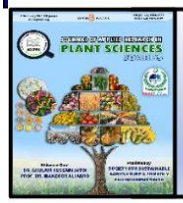
J. Appl. Res Plant Sci. Vol. 4(1), 529-535, 2023, https://doi.org/10.38211/joarps.2023.04.01.63

Research Article

OPEN ACCESS



Available on https://www.joarps.org
Journal of Applied Research in Plant Sciences (JOARPS)
ISSN: 2708-3004 (Online), 2708-2997 (Print)

Market Integration of Wholesale Chilli Prices of Pakistan

Mehar ul Nissa Rais[1*], Tehmina Mangan[1], Jam Ghulam Murtaza Sahito[1], Hakimzadi Wagan[1]
Naeem Ahmed Qureshi[2], Ghulam Mujtaba Khushk[3], Arshad Ali Narejo[3], Zuheb Hussain Mirjat[1]

[1]Department of Agricultural Economics, Sindh Agriculture University, Tandojam-Pakistan.
[2]Department of Statistics, Sindh Agriculture University, Tandojam-Pakistan.
[3]Department of Rural Sociology, Sindh Agriculture University, Tandojam-Pakistan.
Correspondence email: meharrais123@gmail.com
Article Received 08-09-2022, Article Revised 10-01-2023, Article Accepted 26-02-2023

Abstract

Vegetables hold very important and significant place in our diet, among vegetables chilli (*Capsicum annuum* L.) is one of the most important vegetable crop of Pakistan. The vegetable's market integration is the major problem in Pakistan and symbol of efficiency is integrated markets. The present study was conducted for domestic integration of four major chilli markets of Pakistan by using their monthly wholesale chilli prices of eighteen years (June 2000 to July 2019) by adopting Johan-sane integration approach. The Augmented Dickey Fuller (ADF) test revealed that prices are integrated at first difference and results of pair wise integration showed chilli markets of Pakistan (Hyderabad, Lahore and Quetta) are integrated in the long-run and in short run with strong relationship, except Peshawar market because of long distance, price variation & seasonal effects. The results of Vector Error Correction Model **(**VECM) showed significant adjustment of prices in almost three pairs of markets (Hyderabad, Lahore and Quetta) and the finding of Granger causality test showed the bidirectional and unidirectional causality relationship between the chilli markets. Granger causality tests have also indicated that unlike in other market pairs such as Lahore-Peshawar and Quetta-Peshawar have no causality direction on price formation between them. The government should design a network of chilli wholesale markets across the country that are nearly equal distance apart in order to improve market convergence and price transmission to make chilli more profitable.

Key words: *Chilli, Market Integration, Granger Causality and Vector Error Correction Model (VECM)*.

Introduction

History of global market integration began with the 19th century, when significant advancements in international market integration and the development of a genuinely global economy were crucial (Sehar *et al.,* 2018). Global market integration is often referred to as the birth of capitalism (Nazli *et al.,* 2012), the degree of price transmission between two markets that are either vertically or geographically connected is known as market integration (Amit *et al.,* 2006). The word "integration" describes a phase in which the consistency of relationships between independent, social units and improvement of markets (Ali *et al.,* 2018), market integration shows the relationship of the firm in market (Sahito, 2015). Integrated marketing is a systematic approach to ensuring that you are aligned with your message in all marketing channels such as wholesaler, retailors, traders, beopari and commission agents (Hossain and Verbeke, 2010). When markets are well integrated, market forces are believed to be functioning well, which means that price increases in one place are predictably linked to price changes in other locations, and market agents are able to communicate across markets (Mukhtar *et al.,* 2007), simultaneously prices are determined in different places and spread from one market to other market (Gonzalez and Helfand, 2001). Beag and Singla (2014) conducted a study to found the markets integration of agricultural product by applying the Engle-Granger test, cointegration technique and Ravallion test by using secondary price data from 1984-2002. Whereas, Zahid *et al.,* (2007) determined long run wheat's market integration between Lahore as a central market and five other markets of Punjab, Pakistan by using the Engle and Granger test for cointegration. Similarly, the monthly wholesale real price of onion from four regional markets of Pakistan was used to examine spatial market integration with the help of error-correction model (ECM), and found that the onion regional markets have good price linkages and

consequently spatially integrated (Lohano and Mari, 2006). Monthly wholesale price data from 1995 to 2003 of rice (Basmati) markets of Punjab used to estimate the degree of integration with the application of law of one price (LOP) framework and cointegration techniques by Mushtaq *et al.,* (2006). However, Umer *et al.,* 2015 found the four markets of wheat i.e. Hyderabad, Lahore, Multan and Rawalpindi were well integrated except one market (Peshawar). Unit root test used by Sahito, (2015) for the study of cointegration amongst wheat markets of Pakistan. Numerous research undertaken by economists revealed that certain markets were only partially integrated as a result of information gaps, distance, and disparate socioeconomic conditions (Lohano *et al*., 2005; Fayaz *et al*., 2014; Ghafoor *et al*., 2009; Arshad and Hameed, 2009; Ali *et al.,* 2018; Reddy *et al.,* 2012; Sekhar, 2012). Above studies are the evidence, that many researchers were used time series data with the help of different models to examine the market integration of different agricultural commodities, but not a specific empirical evaluation of chilli market integration was carried out in Pakistan until, previous studies have ignored the province wise chilli market linkage and level of integration in the Pakistan. Although, Chilli is economically very important and valuable crop of Pakistan, which is consumed domestically and exported throughout the world (Rais *et al*. 2021). It is a best resource of vitamins (A, C, E & P) as well as having medicinal properties (Choudhary *et al*., 2009). To get more profit, the production and marketing mechanism of chilli markets should be better. Therefore, the aim of the present study is to determine the level of integration of wholesale prices between the markets, evaluate the price transmission by using Vector Error Correction Model (VECM) and find out the causality relationship between the selected chilli markets of Pakistan.

Materials and Methods

For present study the four regional chilli markets of Pakistan were selected i.e Hyderabad, Lahore, Peshawar and Quetta. For market relationships, the monthly wholesale chilli prices in rupee (PKR) from June, 2000 to July, 2019 were used as secondary data (GOP, 2020). Augmented Ducky-fuller (ADF) unit root test applied on secondary chilli prices data to prevent spurious regression, followed by the Johansane cointegration test, VECM (Vector Error Correction Model) and GCT (Granger Causality Test). These methods were used by; Sahito (2015); Hossain and Verbeke (2010); Ghafoor *et al*. (2009); Zahid *et al*. (2007) and Lohano *et al*. (2005).

Market integration test: Following basic relationship is widely used to monitor for the presence of market integration when studying the price relationship between two markets.

$$A_{it} = \gamma_0 + \gamma_1 A_{IJ} + \varepsilon_t$$

Therefore,
A_i = chilli prices in i^{th} market
A_j = chilli prices in j^{th} market
ε = is the residual term
γ_0 = Represent cost

For the identification of stationary or non-stationary results, in 1981, unit root tests was used by Dickey and Fuller. The Akaike Information Criteria were used to choose the lag time .The test is based on the t-statistic of β_1, which is given by the equation below.

$$\Delta A_t = \alpha + \beta A_{t-1} + \gamma t + \sum_{k=2}^{n} \delta_k \Delta A_{t-k} + \varepsilon_t$$

Where,
$\Delta A_t = A_t - A_{t-1}$
$\Delta A_{t-k} = A_{t-k}$,A_{t-k-1}
k= 2, 3 ….n, $\alpha\ \beta\ \gamma\ and\ \delta$ are the parameters

$$A_{it} = a_1 + a_2 A_{jt} + v_{it}$$

Where
A_{it} = price in market *i* at time
A_{jt} = price in market j at time

$$\Delta v_t = \delta v_{t-1} + \sum_{k=2}^{n} \gamma_k \Delta v_{t-k} + \sigma_t$$

Where v_t , v_{t-1}, v_{t-k-1} are residuals at time t, t-1, t-k and t-k-1.

Vector Error Correction Model (VECM): The VECM was used to model the short-term relationship between the country's chilli markets. The following is a description of a bivariate VECM model:

$$\begin{bmatrix}\Delta MP_{1t}\\ \Delta MP_{2t}\end{bmatrix} = \begin{bmatrix}\alpha_1\\ \alpha_2\end{bmatrix} + \sum_{i=1}^{k}\begin{bmatrix}\beta_i^{mP1,P2} & \beta_i^{mP1,P2}\\ \beta_i^{mP1,P2} & \beta_i^{mP1,P2}\end{bmatrix} \times \begin{bmatrix}\Delta MP_{1t-1}\\ \Delta MP_{1t-1}\end{bmatrix} + \begin{bmatrix}\emptyset_1\\ \emptyset_2\end{bmatrix}[ECT_{t-1}] + \begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\end{bmatrix}$$

Where:
$MP1$ = Series of prices in one chilli market and
$MP2$ = Series of prices in other chilli market
$\emptyset_i$ = long-term market reaction to disequilibrium
β_i= Parameter adjustments for lagged (short-run dynamics)
If the two markets are co-integrated then $\emptyset_1 < 0 \; and \; \emptyset_2 > 0$ are the results.

Granger Causality Test: In 1987, Granger and Engle introduced GC test (Granger causality) within a bivariate context, to investigate the causality direction among different markets. The model is as follows:

$$\Delta A_{it} = \theta_{1I}\Delta A_{it-1} + \cdots + \theta_{ln}\,\Delta A_{it-1} + \cdots + \theta_{2n}\Delta A_{jt-n}$$
$$-y_1(A_{it-I} - \alpha A_{jt-1} - \delta)\varepsilon_i$$
$$\Delta A_{jt} = \theta_{3I}\Delta A_{jt} - 1 + \cdots \theta_{3n}\Delta A_{jt-n} + \theta_{4I}\Delta A_{it-1} + \cdots \theta_{4n}\,\Delta A_{it-n}$$
$$-y_2(A_{it-1} - \alpha A_{jt-1} - \delta) + \varepsilon_{2t}$$

Results and Discussion

Trends of wholesale prices of chilli in Pakistan: The results of trends of wholesale prices of chilli shows that the prices in different markets of Pakistan change at same time. Similarly, marketing system of Sindh also shows inefficiencies and prices fluctuations were observed. Tendency of wholesale chilli prices showed that the highest price in Quetta market and lowest price at Hyderabad was recorded, as compared to other chilli markets of the Pakistan during the year 2011-2013 (Figure 1). Results are agreed with Ismail (2015), Ghafoor *et al*. (2009) and Marri, (2010), found some spatial variations between the district market prices as well as some seasonal variations.

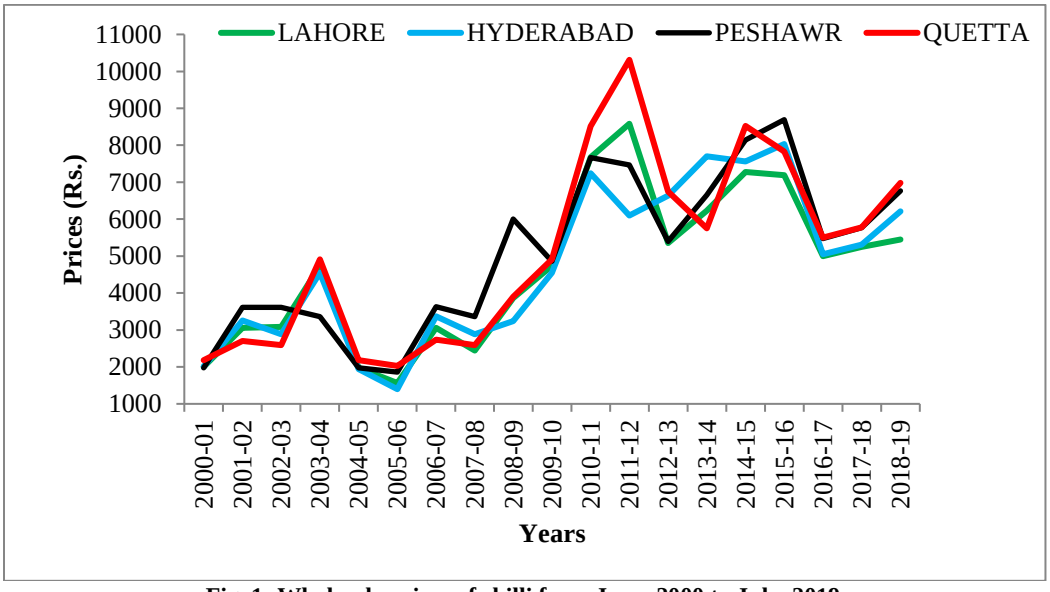


Fig. 1: Wholesale prices of chilli from June, 2000 to July, 2019.

Descriptive statistics of monthly wholesale chilli prices in Pakistan: Table 1 reveals that the low chilli prices varied from Rs.1025/40kg in Hyderabad market to Rs.1317/40kg in Lahore market. The highest chilli wholesale price change from Rs. 12800/40 kg in Hyderabad market to Rs.10418/40kg in Lahore market during the study period. The average prices were found Rs. 4639/40kg in Hyderabad, 4879/40kg in Lahore Rs.5355/40 kg in Peshawar and in Quetta 2810/40kg. Current research indicates that the highest value of standard deviation in the Quetta wholesale market (Rs. 2810) and lowest value in Lahore wholesale market (Rs. 2343) from June, 2000 to July, 2019. Also, Fayaz (2014) indicated that the price variations are major factor in markets; he found minimum price of maize crop was 2998/100 kg in Ahmedabad and maximum price was 12,667/100 kg in Bengaluru market in India during the study period, results of current study are accordance with Sehar *et al*. (2018). The results of probability in all market less than 0.5% confident level which means the null hypothesis is significant.

Table 1. Descriptive statistics of monthly wholesale prices for chilli in selected markets from June, 2000-July, 2019.

Markets	Monthly wholesale price (PKR)			Standard deviation	Probability
	Minimum	Maximum	Mean		
Hyderabad	1025.00	12800.00	4639.41	2372.71	0.001
Lahore	1317.00	10418.00	4879.14	2343.49	0.001
Peshawar	1600.00	9800.00	5355.34	2441.60	0.003
Quetta	1800.00	12920.00	5380.22	2810.46	0.001

Unit root test: In current research, Augmented Dickey-Fuller (ADF) test was used on four wholesale price series of chilli markets to determine the integration. The existence of unit root is refused at 1% level of significance for all price series after their first difference (Table 02). Unit root test result provides the evidence that whole price series are found non-stationary at level but stationary at first difference during ADF test, the results are in agreement with Lohano and Mari, (2006); Mukhtar and Tariq (2008); Ghafoor *et al*. (2009) and Umar *et al*. (2015). On the basis of unit root test results, we moved for the co-integration test to examine a long-run relationship between different market prices.

Table 2. Unit root test (Augmented Dickey Filler).

Markets	At level	At 1st difference
Hyderabad	-1.74475	-8.97191
Lahore	-1.40789	-8.90016
Peshawar	-1.50194	-9.04408
Quetta	-1.894343	-7.32851
Markets	At level	At 1st t difference
C Values (Critical): 1 percent level 5 percent and 10 percent are -3.454, -2.872 and -2.573.		

Pairwise co-integration test: Result of long-run equilibrium relationship between three pairs of regional chilli markets are presented in table 03. Trace statistics and maximum Eigen value statistics recommend a co-integration relation in three pairs of four markets except only one pair of chilli market. Peshawar markets partially integrated because of long distance, price variation & seasonal effects, Mushtaq et al. (2006) and Ghafoor *et al*. (2009) also found overall integration in grain and fruits markets. Numerous empirical research carried out by Francesca *et al*. (2004), offer economic and statistical proof of integration or segmentation at the country level.

Table 3. Pairwise co-integration test results (logged chilli market prices).

Markets	H_0	H_1	Trace value	M-Eigen-value
Log Hyderabad Log Lahore	I=0 I≤1	I≥1 I≥2	33.285 (15.49)** 03.832 (3.84)	29.453(14.264)** 03.832 (3.84)
Log Hyd-Log Peshawar	I=0 I≤1	I≥1 I≥2	09.262 (15.49) 03.550 (3.84)	05.711 (14.264) 03.55 (3.84)
Log Hyd-Log Queeta	I=0 I≤1	I≥1 I≥2	24.151 (15.49)** 04.906 (3.84)**	19.245 (14.264) ** 04.906 (3.84)

The results of joint co-integration indicates that the trace statistics as well as the maximum eigenvalue statistics shows that three markets are co-integrated except Peshawar market. Sahito (2015) used application of Johansen co-integration tested for analyze long-run market integration between five markets of wheat of Pakistan and found wheat markets of Pakistan are very well integrated in the long run. Fayaz & Naresh (2014) determined overall cointegration test have indicated that different wholesale apple markets in the country are well-integrated and have long-run price association across them (Table 4).

Table 4. Joint cointegration test results logged chilli market prices.

Market pairs	H_0	H_1	Trace value	M- Eigen-value
Log Hyderabad	I is equal to 0	I greater than or equal to 1	98.813 (47.856)**	65.727 (27.584)**
Log Lahore	I less than or equal to1	I greater than or equal to 2	33.086 (29.797)**	20.044 (21.131)
Log Peshawar	I less than or equal to 2	I greater than or equal to 3	13.041 (15.494)	7.848 (14.264)
Log Quetta	I less than or equal to 3	I greater than or equal to 4	5.912 (3.841)**	5.192 (3.841)**

Vector error correction model results: The results of table 5 shows the significant adjustment of prices in almost all the pairs of markets except the Peshawar market. Mukhtar and Tariq (2008); Ghafoor *et al.,* (2009); Umer *et al.,* (2015) also found significant adjustment of prices in different markets.

Table 5. Vector error correction model results of chilli crop markets of Pakistan.

Chilli market pairs	Speed of adjustment
Log Hyderabad Log Lahore	-0.123906** 0.291099*
Log Hyderabad Log Peshawar	-0.101301** -0.023731*
Log Hyderabad Log Quetta	-0.178189*** 0.182985***

Granger causality test: Granger-causality test are used to analyse cause effect relationship between two markets, the results in table 6 indicate the price in Hyderabad Market Granger-causes the price in Lahore and Quetta. Hyderabad dominates price formation with these regional markets except Peshawar market due to long distance. We found unidirectional and bidirectional causality in the chilli markets of Pakistan. Umer *et al*. (2015) also found unidirectional causality running from Peshawar-Karachi -Lahore among wheat markets. Similarly, Ghafoor *et al*. (2009) applied Causality test; result shows that the Karachi market has bidirectional causality with Lahore-Faisalabad-Multan-Hyderabad and Sukkur and a unidirectional relationship with the rest. Also, current research findings are in agreement with Zahid *et al*. (2007).

Table 6. Pairwise Granger causality tests.

Null Hypothesis	F-Statistic	Probability	Decision
logLahore No Granger Cause logHyderabad	0.97166	0.3801	Reject H_0
logHyderabad No Granger Cause logLahore	5.98350**	0.0029	Reject H_0
logPeshawar No Granger Cause logHyderabad	0.37199	0.6898	Accepted H_0
logHyderabad No Granger Cause logPeshawar	0.46818	0.6268	Accepted H_0
LogQuetta No Granger Cause logHyderabad	3.03389	0.0701	Accepted H_0
logHyderabad No Granger Cause logQuetta	2.64005*	0.0536	Reject H_0
LogPeshawar No Granger Cause logLahore	1.21333	0.2992	Reject H_0
LogLahore No Granger Cause logPeshawar	0.48332	0.6174	Accepted H_0
LogQuetta No Granger Cause logLahore	8.53078**	0.0003	Reject H_0
log Lahore No Granger Cause logQuetta	3.39854*	0.0352	Reject H_0
logQuetta No Granger Cause logPeshawar	0.12692	0.8809	Accepted H_0
logPeshawar No Granger Cause logQuetta	5.02709**	0.0073	Reject H_0
Note: * & ** shows the rejection of null hypothesis at 0.05 and 0.01 level of significance, respectively.			

Conclusion

It is concluded that the chilli markets of Pakistan (Hyderabad, Lahore and Quetta) are integrated in the long-run and in short run with strong relationship, except Peshawar market because of long distance, price variation & seasonal effects. High price fluctuations from 2000-2019 in different chilli markets of Pakistan were observed. Also, all price series are found stationary at first difference during ADF test. Findings of join-cointegration shows long-run equilibrium relationship between three pairs of chilli markets except one market Peshawar due to long distance, price variation and seasonal effects, the Error Correction Model (VECM) achieved adjustment of prices of whole pairs of markets were significant and current research found unidirectional and bidirectional causality in the chilli markets of Pakistan. Furthermore, the result shows Hyderabad dominates price formation with these regional markets except Peshawar market due to long distance. Granger causality tests have also indicated that unlike in other market pairs such as Lahore-Peshawar and Quetta-Peshawar have no causality direction on price formation between them.

Recommendations

The study's main recommendation is to design a network of chilli wholesale markets across the country that are nearly equal distance apart in order to improve market convergence and price transmission to make chilli more profitable. Government role needs to be invoked, wherever necessary, to remove market imperfections in the interest of producer and consumer. The study pinpointed the need for maintaining time series data for different indicator so as to create a reliable management information system for planning, appraisal, implementation, monitoring and evaluation of production, marketing, and exports for chilli in the long run.

Acknowledgments:

Current research is the part of PhD thesis; Dr. Mehar Ul Nissa Rais (PhD Scholar) is highly thankful to Worthy Vice Chancellor Professor Dr. Fatah Muhammad Marri for his valuable for guidance and input in the thesis draft. Scholar is also thankful to supervisory committee for their extraordinary and inspiring supervision and help at every step during current research.

Novelty Statement:

The findings of the study may have a significant impact on the policies formulation about chilli prices & market regulations, also can be accomplished by improving chilli production efficiency in Pakistan.

Conflict of interest:

The authors have declared no conflict of interest.

References:

Ali, Q., M. T. Khan & M. Ashfaq. (2018). Efficiency analysis of off-season capsicum/bell pepper production in Punjab-Pakistan: A dea approach. *The Journal of Animal and Plant Sciences*, **28** (5): 1508-1515.

Amit, K. R., B. Atteri & P. Kumar. (2004). Marketing Infrastructure in Himachal Pradesh and integration of the Indian apple markets. *Indian Journal of Agricultural Marketing*, **18** (3): 243-261.

Arshad, F.M., & A. Hameed. (2009). The long run relationship between petroleum and cereals prices. *Global Economy finance journal*, **2** (3): 91-100.

Beag, F. A., & N. Singla. (2014). Cointegration, causality and impulse response analysis in major apple markets of India. *Agricultural Economics Research Review*, **27** (2): 289-298.

Francesca, C., V. Errunza & S. Sarkissian. (2004). Industry Risk and Market Integration. *Management Science*, **50** (2): 207-221.

Channa, M.H., M. Sial, G.N. Dahri, A.S. Jamro, T. Solangi, A. Nasir & A. Aamir. (2020). Measuring profitability of chilli Pepper production in Sindh, Pakistan. *Journal of Economic & sustainable development*, **08** (11): 81-89.

Choudhary, B. R., & S.A. Fageria. (2009). Production technology of vegetables. *Sarhad journal of Agriculture*, **1** (1): 66-67.

Dawson, P. J., & P. K. Dey. (2002). Testing for the Law of One Price: Rice Market Integration in Bangladesh. *Journal of International Development*, **14**: 473-84.

Engle, R. F., & C. W. J. Granger. (1987). Cointegration and Error Correction: Representation, Estimation and Testing. Econometrica. **55**: 251-276.

Fayaz, A.B., & N. Singla. (2014). Cointegration, Causality and Impulse Response Analysis in Major Apple Markets of India. *Journal of Economic Research*, **27**(2): 289-298.

Ghafoor, A., K. Mushtaq & Abedulla. (2009). Cointegration and causality: An application to major mango markets in Pakistan. *Lahore Journal of Economics*, **14** (1): 85-113.

Gonzalez, G., & S. Helfand. (2001). The extent, pattern, and degree of market integration: A multivariate approach for the Brazilian Rice Market. *American Journal of Agricultural Economics*, **83** (3): 576-92.

GOP, (2020). Agricultural statistics of Pakistan, 2019-20. Ministry. Food, Agric. Livest., Econ.

Wing, Islamabad, Pakistan. http://www.amis. Pk.

Hossain, M.I., & W. Verbeke. (2010). Evaluation of rice markets integration in Bangladesh. The *Lahore journal of economic*, **15** (2): 77-96.

Ismail, H., (2015). integration Analysis of Rural Wheat Markets in Northern Bangladesh. *Journal of International Logistics and Trade*, **9**: 77-97.

Lohano, D. H., & F. M. Mari. (2006). Testing Market Integration in Regional Onion Markets of Pakistan: Application of Error Correction Model in the Presence of Stationary. *International Research Journal of Finance and Economics*, **1**: 89-97.

Lohano, H. D & Mari, F. M. (2005). Spatial price linkages in regional onion markets of Pakistan. *Journal of Agriculture and Social Sciences*, **01**(4): 25-29.

Mushtaque, K., F. Abbass & Abdullah. (2007). Government intervention and market integration in prominent wheat markets of Pakistan. *Pakistan journal of agricultural sciences*, **44** (2): 356-360.

Mushtaq, K., (2006). Testing the Law of One Price: Rice Market Integration in Punjab, Pakistan. *Pakistan Journal of Agricultural Sciences*, **43** (3): 213-216.

Mukhtar, T & M. Tariq. (2008). Price Integration in Wholesale Maize Markets in Pakistan. *Journal of Pakistan development review*, **5** (3): 1075-1084.

Nazli, H., S.H. Haider & A. Tariq. (2012). Supply and demand for cereals in Pakistan, 2010-2030. IFPRI Working Paper No. 005, International Food Policy Research Institute, Washington, DC, USA. 34 p.

Rais, M.U.N., T. Mangan, J. G. M. Sahito & N. A. Qureshi. (2021). A trend analysis: Forecasting growth performance of production and export of chilli in Pakistan. *Sarhad Journal of Agriculture*, **37** (1): 220-225.

Reddy, B.S., S.M., Chandrashekhar, A.K. Dikshit & Manohar, N.S. (2012). Price trend and integration of wholesale markets for onion in metro cities of India. *Journal of Economics and Sustainable Development*, **3** (70): 120-130.

Sahito, J. G. M. (2017). Market integration of wheat in Pakistan. *Journal of Agriculture Research*, **55** (3): 545-556.

Sehar, S., M. Ling, S. Hassan & J. Han. (2018). Price volatility spillover in domestic cotton markets of Pakistan: an application of DCC-Mgarch model. *The Journal of Animal and Plant Sciences*, **28** (4): 1152-1162.

Sekhar, C.S.C. (2012). Agricultural market integration in India: An analysis of select commodities. *Food Policy*, **37** (3): 309-322.

Umer, I . A, l. Yiug & Khalid, M. (2015). Spatial price transmission in Pakistan: the case of wheat and rice market. *Pakistan journal of agriculture research*, **28** (4): 25-39.

Zahid, M. S., A. Qayyum & W. S. Malik. (2007). Dynamics of wheat market integration in northern Punjab, Pakistan. *The Pakistan development review*, **46** (4): 817-830

.