Gravity model and International Trade: Importance of Determinants of India's Gems and Jewellery Exports (2000-01 to 2023-24)

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INTRODUCTION

Foreign trade encourages growth and development by efficiently using resources of the country. As development process starts, the structure of trade undergoes a change in terms of composition and direction. The development leads to growth in production of non –traditional items and the diversification of markets from traditional to non-traditional (Ricardo,2017). The diversification of markets creates scope for manufacturers where they can sell and generate earnings for the country. The export earnings finance the essential developmental imports especially for the developing countries. Product-wise and Destination-wise exports of a country gives an idea about the structural shifts and diversification of the export destinations. The shift from traditional markets to non-traditional markets represents new opportunities for the exports of developing countries. Also, this structural shift prevents developing countries from risk and helps in increasing foreign exchange earnings. The exports of commodities by a country which other country demand it, gains stock of essential goods and benefits the former country in terms of gain in foreign reserves (Helpman, 1987).

Indian economy underwent a major structural change in the form of economic reforms in the year 1991. Therefore, the time period for the present study is taken from 2001-02 to 2023-24 . For the analysis of Gravity model, the data on Gross Domestic Product and Gross Domestic Product per capita of India and partner countries (in current US$) has been obtained from World development Indicator database of World Bank, the data on the exchange rates for all countries (in national currency per US $) are obtained from International Financial Statistic (IFS) database of International Monetary Fund (IMF), the data on the distance (in kilometer) between capital of India and other capital cities of partner countries and language are taken from CEPII (French Centre d'EtudesProspectives et d'InformationsInternationales) and the data for India's exports of gems and jewellery and sub-categories and its partner countries data has been obtained from Gems and Jewellery Export Promotion Council (GJEPC) Reports, Export Import Data Bank, Department of Commerce, Ministry of Commerce and Industry, Government of India and few internet sources. The gravity model of trade is one of the most popular empirical tools to explain trade flows among trading partners and an important model in international economic studies. To understand the trade pattern in the world, Jan Tinbergen introduced the core gravity model to international trade in 1962 which was derived from Newton's theory of gravitation: "Just as gravitational attraction between any two objects is proportional to the product of their masses and diminishes with distance, the trade between any two countries is, other things equal, proportional to the product of their GDPs and diminishes with distance". The derived gravity equation for trade can be expressed as:

$$Trade_{ij} = \frac{GDP_i \times GDP_j}{Distance_{ij}} \qquad (1)$$

Where trade$_{ij}$ is the volume of trade between two trading countries i and j. GDP$_i$ and GDP$_j$ are the national incomes of country i and j and distance$_{ij}$ denotes the distance between two countries (as proxy of trade cost). The above equation is often transformed into a linear log form as follows:

$$\log(Trade_{ij}) = \alpha + \beta_1 log(GDP_i \times GDP_j) - \beta_2 log(Distance_{ij}) + \mu_{ij} \qquad (2)$$

Equation (2) is core gravity model equation where trade is assumed as positive function of income and negative function of geographical distances. To estimate the trade effects for a particular time the classical gravity model was based on the cross sectional data. However, the panel data methodology has an advantage over cross sectional data as it captures the relevant relationship among variables over time by using more information and combines both time series and cross sectional data. The use of panel data allows minimization of bias generated by heterogeneity across countries (Maryam and Mittal, 2019).

In order to analyze the international trade by means of gravity model it is necessary to insert more variables beyond the original ones like territorial boundaries, common languages, common participation in trade agreements and others (Cardoso, 2016). Generally the large economies spend large amount on imports as they have large incomes. They also attract large shares of other countries expenditure because of their production of wide range of products. So, trade between any two countries depends on the size of the economy or their GDP (Krugman and Obstfeld, 2009 and Wani et al., 2016).

Classical gravity model focuses explicitly on GDP as an important determinant of trade. As per capita GDP helps in indicating the level of development of a country, it serves an important role in the regression equation (Rahman, 2006). To distinguish influence between H-O and Linder hypothesis on trade—a term for the difference in per capita Gross Domestic Product and Relative Factor Endowment are added to the standard formulation of the gravity model to capture the distinctive feature of each. The Linder hypothesis would be supported by a negative sign on these terms, while the Hecksher-Ohlin hypothesis would be supported by a positive sign. Both hypotheses are put to the test.

Distance seems to be a reasonable measure of averaging across the different modes of transportation and it works well in practice. While **common language** is expected to reduce transaction cost as speaking the same language helps in facilitating trade negotiations (Batra, 2006). The inclusion of **exchange rate** in the demand equation is important because the price of gems and jewellery products on the world market is quoted in US$, and changes in the exchange rates of the local currencies against the US $ would affect the domestic price of gems and jewellery products and hence the demand for gems and jewellery products (Marbuah, 2018). The trade openness variables of India and partner country i.e., Export GDP ratios are also considered as major determining factors of India's exports(Rahman, 2006). These ratios indicate the relative importance of international trade in the economy of a country. In order to identify the major determinants of India's gems and jewellery exports, panel data estimation technique has been employed in a gravity model framework.

The chapter is explained in two parts: a) the determinants of India's exports of gems and jewellery to its top four concentrated countries for the period 1990-1991 to 2017-2018. b) the determinants of India's exports of top four concentrated gems and jewellery sub-categories to top four countries for the period 1990-1991 to 2017.
the study.

Theoretical Framework:
Gravity Model:
The Gravity model is just like Newton's theory of Gravity,1687: Just as the gravitational attraction between any two objects is proportional to the product of their masses and diminishes with distance, the trade between any two countries, other things being equal, proportional to the product of their

GDPs and diminishes with distance. Broadly speaking, large economies tend to spend large amount on Imports because they have large incomes. They also tend to attract large shares of other countries' spending because they produce a wide range of products. So, the trade between any two countries is larger, the larger is either economy or their GDP. The distance between any two economies is directly and proportionally related to transaction costs. We all know that with increasing costs, trade always decreases. So, trade is inversely related to distance between the two countries, (Paul R. Krugman, Maurice Obstfeld,2009).

In the present paper, Gravity Model analyse the significance of these theories:-

Eli Heckscher-Bertil Ohlin Theory:

Eli Heckscher (1919) and Bertil Ohlin (1933) propounded the theory of international trade which described that different endowment of resources in the countries leads to international trade. Heckscher–Ohlin trade theorem explicitly states that a nation will export the commodity whose production requires the intensive use of the nation's relatively abundant and cheap factor and import the commodity whose production requires the intensive use of the nation's relatively scarce and expensive factors. The present study checked the significance of H-O theory by using the variable "Relative Factor Endowment" in the gravity model which explain that difference in factor endowments is reason for the increase in trade between the countries. "Relative Factor Endowment is defined to be the absolute value of the difference between natural logarithm of capital – labor ratio in Egger (2000) to represent the factor endowments of production. However, Egger (2002) gave more simplified definition for Relative Factor Endowment as the absolute value of the difference between natural logarithm of per capita GDP". Here, we are considering Relative Factor Endowment as the absolute value of the difference between natural logarithm of per capita GDP. If Relative Factor Endowment has positive sign, this shows the support of H – O theory and the negative sign of it support the Linder's hypothesis (Salvatore, D., 2004; Kabir, M., &Salim, R., 2010).

Linder's Hypothesis:

The hypothesis was proposed by economist Staffan Burenstam Linder in 1961 which states that "the more similar the demand structure of two countries, the more intensive, potentially, is the trade between these two countries".If two countries having the same pattern of demand then all the exportable and importable products of the two countries will also be the same. Linder theory is primarily demand-side oriented which are important in explaining the patterns of international trade. The present study checked the significance of the variable "Difference in Per Capita GDP" in the Gravity Model. This variable is specifically used to test of the Linder Hypothesis, which posit that "countries with similar levels of per capita income will exhibit similar behaviour, produce similar but differentiated products and trade more amongst themselves." If per capita income differential has negative sign, this will support the Linder's hypothesis and the positive sign of it shows the support of H – O theory (Batra, A., 2006; Kabir, M., &Salim, R., 2010 and Wani et.al., 2016).

New Trade Theory

Paul Krugman founded a new trade theory in 1979. He showed that the nature of trade depends on similarity of countries in terms of factor endowments, as factor endowments depends upon per capita GDP also. The present study checked the significance of the variable "Similarity Index" in the Gravity Model which is defined as the logarithm of an index that captures the relative size of two countries in terms of GDP. If Similarity in per capita GDP has positive sign, it will support the new trade theory and the negative sign of it will support the H – O theory (Kabir, M., &Salim, R., 2010; Breuss, F., & Egger, P., 1999 and Serlenga, L., & Shin, Y., 2007).

Review of Literature:

Fitzsimons et.al. (2009) studied the volume of North-South trade in Ireland with the help of the Gravity model approach. The paper covered the study period of 1970-1992 and collected data from World Trade Organisation (WTO). The paper found that North-South trade in Ireland was greater rather than the expectation of being less on the basis of the international experience and the elasticity of the trade flows with respect to distance close to -0.6, i.e., similar to the other values found in the studies.

Martínez-Zarzoso& Nowak-Lehmann(2011) applied the gravity trade model to assess Mercosur-European Union trade, and trade potential following the agreements reached between both trade blocs for the years 1990-91 to 2000-01. The model is tested for a sample of 20 countries, the four formal members of Mercosur plus Chile and the fifteen members of the European Union. Furthermore, a number of variables, namely, infrastructure, income differences and exchange rates added to the standard gravity equation, are found to be important determinants of bilateral trade flows.

Baltagiet.al.(2012) discussed the full interaction effects design to analyze bilateral tradeflows betweenEU15, USA and Japan and their most important57 trading partners over the time period 1986-1997. The data source was Direction of Trade Statistics- Yearbook, IMF, 1999.Their analysis fully supported the new trade theory and linder's hypothesis. The article declared the significance of all the interaction effects and absence of any of the effect will lead to biased estimates and misleading interpretation.

Hufbaueret.al. (2015) studied the impact of economic sanctions on the US trade that were imposed in the period of 1990's (i.e., from 1990-91 to 1999-00) with the help of the gravity model. The paper fully concentrated on finding out the effectiveness of the sanctions as a policy tool and the centre of the public discourse and found that the economic sanctions were fully effective in taking the economy out of the war situation.

Erdem, E., &Nazlioglu, S. (2023) analysed the determinants of the agricultural exports of the Turkish to the European Union with the help of the gravity model. The paper concluded that there was a significant positive impact of the membership of the European Union – Turkey on the agricultural exports of the Turkey and also its market shares.

Yan (2022) analysed the static trade effects in China under CAFTA (China-Asean Free Trade Area) with the help of the Gravity model. The paper established two gravity models and used the panel data of 22 sample countries and areas from 2000 to 2004 and investigated the static trade effects in China after the establishment of CAFTA. Finally, the paper recommended that the future research can be more focussed on analysing the trade effects in some certain industry.

Kabir&Salim (2010) attempted to explain the pattern of trade with the help of augmented gravity model. It examined the significance of serial correlation, heteroscedasticity in both exports and imports of BIMSTEC (Bay of Bengal Initiative for Multi Sectoral Technical and EconomicCooperation. The estimates of regression showed that the imports of BIMSTEC supports linder's hypothesis which depicts that countries having similar GDP trade with each other, while the exports supports Heckscher- Ohlin Samuelson hypothesis which means usually those countries trade with each other which differ in per capita GDP.

Mitze(2010)made an elaborative study to analyze the impact of trade costs on international activity, mainly studied European boarder regions for the years 1999 to 2008. The report mainly used two models, Hausman Taylor model (HT) and Fixed Effects VectorDecomposition (FEVD) model. It arrived at a conclusionthat HT model works better for time varying variable and FEVD for time fixed variables andthe choice of appropriate estimator is veryessential to avoid any kind of discrepancy.

Alleyne and Lorde (2014) studied the controlling factors of CARICOM trade with the rest of the world with the help of the gravity model for the study period 1995-2012. The Gravity model

revealed that traditional variables played a very important role in the determination of the total international trade for countries within the CARICOM region and the growth in GDPs of member states and their trading partners should result in improvement oftraded volumes. The paper concluded that the CARICOM region should heavily consider the markets which are least remote and not those where a long historical ties exist with transportation efficiency.

KG &Aswal (2018)attempted to find out the determinants ofmanufactured exports to developing and developed countries with the help of augmented gravity model for the years 2001 to 2010. The theoretical framework behind this model basically revolves around new tradetheory, linder's hypothesis and Heckscher -Ohlin theory of trade. Data sourced from UNCTADStatisticDatabase, UNIDO, WDI and World Bank. The study found that new trade theory variables andHeckscher Ohlin theory are supportedby the model, but the coefficients for total Gross Domestic Productfor developing countries are more significant than developed countries and this indicates that the indicesfor trade relations with developing countries are better than the developed countries.

The present paper is based on post-reform period, i.e., from 2001-02 to 2023-24 and the main **objective** of the present study :

1)To analyse the significance of determinants of India's gems and jewellery exports .
2) To analyse the significance of geographival distance in India's gems and jewellery exports .
3) To analyse the significance of Similarity Index in India's gems and jewellery exports .
4) To analyse the significance of new trade theory in India's gems and jewellery exports .

Determinants of India's Gems and Jewellery Exports

The top four concentrated countries to which India is exporting gems and jewellery for the study period (1990-91 to 2017-18) are U.S.A., HongKong, U.K. and Switzerland and the following are the results for the same.

Panel Unit root test analysis

Table 1.1 shows the results of the ADF – Fisher test. Including an intercept in the ADF regression, the results show that all the variables contain unit root at level except log exchange rate which is stationary at level. Stationarity is achieved after first differencing of the variables. Hence, it was conclude that all the variables are integrated of order one (i.e., *I(1)*), an indication of a possible long run relationship among the variables. So, the integrated variables at level and first difference are significant at 1% level of significance.

Table 1.1. Panel unit root test of Gems and Jewellery Exports

Variables	Augmented Dickey Fuller test (Chi-square)	
	Level	First difference
	Statistic (prob.)	Statistic (prob.)
Logof totalgems and jewelleryexports	7.7929(0.4540)	20.7751(0.0078)*
Log of TGDP	1.6828(0.9920)	39.8778(0.0002)*
Similarity Index	1.3478(0.9950)	36.2808(0.0001)*
Relative Factor Endowment	0.5821(0.9998)	40.9887(0.0005)*
Logof Exports /GDP INDIA	15.0853(0.0575)	22.6973(0.0038)*
Exchange rate	35.9838(0.0000)*	0 (0)
Log of Exports/GDP All four countries	7.3771(0.4965)	27.219(0.0006)*

Note: * and ** represent 1% and 5% significance levels. All the variables except exchange rate (stationary at level) are stationary at first difference as p value is below 0.05. Degree of freedom =110 (i.e., n-1, where n is no. of observations). DF statistic F critical values are 8.73,6.49 at 1%,

and 5% level of significance respectively for sample size 100. First difference denotes rejection of Null hypothesis of unit root at 1% levels respectively.

Panel Cointegration test analysis

As all the series contain a single unit root, testing for cointegration is feasible. For I (0) and I (1) variables, Kao panel cointegration test has been used for the purpose of investigating the long run relationships between the variables. The results of panel cointegration test confirm the existence of a long-run cointegration relationship between the variables.

Table1.2: KAO Residual Co-integrationtest

ADF	t-statistic	Probability
	-3.2697*	0.0005

Note: * and ** represent 1% and 5% significance levels. The null hypothesis: There is no cointegration. Rejected null hypothesis and estimated parameters are significant at 1% level of significance. DF statistic t-critical values (with constant) are -3.51 and -2.89 at 1% and 5% level of significance respectively for Sample size 100 (the closet number to our sample of 96 observations).

Panel least square regression analysis

The gravity model uses panel data to estimate trade effects and trade relationships over the time period i.e., 2001-02 to 2023-24. The results of gravity model estimated for India as reporting country with top four concentrated countries: U.S.A., Hong Kong, U.K. and Switzerland as partner countries to which India is exporting Gems and Jewellery products based on the following equation:

$RX_{ijt} = B_I + B_2 InTGDP_{ijt} + B_3 lnSGDP_{ijt} + B_4 lnRFE_{ijt} + B5lnRER_{ijt} + B6lnDisij + B_7CL_{ij} + B_8lnEGDP_{it} + B_9EGDP_{jt} + E.$

The estimated results of gravity model of India's gems and jewellery exports are shown in the Table 4.3. In the estimation process, total GDP, similarity index,Relative Factor Endowment (RFE), Distance, Relative Exchange Rate (RER),export/GDP ratio of other countries and dummy variable, i.e., common language are found to be significant at 1% level of significance. Export/ GDP ratio of India found to be significant at 10 % level of significance.The values of R- squared and Adjusted R-squared are 0.8214 and 0.8042 respectively. The F- ratio (probability of F-statistic) is significant.

In our estimation, the variables with **expected positive signs and significant** at 1% level of significance are total GDP and Relative Exchange Rate (RER) of selected partner countries which indicate the important determinants for India's gems and jewellery exports. It implies that with 1% increase in total GDP of India and other country for the considered study period (1990-1991 to 2017-2018), the exports of the India's gems and jewellery exports in India increase by 11.75%. The estimated coefficient of exchange rate shows that a unit increase in the exchange rate of national currency to the dollar will result in an increase of dollar9.17 million in value of India's gems and jewellery exports to selected partner countries. It also implies that depreciation of an exporting country's currency relative to the dollar makes the exporting country's gems and jewellery exports less profitable, leading to decrease in exports flow. Only Exports/GDP ratio of India in our regression model was found to be significant at 10% level of significance with the expected sign.The variable with **expected negative signs and significant** at 1% level of significance is Exports/ GDP Ratio of selected partner countries. The Export-GDP ratio of partner country was found to be significant in our regression model at 1% level of significance.

To support theoretically, the theories of H-O, Linder and New trade are considered. To test for the strength of the Linder hypothesis as against the Hecksher – Ohlin hypothesis, the log of RFE has been included. The log Relative Factor Endowment appears as positive and significant for model. The estimation results of Gravity model for gems and jewellery exports support the H-O theory

which implies that countries with different levels of per capita income and different preferences will trade more with each other. The positive sign of RFE supports the H-O theory and the negative and significant Similarity Index also supports the H-O theory over the new trade theory in case of India's exports of gems and jewellery.

The variables common language and distancewere found to be insignificant in our regression model with expected signs. Thus in our estimation, most of the variables are found with the expected signs and are significant at different levels which explains the importance of determinants in India's exports of gems and jewellery exports to the concentrated countries (i.e., U.S.A., Hong Kong, U.K. and Switzerland).

Table 1.3: Gravity modelestimatefor India's Gemsand Jewellery Exports

Independent variables	Coefficient	(t-statistic)	Standard error
C	4.0943	$(2.8909)^{*}$	1.4209
CL_{ij}	4.9610	(0.7043)	7.0434
$lnRER_{ijt}$	-9.1763	(-7.0527)*	1.3011
$lnDIS_{ij}$	-4.5710	(-0.6893)	6.6312
$ln(X/GDP)_{it}$	12.1939	(1.6910)***	7.2111
$ln(X/GDP)_{jt}$	-7.7612	(5.0322)*	1.5423
$ln(TGDP)ij$	11.7529	(6.1822)*	1.9011
$ln(RFE)_{ij}$	23.7119	(3.0011)*	7.9011
$ln(SGDP)_{ij}$	-4.9810	(-4.4251)*	1.1256
R-squared	0.8214		
Adjusted R-squared	0.8042		
Prob(F-statistic)	0.0000		

Note: *=1%, **=5% and ***=10%. Degree of freedom=103 (i.e., n-k, where n= 111 as no. of observations and k = 8 as no. of explanatory variables excluding constant term).

t - statistic critical values are 2.617, 1.980 and 1.658 at 1%, 5% and 10% level of significance.

Comparison among models of India's exports of gems and jewellery:

In this chapter, the following hypothesis has been tested:

$H1_0$: Geographical distance between India and the importing country is not a significant determinant of India's gems and jewellery exports.

$H1_1$: Geographical distance between India and the importing country is a significant determinant of India's gems and jewellery exports.

$H2_0$: Similarity index between India and the importing country is not significant in terms of new trade theory or H-O theory.

$H2_1$: Similarity index between India and the importing country is significant in terms of new trade theory or H-O theory.

$H3_0$: Relative Factor Endowment is not significant determinant in terms of H-O theory or Linder Hypothesis.

$H3_1$: Relative Factor Endowment is significant determinant in terms of H-O theory or Linder Hypothesis.

From the empirical evidences of the five models, it is observed that Total GDP, RFE, Similarity Index and Export/ GDP ratio of India of gems and jewellery exports are crucial determinants. These variables are found largely significant in all five models. Particularly, total GDP allows us to explore the link between a country's trade with partner country as a good indicator of general health of the economy. The India's Export- GDP ratio is significant factor for increasing India's trade in case of gems and jewellery exports. Relative Factor Endowment (RFE) supports the H-O theory and

found as important determinant in gems and jewellery exports model which implies that it rejects the null hypothesis ($H3_0$) and accepts the alternate hypothesis ($H3_1$) that Relative Factor Endowment is significant determinant in terms of H-O theory.

Another variable, the Similarity index supports New Trade theory for gold and non-gold exports whereas for gems and jewellery, coloured gemstones and cut & polished diamonds exports, it supports the H-O theory which implies that it rejects the null hypothesis ($H2_0$) and accepts the alternate hypothesis ($H2_1$) that Similarity index between India and the importing country is significant in terms of both new trade theory or H-O theory. With regards to the distance effect, all models supports that transportation costs are inversely related to India's exports of gems and jewellery and its sub- categories although this variable is found to be insignificant for the gems and jewellery and non- gold exports when estimated separately which implies that it rejects the null hypothesis and accepts the alternate hypothesis that Geographical distance between India and the importing country is a significant determinant of India's gems and jewellery exports except for the above mentioned cases(i.e., gems and jewellery and non-gold exports).

The exchange rate is found to be insignificant for gold, coloured gemstones and cut &polished diamonds exports whereas for gems & jewellery and non-gold it is found to be significant. The language as dummy variable is found significant forgold, coloured gemstones and cut & polished diamonds exports. The Export/ GDP ratio of the selected partner countries is found to be significant for the gems and jewellery exports and its sub- categories except gold exports.

Table 2: Summary of all export models

Independent variables	Gems and Jewellery
$InTGDP_{it}$	Significant (+)
$InRER_{ijt}$	Significant (+)
RFE_{ijt}	Significant (+) H-O
$SGDP_{ijt}$	Significant(-) H-O
$In (X/GDP)_{it}$	Significant (+)
$In (X/GDP)_{jt}$	Significant (-)
$InDIS_{ijt}$	Insignificant (-)
$LANG_{ij}$	Insignificant (+)

Note: significant and insignificant measured at 1, 5 and 10% level of significance for t-statistics. + and – signs represent the positive and negative significant impacts of variables in regression. L implies Linder Hypothesis, H-O implies Heckscher–Ohlin theory and N implies New Trade theory.

As per table 2, in case of similarity index, **gems and jewellery** exports supports Heckscher-Ohlin theory whereas **gold** and **non-gold** exports supports new trade theory in case of similarity index and Heckscher-Ohlin theory in case of relative factor endowment index. The sub-category **coloured gemstones** exports supports Heckscher-Ohlin theory in case of similarity index whereas **cut & polished diamonds** exports supports Heckscher-Ohlin theory in case of similarity index and relative

factor endowment index. The similarity index supports Heckscher- Ohlin theory in case of gems and jewellery exports, coloured gemstones and cut & polished diamonds exports whereas its supports new trade theory in case of gold and non-gold exports. The relative factor endowment index supports Heckscher-Ohlin in case of gold, non-gold and cut & polished diamonds exports.

Table 3:Summary of theoretical support for Hypothesis

Models/ Independent variables	SGDP$_{ijt}$		RFE$_{ijt}$	
	H-O (Hekscher-Ohlin theory)	New trade theory	H-O (Hekscher-Ohlin theory)	LH (Linder's Hypothesis)
Gems and Jewellery Exports	✓	x	✓	x

The present paper summarizes main findings and conclusion of the research work with policy implications for the improvement of India's gems and jewellery exports and its sub-categories during 2001-02 to 2023-24 and in the recent changing economic scenario.

Major Findings :
1. The important determinants were Total GDP, RFE, Similarity Index and Export/ GDP ratio of India's gems and jewellery exports and its sub-categories and they were found to be significant in all the five models.
2. The variable Relative Factor Endowment (RFE) was significant in all the five models (Gems and Jewellery, Gold, Non-Gold, Coloured Gemstones and Cut & Polished Diamonds Exports) and it supported Heckscher-Ohlin theory and rejected Linder's hypothesis.
3. The variable Relative Exchange Rate (RER) was found to be significant for gems and jewellery and non-gold exports whereas for gold, coloured gemstones and cut &polished diamonds exports it was insignificant.
4. The Similarity Index between the India and the importing country was significant in all the five models. This variable supported Heckscher-Ohlin theory for gems and jewellery, coloured gemstones and cut & polished diamonds exports which supports the fact that different endowment of resources in the countries leads to international trade. The nature of trade between India and its concentrated partner countries for gold and non- gold exports depends on similarity of countries in terms of factor endowments.
5. The Export- GDP ratio of India and its selected partner countries was significant factor for increasing India's trade in case of gems and jewellery exports except gold exports of partner countries.
6. The variable geographical distance was found to be significant in all the five models, therefore, it supported that transportation costs are inversely related to India's exports of gems and jewellery.
7. The variables Relative Exchange Rate and Exports/GDP ratio of partner countries were found to be insignificant for gold exports. The gold exports supported New Trade Theory (in terms of similarity index in Gravity model) and Heckscher- Ohlin theory (in terms of Difference in Relative Factor Endowment) .

Policy Implications:
1. The paper observed that Total GDP, Relative Factor Endowment, Similarity Index and Export/ GDP ratio of India of gems and jewellery exports and its sub-categories are crucial determinants in trade as these variables are found largely significant in all five models. In order to boost the exports of gems and jewellery, the future policies must consider these determinants while formulating trade policies for exports.

2. The sub-category gold exports supports New Trade Theory and therefore 'Similarity Index' in trading with the concentrated partner countries which are mostly developed. The variables Relative Exchange Rate (RER) and Exports/ GDP ratio of partner countries $(X/GDP)_{jt}$ were also found to be insignificant in the trading of gold exports with developed countries which clears fact that in order to boost the trade of gold exports, the future policies explore the markets of developing countries also.

3. The sub- categories non- gold and costume/ fashion jewellery exports had comparative disadvantage with high growth so government should focus on these sub-categories by organizing the awareness programme regarding the quality and variety preferences in their export destinations. It will help them to catch up with new trends in global market product planning and development. The government can also establish design development centres to bring new futuristic designs in order to increase their competitiveness internationally.

4. The agencies like DGFT (Directorate General of Foreign Trade), WTO (World Trade Organisation) and GJEPC (Gems and Jewellery Export Promotion Council) must refine their operations and contribute additionally towards export promotion of India's gems and jewellery exports specifically for sub-categories which are recording low growth but still are competitive like pearls.

Limitations:

1. The paper is limited only to exports of gems and jewellery in India and the data used for the analysis is of secondary in nature. The analysis depends on the basis of accuracy and hence suffers from limitations of the same.

2. The paper analysed the data for the post-reform period (2001-02 to 2023-24) and not the pre-reform period and hence it is not possible to compare pre- and post-reform period.

3. The paper analysed the data till 2023-24 as per the availability of the data at the time of data collection.

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