production and/or sales. Inventories may be viewed as an idle resource which has an economic value. Better management of inventories would release capital for use elsewhere productively.

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Coyle et al., (2003) have pointed out that Inventory is an asset on the balance sheet of companies has taken on increased importance because many companies are applying the strategy of reducing their investment in fixed assets, like plants, warehouses, equipment and machinery, and so on, which even highlights the significance of reducing inventory. Further they pointed out that the changes in inventory levels affect return on assets (ROA), which is an important financial Parameter from an internal and external perspective. Reducing inventory usually improves ROA, and vice versa if inventory goes up without offsetting increases in revenue.

Bloomberg et al. (2002), inventory classification systems help allocate time and money in inventory management and allow firms to deal with multiple product lines and multitude of stock-keeping units (SKU).

Sambasiva Rao. K (2002) In his Study on Materials Management in Public Sector Ship Building Industry evaluates. The performance of materials management and identifies some problems faced by materials management in documentary evidence and survey of expert opinion. He evaluates the existing purchase systems and lead time involved in procurement of materials and suggests that the long lead time should be reduced. His study points at the excess inventory in terms of number of months cost of production in all the engineering units. He also highlights some of the problems in the area of materials management such as delay on the part of customers in supplying their own materials, existence and disposal of surplus and non-moving items, excessive lead times and excessive dependence on imports. According to him the administrative and procurement lead times of the company are on the higher side due to the peculiar nature of the industry. He suggests liberalized purchase procedures, increased financial powers to the personnel, Opening up of liaison offices in various countries to reduce the lead time.

Letinkaya and Lee (2000), Historically, inventory management has been referred to as excess inventory and inadequate management or shortage of inventory and adequate management practice. Several penalties could be apportioned to excesses in either direction. Inventory problem has escalated as progress in technology increases the ability of organizations to produce goods faster in multiple design variation and greater quality.

Arnold, (2000), For instance, from several yards away a scanner reads the information from radio frequency identification, making it suitable for tracking items stacked on high shelves in warehouses. It also provide excellent anti-theft characteristics and also encode more data than a bar code, in some systems inform the merchants if an item is out of place in the store.

Fuller, (2000) pointed out that It is possible to utilize the concept of ABC model in formation of rational inventory policy which should give the best possible service level to production while minimizing investment costs

Coleman (2000); and six years later Jay & Barry (2006); pointed out inventory management is a science based art of ensuring that just enough inventory stock is held by an organization to meet demand. Hence to sum up with inventory is the availability of any stock or resources used in an organization. Therefore it is to point out that an inventory system is the set of policies that controls and monitors inventory level and determines how large orders should be made, what level should be maintained and when stock should be refilled.

RESEARCH GAP:

The above literature survey failed to highlight the relationship between Finished Stock Turnover Ratio and Raw Material Turnover Ratio for Effective Inventory Control System. Since every research is based on the principle of gap analysis this paper is an attempt to find relationship between Finished Stock Turnover Ratio and Raw Material Turnover Ratio, which is here considered as the research gap.

RESEARCH QUESTIONS:

Following are the three research questions those were addressed in this research paper:

I. What are the factors affecting effectiveness of inventory control systems in Jindal Steel & Power Limited?
II. What are the challenges inventory control system is facing in Jindal Steel & Power Limited?
III. What are the measures to be taken so that they can enhance the effectiveness of inventory control system in Jindal Steel & Power Limited?

RESEARCH OBJECTIVE(S):

Based on the above research questions following objective was prepared.

- To test the relationship between finished stock turnover ratio and raw material turnover ratio for effective inventory control system in JSPL.

RESEARCH HYPOTHESIS:

Hypothesis:

Ho: A well-planned and effective inventory control technique does not provide a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL.

Ha: A well-planned and effective inventory control technique provides a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL.

RESEARCH METHODOLOGY:

In this section the requirement is to find whether a well planned and effective inventory control technique does not provide a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL. To find this there is a need to test the relationship between finished stock turnover ratio (FSTR) and raw material turnover ratio (RMTR). For this it is required to test the causality and co-integration between FSTR and RMTR in JSPL (i) whether there is bi-directional causality between FSTR and RMTR, (ii) whether there is unidirectional causality between the two variables, (iii) whether there is no causality between FSTR and RMTR in JSPL (iv) whether there exists a long run relationship between FSTR and RMTR in JSPL. Here in this case the following hypothesis is tested.

Hypothesis:

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Ho: A well-planned and effective inventory control technique does not provide a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL.

Ha: A well-planned and effective inventory control technique provides a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL.

The choice of the existing model is based on the fact that it allows for generation and estimation of all the parameters without resulting into unnecessary data mining.

The growth model for the study takes the form:

FSTR=f (RMTR) ---(EQ-1)

Where, FSTR and RMTR finished stock turnover ratio and raw material turnover ratio respectively.

Equation (1) is treated as a Cobb-Douglas function with raw material turnover ratio (RMTR) into JSPL, (RMTR), as the only explanatory variable.

The link between inished stock turnover ratio and raw material turnover ratio in JSPL can be described using the following model in linear form:

$LnFSTR_t = \alpha + \beta Ln\ RMTR_t + \varepsilon_t$ ----------------------- (EQ-1.1)

α and $\beta>0$

The variables remain as previously defined with the exception of being in their natural log form. ε_t is the error term assumed to be normally, identically and independently distributed.

Here, $FSTR_t$ and $RMTR_t$ show the finished stock turnover ratio annual growth rate and raw material turnover ratio growth at a particular time respectively while εt represents the "noise" or error term; α and β represent the slope and coefficient of regression. The coefficient of regression, β indicates how a unit change in the independent variable (raw material turnover ratio) affects the dependent variable (finished stock turnover ratio). The error, ε_t, is incorporated in the equation to cater for other factors that may influence FSTR. The validity or strength of the Ordinary Least Squares method depends on the accuracy of assumptions. In this study, the Gauss-Markov assumptions are used and they include; that the dependent and independent variables (FSTR and RMTR) are linearly co-related, the estimators (α,β) are unbiased with an expected value of zero i.e., $E(\varepsilon_t) = 0$, which implies that on average the errors cancel out each other. The procedure involves specifying the dependent and independent variables; in this case, FSTR is the dependent variable while RMTR the independent variable.

But it depends on the assumptions that the results of the methods can be adversely affected by outliers. In addition, whereas the Ordinary Least squares regression analysis can establish the dependence of either FSTR or RMTR or vice versa; this does not necessarily imply direction of causation. Stuart Kendal noted that "a statistical relationship, however, strong and however suggestive, can never establish causal connection." Thus, in this study, another method, the Granger causality test, is used to further test for the direction of causality.

Here we will assume the hypothesis that there is no relationship between finished stock turnover ratio (FSTR) and raw material turnover ratio (RMTR). To confirm about our hypothesis, primarily, we have studied the effect of raw material turnover ratio (RMTR) on finished stock turnover ratio and vice versa by two simple regression equations:

$RMTR_i = a + b*FSTR_i$ …………….. (EQ-2)

$FSTR_i = a1 + b1*RMTR_i$……………… (EQ-3)

FSTR = finished stock turnover ratio.

RMTR = raw material turnover ratio

t= time subscript.

This study aimed to examine the long-term relationship between raw material turnover ratio (RMTR) and finished stock turnover ratio (FSTR) growth in JSPL between 2005-06 and 2014-15. In this research the investigation has been carried out to test the relationship between these two variables by using co-integration procedures. Next, unit root, cointegration procedures were utilized to test the long run relationship between raw material turnover ratio (RMTR) and finished stock turnover ratio (FSTR). The first step for an appropriate analysis is to determine if the data series are stationary or not. Time series data generally tend to be non-stationary, and thus they suffer from unit roots. Due to the non-stationarity, regressions with time series data are very likely to result in spurious results. The problems stemming from spurious regression have been described by Granger and Newbold (1974). In order to ensure the condition of stationarity, a series ought to be integrated to the order of 0 [I(0)]. In this study, tests of stationarity, commonly known as unit root tests, were adopted from Dickey and Fuller (1979, 1981) and Phillips-Perron test. As the data were analyzed, we discovered that error terms had been correlated in the time series data used in this study.

Following equation checks the stationarity of time series data used in the study:

$\Delta y_t = \beta_1 + \beta_1 t + \alpha\, y_{t-1} + \gamma\, \Sigma \Delta y_{t-1} + \varepsilon_t$ -------------------------(EQ-4)

Where ε_t is white nose error term in the model of unit root test, with a null hypothesis that variable has unit root. The ADF regression test for the existence of unit root of y_t that represents all variables (in the natural logarithmic form) at time t. The test for a unit root is conducted on the coefficient of y_{t-1} in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that y contains a unit root is rejected. The null and alternative hypothesis for the existence of unit root in variable y_t is H_0; $\alpha = 0$ versus H_1: $\alpha < 0$. Rejection of the null hypothesis denotes stationarity in the series.

If the ADF test-statistic (t-statistic) is less (in the absolute value) than the Mackinnon critical t-values, the null hypothesis of a unit root cannot be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series

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In this research study Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests are used for testing a null hypothesis that an observable time series is stationary around a deterministic trend. The series is expressed as the sum of deterministic trend, random walk, and stationary error, and the test is the Lagrange multiplier test of the hypothesis that the random walk has zero variance. KPSS type tests are intended to complement unit root tests, such as the Dickey–Fuller tests. By testing both the unit root hypothesis and the stationarity hypothesis, one can distinguish series that appear to be stationary, series that appear to have a unit root, and series for which the data (or the tests) are not sufficiently informative to be sure whether they are stationary or integrated.

In the context of this analysis, the Granger method involves the estimation of the following equations:

If causality (or causation) runs from RMTR to FSTR, the equation is:

$dLnFSTR_{it} = \eta_i + \Sigma\alpha_{11} dLnFSTR_{i,\,t-1} + \Sigma\beta_{11} dLnRMTR_{i,\,t-1} + \varepsilon_{1t}$ ----------------(EQ-5)

If causality (or causation) runs from FSTR to RMTR, the equation is:

$dLnRMTR_{it} = \eta_i + \Sigma\alpha_{11} dLnRMTR_{i,\,t-1} + \Sigma\beta_{11} dLnFSTR_{i,\,t-1} + \varepsilon_{1t}$ -------------(EQ-6)

The Granger causality test is then augmented with an error correction term (ECT) and the error correcting models could be built as below:

$$dLnFSTR_{it} = \eta_i + \Sigma\alpha_{11} dLnFSTR_{i,t-1} + \Sigma\beta_{11} dLnRMTR_{i,t-1} + \lambda ECM_{it} + \varepsilon_{it} \text{-------(EQ-7)}$$

$$dLnRMTR_{it} = \eta_i + \Sigma\alpha_{12} dLn\,RMTR_{i,t-1} + \Sigma\beta_{12} dLnFSTR_{i,t-1} + \lambda ECM_{it} + \varepsilon_{it} \text{----- (EQ-8)}$$

Where, t represents year, d represents first order difference calculation, ECM_{it} represents the errors of long term balance which is obtained from the long run cointegrating relationship between FSTR and RMTR. If $\lambda = 0$ is rejected, error correcting mechanism happens, and the tested long term causality is reliable, otherwise, it could be unreliable. If $\beta 1=0$ is rejected, and then the short term causality is proved, otherwise the short term causality doesn't exist.

Table: 1.1 Result of OLS method

Variable	**Dependent variable is LnFSTR**					
	Unstandardized Coefficient	**Standardized Coefficient**	**SE**	**t-ratio**	**R^2**	**Sig.**
LnRMTR	.527	.898	.091	5.766	.806	.000
	Dependent variable is LnRMTR					
LnFSTR	1.529	.898	.265	5.766	.806	.000

Source: Researcher's own estimate

This section presents the relationship between RMTR and FSTR in terms of OLS Technique. In ordinary least square Method it is observed that the significance values are less than 0.05 in both the cases i.e. 0.000<0.05, it is reject the null hypothesis that there is no relationship between the variable and the results of the Ordinary Least Squares Regression are summarized in the Table 4.13. The empirical analysis on basis of ordinary Least Square Method suggests that there is positive relationship between raw material turnover ratio (RMTR) and finished stock turnover ratio (FSTR) growth in JSPL and vice versa.

Table: 1.2: Probability values after Unit Root Test
with an Intercept and Linear Trend

Variable	**Intercept only**		**Trend & Intercept**	
ADF-TEST	**LnFSTR**	**LnRMTR**	**LnFSTR**	**LnRMTR**
Level				
SIC	0.9903	0.9793	0.5079	0.1807
AIC	0.9903	0.9793	0.5079	0.1807
First differences				
SIC	0.5188	0.1900	0.0395	0.4717
AIC	0.5188	0.1900	0.0395	0.4717
Second differences				
SIC	0.0017	0.1745	0.2404	0.4791
AIC	0.0017	0.1745	0.2404	0.4791

Table 4.14 present the results of the unit root test. The results show that both variables, namely LnFSTR and LnRMTR did not attain stationarity after first differencing, I(1), using ADF test. The augmented Dickey Fuller Test provides result of stationary at first difference at all lag differences. Table-4.14 presents the results of the unit root test for the two variables for their levels, first differences and second differences. The results indicate that the null hypothesis of a unit root cannot be rejected for the given variable as the ADF value is not smaller than the critical t-value at 1% ,5% and 10%level of significance for all variables and, hence, one can conclude that the variables are not stationary at their levels first differences and second differences in ADF test.

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Table: 1.3: Johansen Cointegration Tests

Sample (adjusted): 3 10
Included observations: 8 after adjustments
Trend assumption: Linear deterministic trend
Series: LFSTR LRMTR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.905564	24.31797	15.49471	0.0018
At most 1 *	0.493336	5.439264	3.841466	0.0197

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.905564	18.87870	14.26460	0.0087
At most 1 *	0.493336	5.439264	3.841466	0.0197

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LFSTR	LRMTR
-1.450695	2.859211
5.069760	-2.340927

Unrestricted Adjustment Coefficients (alpha):

D(LFSTR)	0.168162	-0.016334
D(LRMTR)	-0.079274	0.229305

1 Cointegrating Equation(s):	Log likelihood	9.830784

Normalized cointegrating coefficients (standard error in parentheses)

LFSTR	LRMTR
1.000000	-1.970925
	(0.23428)

Adjustment coefficients (standard error in parentheses)

D(LFSTR)	-0.243952
	(0.04285)
D(LRMTR)	0.115002
	(0.23753)

Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen and Juselius (1992) LR statistic for cointegration is conducted. The crucial approach which is used in this study to test cointegration is called the Johansen cointegration approach. The Johanson approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order. The results reported in table (4.15) suggest that the null

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hypothesis of no cointegrating vectors can be rejected at the 1% level of significance. It can be seen from the Likelihood Ratio (L.R.) that it has two co-integration equations. In other words, there exists two linear combination of the variables.

The normalized cointegrating equation is

LnFSTR = 3.324+0.527*LnRMTR ------- (EQ-9)

The standard error is in the parentheses the behavioural parameter (RMTR) is statistically significant at 1%. Estimating the long-run relationship, the results are contained in Equation-9 which shows positive relationship between raw material turnover ratio (RMTR) and finished stock turnover ratio (FSTR). Precisely, 1% increase in RMTR raises the level of FSTR by 0.52%.Therefore, the normalized cointegration equation reveals that there is a positive relationship between raw material turnover ratio (RMTR) and finished stock turnover ratio (FSTR). Looking at the results, the normalized cointegrating Equation-9 reveals that in the long-run, RMTR affects FSTR positively in JSPL.

Interestingly, this result is impressive because 1% change in raw material turnover ratio (RMTR) volume leads to about 0.52% change in finished stock turnover ratio (FSTR) via FSTR growth in the same direction, over the long-run horizon. This of course is highly significant judging from the t-statistic.

The results of Pair-wise Granger Causality between FSTR and RMTR are contained in Table-1.4. The results reveal the existence of a bi-directional causality which runs from FSTR to RMTR and vice versa.

Table: 1.4: Granger Causality test

Pairwise Granger Causality Tests
Sample: 1 10
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.	
LRMTR does not Granger Cause LFSTR	8	18.0027	0.0213	Reject
LFSTR does not Granger Cause LRMTR		1.61565	0.3341	Accept

FINDINGS AND CONCLUSION:

From the above Table-1.4 it is found that for the Ho of "LnRMTR does not Granger Cause LnFSTR", it is to reject the Ho since the F-statistics are rather High and most of the probability values are close to or even smaller than 0.1 at the lag length of 2. Therefore, it is to accept the Ho and conclude that LnRMTR does Granger Cause LnFSTR, but for Ho of "LnFSTR does not Granger Cause LnRMTR", it is to accept Ho and conclude that LnFSTR does not Granger Cause LnRMTR. This means that a well-planned and effective inventory control technique provides a check on the accuracy for finished stock turnover ratio to raw material turnover ratio in stores of JSPL. Hence it is to conclude that there is unidirectional causality between the two variables and the result supports that there exists a long run relationship between FSTR and RMTR in JSPL.

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