

Structural Asymmetry in Global Production Network: An Empirical Exploration

Satyaki Roy

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Satyaki Roy

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ISID

Institute for Studies in Industrial Development

4, Institutional Area, Vasant Kunj Phase II, New Delhi - 110 070

Phone: +91 11 2676 4600 / 2689 1111; *Fax:* +91 11 2612 2448

E-mail: info@isid.org.in; *Website:* <http://isid.org.in>

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Structural Asymmetry in Global Production Network: An Empirical Exploration

*Satyaki Roy**

[Abstract: The spatial and functional unbundling of production has been facilitated by removal of trade barriers, reduction of transaction costs effected through communication technology, creating opportunities for developing countries to specialize in tasks required for final products. This has increased participation of developing countries such as India in the global production process. However increased participation has been accompanied by declining share of domestic value added in gross exports and rise in foreign contribution to exports. This paper empirically explores the net gain of various advanced and developing countries including India and argues that unit price of inputs and intermediate goods supplied by the developing countries tend to decline over time. The share of manufacturing and standard services has been the lowest in global value added that explains the sad spots in the smile curve. The paper finally argues that global production network is embedded in an asymmetric architecture of institutions that support an asymmetric distribution of rents.]

JEL Classifications: P16, J32, L60, J46

Keywords: GPN, participation rate, value capture, smile curve.

I. Introduction

The spatial and functional fragmentation of production facilitated by technological changes that immensely reduce transaction costs gives rise to new international division of labour articulated through global production network. The unbundling of production and sourcing of inputs from across the world, optimise costs, produce the final product through assembling of various stages of intermediate goods, create brands through design and development for global marketing and reaching to the final consumer requires enormous level of planning across territorial boundaries. MNCs and TNCs are at the apex of this network of contract manufacturing. The 2013 World Investment Report estimates that now over 80 per cent of global trade flows through global production networks led by

* The author is Associate Professor at the Institute for Studies in Industrial Development. This paper is submitted as part of the ICSSR sponsored programme on 'Pathways to India's Industrialisation Addressing Select Critical Issues and Concerns' in 2019.

transnational corporations.¹ The ILO on the other hand estimates that one in five jobs in the world are somehow linked to global value chains. The conventional North-South divide is also undergoing change. It is no longer the case that the South only produces and the North consumes instead China, India and parts of Africa are emerging as destinations for MNCs and TNCs that caused a shift in the geographical share of FDI towards developing countries. The OECD report in 2012 further indicates that between 1990 and 2010, the share of BRIICS economies in the exports of parts and components increased from 0.78 per cent to over 14 per cent. Non-OECD, non-BRIICS, Asia more than doubled their share in the same time period recording a rise from 4.6 per cent to over 9 per cent in 2010. OECD countries' share, at the same time, declines from over 92 per cent of all exports of parts and components to 70 per cent by 2010.² The interdependence of nations in terms of production structure particularly distinguishes this phase of globalisation from the earlier ones.

This change in production structure obviously raises serious doubts on conventional understanding of international trade both empirically and conceptually. The assumptions of perfectly competitive market together with the notion of constant returns to scale had been shaken by New Trade Theory where intra-firm trade was analytically captured through increasing returns to scale premised on imperfect competition. The other classical assumption that industries consist of homogeneous producers is heavily challenged by New New Trade Theory that finds heterogeneity in firm productivity between exporters and non-exporters in a single industry. Trade in final products which was the stylized fact relevant sometime back has become a minor part of the global trade today. Rather countries specialise in tasks and therefore export and import values no longer capture the actual contribution of a country in the web of global production. The more relevant empirical measure in today's world is domestic and foreign value added instead of gross values of exports and imports. It is also to be noted as Cox identified long back that instead of trade happening in the ideal world of free market as globalizers often claim to be, today's world trade is a 'highly leveraged form of managed trade' where lead firms control production and distribution across borders.³

There is no doubt however that the reorganisation of production structure whether conceived as global value chain or in its later incarnation as global production network provides greater opportunity to developing countries in participating into the global production and trade network. The simple reason being countries endowed with unskilled labour can participate in supplying a labour intensive component which might be inserted into an otherwise sophisticated technology intensive final product. This would not have been possible if the spatial and functional unbundling of production was not there and countries continued to trade on final products. In spite of the fact that engagement of developing countries has increased through global production network, questions arise on

¹ UNCTAD (2013)

² OECD (2012)

³ Phillips (2016)

the short and long term impact of such opportunities on various aspects of outcomes. If gross values of exports increase while the domestic value added declines such exports are likely to reduce employment potential of the exporting country. If the import intensity of exports increase and if the contribution of foreign value added in gross exports tend to rise the net effect of integration to global production network may not lead to desired outcomes. Studies also suggest that participation in global production network generally raise the relative returns of factors endowed with capital and skills, as a result it tends to increase the inequality between capital's share and the labour's share on the one hand and between skilled and unskilled labours' share on the other hand. These are concerns related to distributional outcomes of participating in global production networks. The longer term issues relate to technological diffusion through production networks and if the participating country is not able to move up the value chain the country could be locked into perpetual dependence with declining returns to exports. It is also important to assess the regional dimension of integrating into global production structure. In other words, TNCs can easily negotiate with the local production structure in particular regions of a nation and the nation-state with all its legal and territorial boundaries could hardly condition and control the nature of contract. This has important ramifications in terms of labour market, environmental concerns as well as in terms penalising violation of contracts.

The empirical literature on GPN which are mostly case studies, since hardly any macro level data on inter-firm transactions are available, points to the fact that gains through participation largely depends on the position of the particular stage in the overall network. The OECD-WTO-World Bank Group report (2014) suggests "Gains from GVC participation are not automatic. Benefits of GVCs can also vary considerably depending on whether a country operates at the high or at the low end of the value chain." Activities related to agriculture, apparel, automotive, IT hardware and business services require different compositions of knowledge, technology and skills including household activities at the bottom. It has been the case that stages related to manufacturing derived low share of the value added generated across the entire chain compared to those activities relating to high end intangible activities relating to R&D, design, brand building in the pre fabrication stage and after sales service and marketing in the post-fabrication stage. One perspective in regard to potential benefits could be that despite low share in value added if the absolute amount of value added increases it generates employment in the economy. The other perspective could see the asymmetric relation in the global production structure where hierarchies of both capital and labour gives rise to value capture from the developing countries.

This paper would bring in labour process into the analyses of production and distribution of value added. Undoubtedly GPN framework provides a heuristic device to understand the global production process through tracing value added in successive stages of production. It traces the production process from the conceptualization stage to the final sale and beyond. This is surely a paradigmatic shift in industrial organization analyses

primarily because it looks into the dynamics of power and profit beyond the boundaries of manufacturing and brings into agriculture or services in the backward or forward linkages as significant constituents of the value chain. In the following section the paper would aim to see the nature of global integration in case of India, how the absolute and relative amounts of contribution both of domestic value added and foreign value added in gross exports manifest our participation in global trade. And also the extent of integration of various industry categories compared to other developing countries. In the third section we discuss the participation and net gain of developing and advanced countries. Fourth section argues that gains from participation vary according to the nature of industry and even more critical is the stage of production in which the country participates. The final section argues that uneven distribution of the value added does not depend on some intrinsic nature of activities related to global production network but on the asymmetric distribution of potential sources of rents that the emerging property structure gives rise to in the process of globalisation.

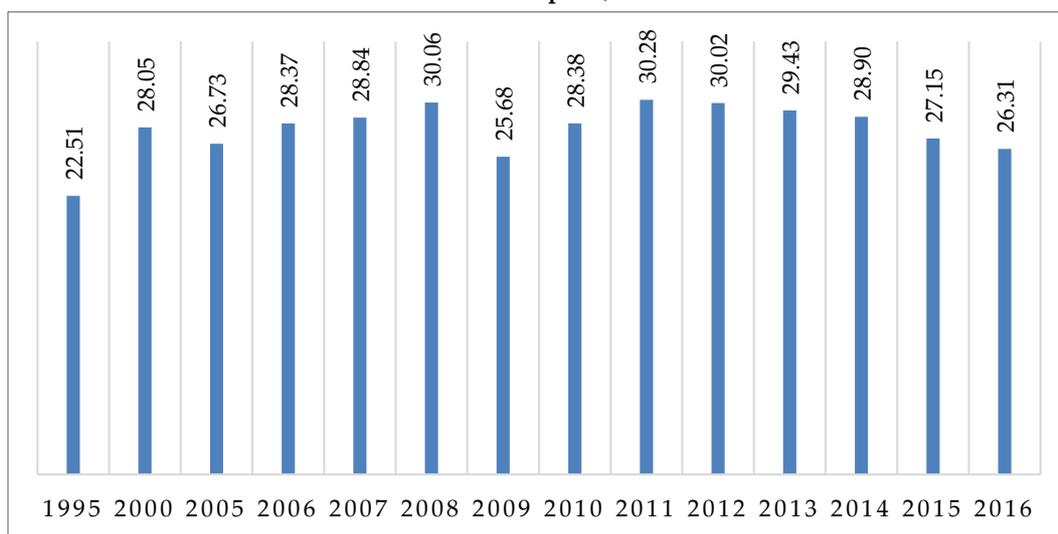
II. Global Integration of Production

Production structure in today's world is far more interpenetrative in nature. Goods and services that cross national boundaries have a significant share of intermediate goods that enter into various stages of production in different countries finally giving rise to the final product for final consumption. It is because of this fragmentation of production into different stages trade data does not capture the actual value added by particular countries. Components can be imported and then with specific value addition can be exported to other countries, it can again be re-imported from the third country after some value being added there and then after performing the next stage of production can be exported to some fourth country. In other words, there can be several phases of incoming and outgoing of goods and services which cannot be captured through figures of gross exports of a country. OECD Trade in Value Added to some extent allows us to understand the value addition that undergoes in different stages of production across national boundaries. But this decomposition does not allow us to untangle the firm level interactions within a particular country. Moreover, the principal indicators of the TIVA database for the year 2018 although allows us to identify the broad trends at the aggregate level till 2015 but the STAN indicators which provides indicators at sectoral level is available till 2011. In addition to that domestic value added and foreign value added categories in decomposed form for 2018 edition do not match with the 2013 edition. Hence even if the broad trends are discussed for the period 1995 to 2015, the disaggregated data and participation indexes are computed for the period 1995 to 2011.

Chart 1 shows the percentage deviation of domestic value added in gross exports from gross exports, recorded for the world during the period 1995 to 2015. It is found that world gross exports figures are inflated due to multiple counting and if we see the domestic value added contribution which enters to foreign final demand, the deviation from exports figures for the world as a whole has increased over time. It actually manifests increased

integration of production across the world over time. Higher the deviation between figures of gross exports and domestic value added for particular countries higher would be the level of integration of that country into global production network. Countries such as Saudi Arabia and Colombia has deviations less than ten per cent while in cases of Korea, Malaysia, Chinese Taipei, Singapore, Ireland and Czech Republic the deviations are higher than forty per cent. This implies that the latter set of countries are more integrated in their backward linkage compared to the former set of countries. Since 2012 however we find that the deviation between these two figures declined which indicates the shrinkage of value chain as a response to global financial crisis.

Chart 1: Percentage of Deviation of Domestic Value Added in Gross Exports from Gross Exports, World



Source: Author's calculation from OECD-TIVA database

If we compute the shares of various sectors in terms of shares in gross exports and domestic value added for the world, we find that the share of manufacturing and Industry as a whole in gross exports is higher than their shares in domestic value added totals (Table 1). While in agriculture and allied activities, services and construction the shares in terms of domestic value added is higher compared to what it is in terms of gross value of exports. Therefore, if we go by gross export figures manufacturing and overall industry seems to be overvalued and in cases of agriculture, services and construction export figures actually undervalue their contributions in output. The reason being many of these activities might have been considered as part of manufacturing value added even if they are actually not so. In case of Finance Real estate and Business Service the difference between two shares is the highest because a large part of these activities enter into output of other activities mostly manufacturing and not been accounted as independent services inputs.

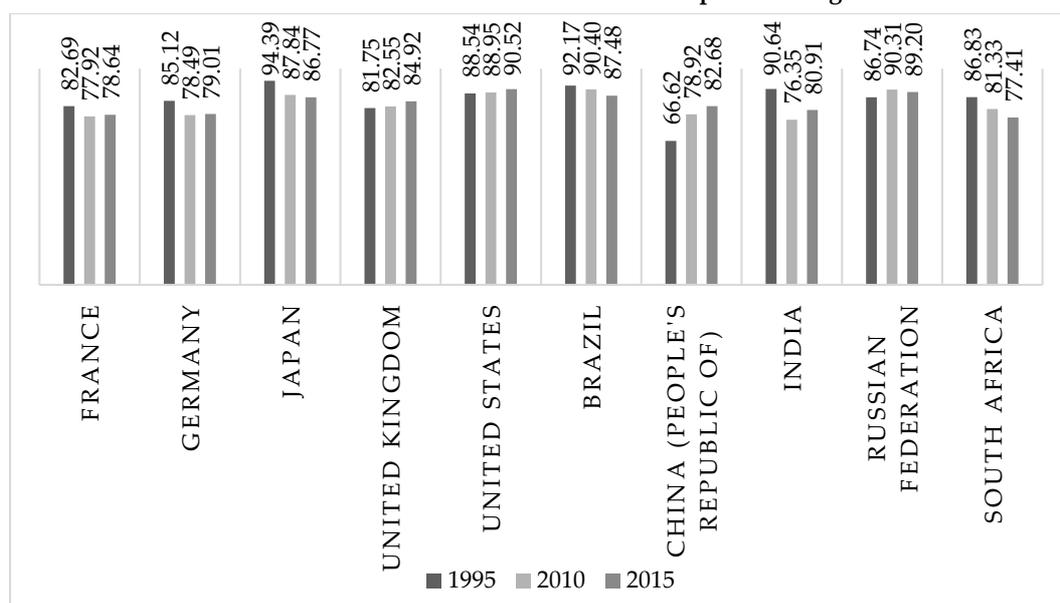
Table 1: Shares of Sectors in Terms of Gross Export and Domestic Value Added in Foreign Demand

	<i>DVAFD</i>	<i>GE</i>
Agriculture, hunting, forestry and fishing	3.47	2.02
Total Manufactures	31.06	56.05
Industry (Mining, Manufactures and Utilities)	45.27	65.02
Total Services including Construction activities	51.26	32.96
Construction	1.03	0.55
Total Services	50.23	32.41
Wholesale, retail, hotels, restaurants, transport	27.32	21.33
Finance, Real Estate and business services	19.56	9.37

Source: Author's calculation from OECD-TIVA data

The share of domestic value added in gross exports has declined for most of the developed and developing countries during the period 1995 to 2015. Chart 2 shows the changes across countries during the reference period. It has marginally declined in the case of UK and the USA among advanced countries, the decline has been higher in cases of Japan and Germany. Interesting to note that only in the cases of China and Hong Kong domestic value added share in gross exports increased during the reference period. The decline in domestic value added share has been higher in cases of Korea, India, Chinese Taipei, Thailand, Vietnam and Luxemburg during the period 1995 to 2005. In many countries including India domestic value added share in gross exports increased during the period 2011 to 2015.

Chart 2: Share of Domestic Value Added in Gross Exports During the Period



Source: Author's calculation from OECD-TIVA data

In Table 2, we see the sector wise trends in the share of domestic value added in gross exports in case of India and China. The share of domestic value added in gross exports in 1995 was much higher in case of India (90.6) compared to China (66.6) but in 2011 it declined in case of India to 76 per cent whereas in case of China it marginally increased to 68 per cent. During the period 2011 to 2016 the share of domestic value added in case of India increased to 83.8 per cent and in case of China it increased to 83.3. The sector wise figures suggest that in manufacturing and for industry as a whole the decline is about 23 percentage points while in case of China the share in manufacturing increased by 8 percentage points. Considering services in total or in various sectors we see that share of domestic value added in gross exports declined in almost all sectors in the case of both India and China. At a more disaggregated level it is seen that in almost all manufacturing activities excepting wood products, other non-metallic mineral products and basic metals the domestic value added share in gross exports increased in the case of China and in case of India the share declined for all manufacturing activities and for all services except health and social work. These trends suggest that at the aggregate level India is far less integrated into global production network compared to China but at the same time in the context of manufacturing it seems that China has been able to increase its domestic contribution in exports over the years while in case of India there is a sharp declining trend.

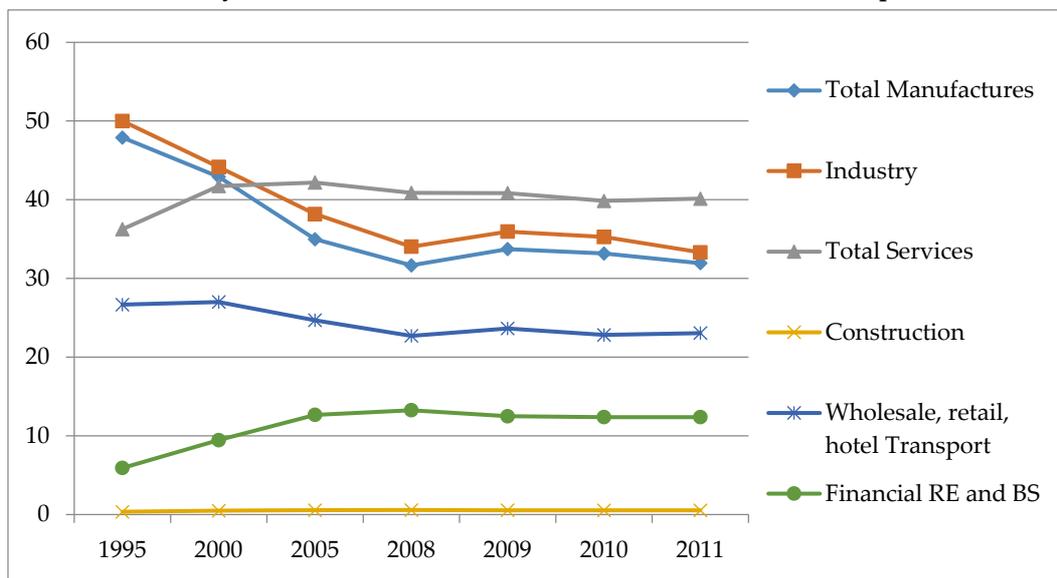
Table 2: Domestic Value Added Share of Gross Exports, India and China

	1995	2000	2005	2008	2009	2010	2011
India							
Agriculture and Allied	97.15	97.38	95.95	95.95	96.51	96.35	95.93
Manufacturing	87.42	84.75	74.84	65.7	68.42	66.29	63.89
Industry	87.75	85.02	76.11	67.01	69.53	67.43	64.7
Construction	88.34	83.46	79.66	78.05	79.7	78.42	75.95
Total Services	94.31	92.67	88.98	88.16	89.31	89.03	87.9
Wholesale, Retail Hotel	94.48	93.1	90.02	87.7	89.47	89.22	88.56
Finance RE and BS	93.05	89.72	86.84	88.1	88.48	88.12	86.01
Total	90.64	88.72	82.53	77.34	79.03	77.69	75.9
China							
Agriculture and Allied	92.99	92.23	89.94	90.16	91.32	90.18	89.85
Manufacturing	51.88	49.37	51.96	60.39	60.87	59.83	59.88
Industry	52.42	49.9	52.29	60.54	60.98	59.93	59.97
Construction	94.1	92.52	88.61	87.95	89.59	88.4	87.91
Total Services	96.6	94.99	94.1	93.38	94.37	93.69	93.64
Wholesale, Retail Hotel	96.71	95.14	94.77	94.24	95.23	94.76	94.7
Finance RE and BS	96.63	94	90.12	88.93	89.93	88.18	88.06
Total	66.62	62.72	62.57	68.23	69.18	68	67.84

Source: Author's calculation from OECD-TIVA data

In Chart 3, we see the industry specific contribution to domestic value added that enters into exports from India. The trends suggest that for manufacturing and industry as a whole there has been a decline in contribution in domestic value added. Considering aggregate services, the contribution in 2011 is higher than that of 1995 levels but at a closer look one finds that services contribution reached its peak in 2005 and then remained more or less unchanged. Within services the contribution of finance real estate and business services records a steep rise from 5.9 per cent in 1995 to 12.4 per cent in 2011.

Chart 3: Industry Share in Domestic Value Added Contribution to Gross Exports in India



Source: Author's calculation from OECD-TIVA data

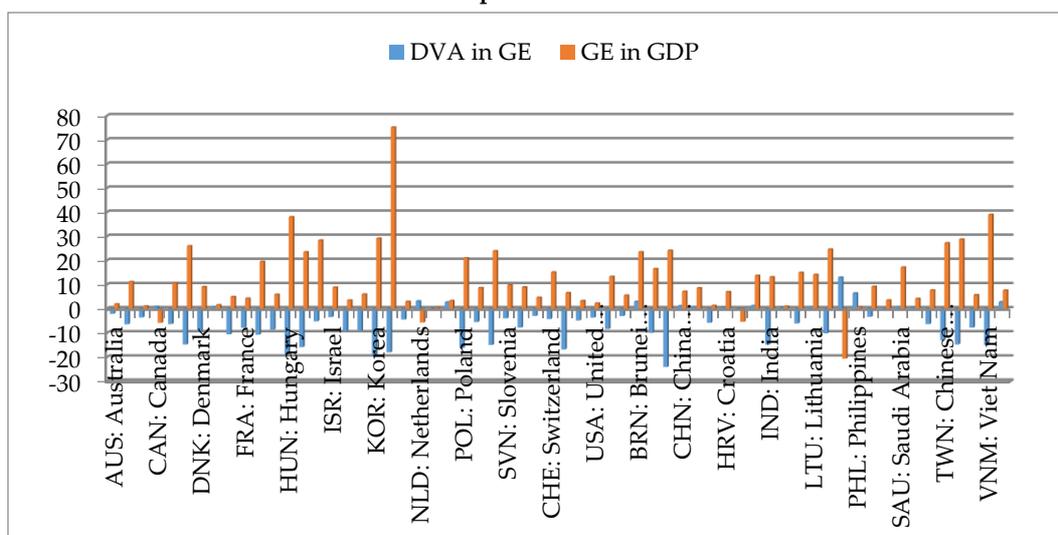
This can also be seen in a different way. Services inputs in various sectors of output have increased over time. One reason being definitional change of productive activities. In other words, those services activities which were earlier accounted on the head of manufacturing output as in-house components are contracted out and separately considered as services inputs. There is also a relative price effect in the sense that prices of manufacturing goods declines faster than that of services because of higher productivity growth and hence values of the same manufacturing activity tend to decline over time resulting in higher relative valuation of services. As a result, share of services inputs in manufacturing and other activities tend to rise. Table 3 only captures the share of domestic services contributing to gross exports of various sectors of India during the reference period.

The share of domestic services value added in gross exports of India has increased from 44.5 per cent in 1995 to 47.5 per cent in 2011. It is however interesting to note that services contribution to total manufacturing exports has fallen from roughly 24 per cent in 1995 to 21 per cent in 2011 and a similar decline is visible for industry as a whole.

Table 3: Domestic Services Value Added in Gross Exports of Various Sectors in India

	1995	2000	2005	2008	2009	2010	2011
Agriculture, hunting, forestry and fishing	5.31	6.39	7.63	6.44	6.42	6.43	6.47
Mining and quarrying	5.64	6.99	8.43	7.68	8.32	7.4	6.81
Total Manufactures	23.69	24.8	24.65	20.6	23.58	21.83	20.88
Industry (Mining, Manufactures and Utilities)	23	24.35	23.56	19.95	22.87	21.22	20.48
Construction	60.87	59.9	57.87	58.11	59.26	59.03	57.87
Total Services	81.18	80.37	79.95	79.66	80.67	80.75	80.47
Wholesale, retail, hotels, restaurants, transport	81.22	80.43	78.25	76.8	78.39	78.65	78.94
Finance, Real Estate and business services	80.3	77.38	81.13	82.14	82.74	82.46	81.08
Total	44.5	49.05	50.01	47.1	48.89	47.41	47.46

Source: Author's calculation from OECD-TIVA data

Chart 4: Change in Domestic Value Added Share in Gross Exports and Change in Share of Gross Exports in GDP

Source: Author's calculation from OECD-TIVA data

The decline in domestic value added share in gross exports has not however affected adversely the export performance of countries. In fact, gross exports as a share of GDP has increased for all countries in the world excepting Canada. Chart 4 shows the change in the share of domestic value added in gross exports and the changes in gross exports as share of GDP. In case of India there has been a rise of about 13.2 percentage points in the share of gross exports to GDP during the period 1995 to 2011, but during the same period share of domestic value added as share of gross exports declined by 14.7 per cent. For almost all the countries in the world gross exports as share of GDP has increased and for most of the countries barring a few such as Canada, Norway, Netherlands, China and Philippines the

share of domestic value added in gross exports shows a decline. Highest rise in share of domestic value added in gross exports has been recorded for Philippines. In case of China the gross exports as share of GDP increased by 7.2 percentage point during the reference period while the share of domestic value added as share of gross exports increased by 1.2 percentage points.

III. Foreign Value Added and Net Gain

The decline of domestic value added in gross exports implies a rise in the share of foreign value added. Production structures are laid down crossing boundaries of nations through vertical, horizontal and diagonal networks coordinated by MNCs and TNCs. Phases of production have become commoditised and price competitions determine the geographical location of particular phases of production. Therefore, some regions and locations specialize on particular tasks and the preceding stages if can be procured at lower costs would be imported from other countries. However, there can be back and forth movements unilaterally or multilaterally and therefore possibilities of re-import and re-export exists. Nevertheless, foreign value added in gross exports has increased for all 61 major countries reported in OECD-TIVA database. Luxemburg records the highest share of foreign value added in gross exports and Saudi Arabia figures the lowest share in the year 2011. If we rank the countries in ascending order in terms of their share of foreign value added and divide them into three groups of roughly 20 each then the group which shows low share of foreign value added comprises of developing countries such as Brazil, South Africa, Russia, Argentina and Indonesia and advanced countries as USA, UK, Switzerland and Japan. In the middle group we find both India and China along with Mexico and Greece, France, Germany and Sweden. The top twenty countries in terms of share of foreign value added in gross exports comprises of developing and developed countries such as Korea, Malaysia, Vietnam, Thailand and Denmark, Finland and Hungary.

Table 4 below shows sectorwise share of foreign value added in gross exports for India and China during the period 1995 to 2011. In case of India the share of foreign value added in gross exports of manufacturing roughly trebled during the reference period increasing from 12.6 per cent in 1995 to 36.1 per cent in 2011. The increase is similar in case of industry as a whole. In case of services foreign content in domestic exports more than doubled from 5.7 per cent in 1995 to 12.1 per cent in 2011. Within services both in the cases of trade and hotels as well as activities related to finance, real estate and business services there has been a sharp rise in share of foreign value added in gross exports.

In the case of China share of foreign value added in exports declined from 48.1 per cent in 1995 to 40.0 per cent in 2011. In cases of services however there has been a rise from 4.4 per cent to 6.4 per cent during the same reference period. It needs mention that the share of foreign value added in gross exports of manufacturing in China had been much higher than what it was in case of India, almost four times but over the past one and half decade

this share declined in case of China and increased in the case of India. In the case of services exports foreign value added content had been higher in the case of India compared to China in 1995 but this share shows a rise in both the countries during the reference period.

Table 4: Share of Foreign Value Added in Gross Exports, India and China Over the Years

<i>India</i>	1995	2000	2005	2008	2009	2010	2011
Industry (MMU)	12.25	14.98	23.89	32.99	30.47	32.57	35.3
Manufacturing	12.58	15.25	25.16	34.3	31.58	33.71	36.11
Services+Construction	5.75	7.44	11.16	11.96	10.84	11.11	12.27
Construction	11.66	16.54	20.34	21.95	20.3	21.58	24.05
Total Services	5.69	7.33	11.02	11.84	10.69	10.97	12.1
WTHRT	5.52	6.9	9.98	12.3	10.53	10.78	11.44
FREBS	6.95	10.28	13.16	11.9	11.52	11.88	13.99
<i>PRC</i>	1995	2000	2005	2008	2009	2010	2011
Industry (MMU)	47.58	50.1	47.71	39.46	39.02	40.07	40.03
Manufacturing	48.12	50.63	48.04	39.61	39.13	40.17	40.12
Services+Construction	3.44	5.03	5.96	6.7	5.7	6.38	6.43
Construction	5.9	7.48	11.39	12.05	10.41	11.6	5.9
Total Services	3.4	5.01	5.9	6.62	5.63	6.31	6.36
WTHRT	3.29	4.86	5.23	5.76	4.77	5.24	5.3
FREBS	3.37	6	9.88	11.07	10.07	11.82	11.94

Source: Author's calculation from OECD-TIVA data

The TIVA database gives data for various sectors within broad industry categories over the years. Table 5 shows the share of foreign value added in gross exports for various sectors in India for the year 2011. The sectors are grouped according to their respective shares in ascending order. We see that real estate activities record the lowest share of foreign value added in gross exports and coke, ref. petroleum product and nuclear fuel industry records the highest share of foreign value added in gross exports. Roughly service related activities and manufacturing activities such as leather, textile and wood products show shares of foreign value added content in gross exports as less than 20 per cent. Manufacturing activities related to computer equipment, electrical equipment, transport equipment, motor vehicles, machinery, metals and chemicals industry records foreign value added content of gross exports higher than 30 per cent.

The pattern broadly suggests that manufacturing products that are of higher value more technology intensive and capital intensive account for a higher share of foreign value added in gross exports. If we see the rise in this share over a period of time sharp increases are visible in chemicals and metals where the rise has been of more than 20 percentage points. In textiles and leather footwear which are relatively labour intensive in nature also

records a rise in the share of foreign value added in exports in the tune of more than 10 percentage points during the reference period.

Table 5: Industry-wise Share of Foreign Value Added in Gross Exports in India 2011

< 10%	>10%-20%	>20%-30%	>30-40
Real estate activities (1.54)	Community, social and personal services (10.37)	Electricity, gas and water supply (23.05)	Computer, Electronic and optical equipment (31.19)
Education (2.55)	Other community, social and personal services (10.38)	Construction (24.05)	Other transport equipment (31.49)
Wholesale and retail trade; repairs (3.55)	Hotels and restaurants (11.06)	Other non-metallic mineral products (25.54)	Transport equipment (32.00)
Agriculture, hunting, forestry and fishing (4.07)	Food products, beverages and tobacco (12.14)	Wood, paper, paper products, printing and publishing (24.82)	Electrical and optical equipment (32.47)
Wholesale and retail trade; Hotels and restaurants (4.4)	Total Business Sector Services (12.33)	Pulp, paper, paper products, printing and publishing (25.27)	Motor vehicles, trailers and semi-trailers (32.48)
Financial intermediation (5.62)	Health and social work (12.84)	Rubber and plastics products (27.13)	Machinery and equipment, nec (32.46)
Computer and related activities (7.53)	Real estate, renting and business activities (14.47)	Chemicals and chemical products (28.56)	Electrical machinery and apparatus, nec (33.96)
Mining and quarrying (7.87)	Transport and storage (18.73)	Electricity, gas and water supply (23.05)	Fabricated metal products (34.72)
Renting of machinery and equipment (8.1)	Transport and storage, post and telecommunication (18.84)	Construction (24.05)	Total Manufactures (36.11)
	Wood and products of wood and cork (19.46)	Other non-metallic mineral products (24.54)	Basic metals and fabricated metal products (40.22)
	Textiles, textile products, leather and footwear (19.83)		Basic metals (42.11)
	R&D and other business activities (19.90)		Manufacturing nec; recycling (42.37)
	Post and telecommunications (19.92)		Chemicals and Non-chemical mineral prod (44.32)
			Coke, ref petroleum prod and nuclear fuel (56.57)

Source: Author's calculation from OECD-TIVA data

The important question however is how a country gains out of participation in global production network. The domestic value added content of gross exports has declined for almost all countries in the world, similar is the case of rise in foreign value added share barring very few exceptions. One argument could be that although domestic value added as share of gross exports had declined but the absolute amount of domestic value added matters because larger its value higher would be the potential of a particular economy to create jobs and so even if the share of domestic value added in gross exports declines the absolute amount if increases would be beneficial for a country. However, a similar argument would be that higher the foreign value added content of gross exports the higher is the loss of potential jobs. In order to comprehend the gains and losses through participation in global production network it is therefore necessary to measure participation rate and net gain.

Participation rate of a country is measured by participation index computed as follows. OECD dataset gives figures of foreign value added embedded in exports which capture the backward linkage and domestic value added embedded in foreign exports measuring forward linkage of a country in production network. Now for a particular country if we add the two and compute the share of a particular country in the aggregate of individual sums then we get the participation rate index for that country. In other words, this gives a measure of how the country is integrated with the global production network. Therefore, over time if the value of the index increases then the participation of the country has increased during the reference period. On the other hand, the ratio of domestic value added embedded in foreign exports to foreign value added embedded in a country's gross exports gives a rough measure of net gain out of participation. If the value is less than one, then there is net loss and higher the value over one the higher would be the net gain.

Table 6: Backward and Forward Linkages for Select Countries, 1995-2011

	1995	2000	2005	2008	2009	2010	2011
OECD							
FVC in GE	53.35	49.63	45.98	45.75	42.92	41.68	42.31
DVC in FX	64.12	58.48	52.99	47.45	49.20	46.90	44.97
BRICS							
FVC in GE	2.396	2.676	3.518	4.600	4.316	4.894	5.251
DVC in FX	4.263	4.569	6.772	8.082	7.082	8.215	8.843
INDIA							
FVC in GE	0.359	0.422	1.078	1.649	1.840	2.253	2.366
DVC in FX	0.521	0.686	1.203	1.415	1.550	1.906	1.879
CHINA							
FVC in GE	4.658	6.586	11.611	11.453	12.932	13.815	13.644
DVC in FX	1.328	1.904	4.121	6.043	6.155	6.582	6.630

Source: Author's calculation from OECD-TIVA data

We see for advanced countries comprising of OECD countries, USA and UK taken together foreign value embedded in their gross exports have declined over time and domestic value embedded in foreign exports for the group as a whole has also declined during the reference period (Table 6). This perhaps suggests that for advanced countries both backward and forward linkage have shrunk over time. In cases of BRICS taken together or for India and China separately both foreign contribution to their gross exports and their contribution to foreign exports have increased over time meaning developing countries over time have increased their participation in global production network. But the level of integration has been undoubtedly much higher for advanced countries compared to developing countries in any particular year. Comparing India and China domestic contribution to foreign exports have increased much sharply in case of China compared to India.

The effect would be clearer if we see the index of participation rate and net gain given in Table 7.

Table 7: Participation Rate and Net Gain

	1995	2000	2005	2008	2009	2010	2011
Participation Rate							
United Kingdom	5.7	4.9	4.4	4.0	4.0	3.8	3.8
USA: United States	11.6	12.3	8.9	8.3	8.6	8.5	8.2
ITA: Italy	4.6	3.7	3.8	3.6	3.3	3.2	3.2
JPN: Japan	6.9	6.3	5.5	4.9	4.6	5.0	4.6
DEU: Germany	9.4	7.6	8.5	8.5	8.2	7.5	7.7
BRA: Brazil	0.6	0.6	0.8	1.0	0.9	1.0	1.1
RUS: Russia	1.7	2.0	2.7	3.3	2.6	2.9	3.2
IND: India	0.4	0.6	1.1	1.5	1.7	2.1	2.1
CHN: China (People's Republic of)	3.0	4.2	7.9	8.7	9.5	10.2	10.1
ZAF: South Africa	0.6	0.5	0.6	0.6	0.5	0.6	0.6
Net Gain							
GBR: United Kingdom	1.05	1.28	1.43	1.32	1.23	1.12	1.08
USA: United States	1.69	1.95	1.93	1.60	2.09	1.86	1.66
ITA: Italy	0.90	0.93	0.93	0.79	0.93	0.81	0.80
JPN: Japan	4.24	4.05	2.88	2.02	2.92	2.59	2.24
DEU: Germany	1.40	1.12	1.12	0.96	1.04	1.01	0.95
BRA: Brazil	1.94	1.53	1.62	1.87	2.06	2.23	2.28
RUS: Russia	1.90	1.92	3.01	2.78	2.65	2.77	2.78
IND: India	1.45	1.63	1.12	0.86	0.84	0.85	0.79
CHN: China (People's Republic of)	0.29	0.29	0.35	0.53	0.48	0.48	0.49
ZAF: South Africa	1.56	1.32	1.17	1.07	1.20	1.40	1.36

Source: Author's calculation from OECD-TIVA data

The participation rate index for countries such as USA, UK, Italy, Japan and Germany has declined during the period 1995 to 2011. For developing countries, the participation rate has increased during the reference period. Comparing the net gain index UK, USA, Japan are among the select developed countries that records net gains, having the index value greater than one while Italy and Germany records a net loss. Considering developing countries, we see that Brazil, Russia and South Africa records net gain and India and China show a net loss due to increased participation. Comparing figures of 1995 and 2011 in case of India the participation rate index shows a five-fold increase, however it recorded net gain in 1995 whereas in 2011 it shows net loss.

In Table 8 we map the matrix of 62 countries showing rankings in terms of participation index in the vertical axis and net gain/loss ratio of countries grouped according to their rankings in the horizontal axis. If the ranking is one, then it shows highest participation rate or gain/loss ratio. The ranking for net gain/loss ratio is taken in terms of absolute value implying interpretation in terms of the ratio being higher or less than one is not taken into account. However, countries showing ranking above 21 have the value of the ratio less than one and hence they experience net loss. Therefore, the first column figures the countries who record net gain out of participating in global production network and the rest actually record a net loss. The top left group of countries comprises of those who rank high in terms of net gain and they are also the top 20 in terms of participation rate in the global production network. Barring Saudi Arabia which has specific resource advantage, the rest are advanced countries. The UK, USA and Japan belong to this group of top gainers. Brazil, South Africa, Philippines, Indonesia, Argentina and New Zealand are gainers among developing countries but their participation rate is relatively low. The third column comprises of mostly developing countries and transitional economies and they are the worst losers with varying degrees of participation. China falls under the top right group. China records top ranking in terms of participation rate however resulting in higher net loss. India shows net loss but its participation rate is less than that of China.

Table 8: Mapping of Net Gain/Loss and Participation Rate Index

		NET GAIN/LOSS RANKING		
		1-21	22-40	41-62
P R A A R T I C I P A T I O N	1-20	US, Japan, UK, Russia, Saudi Arabia, Switzerland, Australia	Germany, France, Italy, Spain, India	China, Korea, Chinese Taipei, Mexico
	21-40	Netherlands, Norway, Brazil, Indonesia, Hong Kong, South Africa, Chile	Sweden, Poland, Austria, Denmark, Finland	Thailand, Ireland, Czech Republic, Turkey, Hungary, Luxemburg, Vietnam
	41-60	Philippines, Argentina, Romania, Colombia, Brunei, New Zealand	Israel, Greece, Lithuania, Croatia, Iceland, Cyprus	Slovak, Portugal, Slovenia, Estonia, Costa Rica, Cambodia

Source: Author's calculation from OECD-TIVA data

IV. Labour and Value Capture

The developmental perspective of chain/network analyses primarily investigates how global economy works through networks and shape the industrialization prospects of developing countries. The principal proposition being countries should specialize on particular phase of a global production depending on their endowment of skills and capabilities thereby increasing their share in the global value added by means of moving up the value chain through innovation and upgrading. No denying the fact that absolute income levels and the general living standards of people in developing countries have increased. The population-weighted income differentials across countries have also narrowed down with the increase in global integration. But the surprising fact was rising inequality within countries and the countries that suffered declining income shares are precisely those that experienced high trade/GDP ratio. This was the backdrop of Kaplinsky⁴ reinventing the Prebisch-Singer thesis of unequal exchange⁵ in the context of twenty-first century. The crux of the argument is that the decline of the barter terms of trade of commodities vis-a-vis manufacturing in Prebisch-Singer thesis was related to country endowments rather than attributes of commodities. The two groups of countries were differentiated in terms of their labour endowments. The commodity producers being labour surplus economies and manufacturing primarily done in labour constrained economies. In the present context the decline in the relative price of manufacturing in the past three decades has been attributed to rapid industrialisation and export from East Asia especially China. The barter terms of trade in manufactures between developing countries and the European Union suffered a decline.⁶ 'Immiserizing growth' implying falling returns with increasing economic activity is reflected in a decline in unit price of exports specially in cases where countries rely heavily on simple assembly of imported input.⁷ James Heintz argues that developing countries face unequal exchange meaning engage in exports with certain amount of labour in exchange of imports that contain less amount of labour.⁸ This happens because profit rates are equalized across national boundaries owing to the mobility of capital while labour is the relatively immobile factor of production. As a result, developing countries that generally happens to be labour surplus import goods at prices that has to accommodate both higher wages of industrialized countries and equalized rate of profit.

Bo Meng and Wei⁹ discusses the existence of smile curve in reference to distribution of value added. This provides a rough framework of the distribution of value added depending upon the nature of activities and the geographical location of specialization.

⁴ For detailed discussion see Kaplinsky, R. (2005, 2007)

⁵ Prebisch, R. (1950), Singer H. W.(1950)

⁶ Maizels et al. (1998)

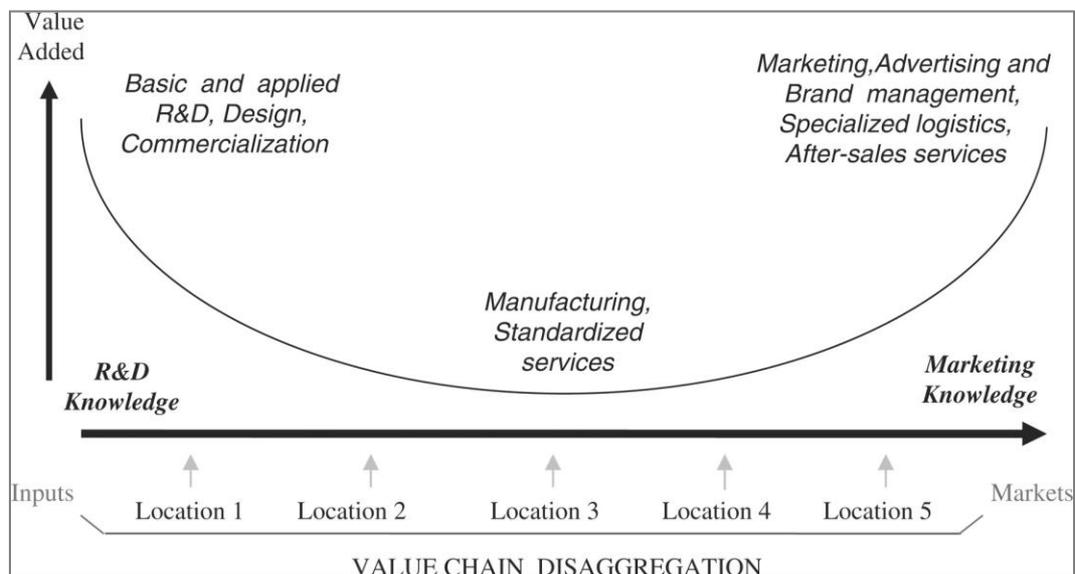
⁷ Kaplinsky, R. (2007)

⁸ Heintz, (2006)

⁹ YE, Ming, Bo MENG, and Shang-jin WEI (2015).

Global value chain development report 2017 of the World Bank¹⁰ also recognizes this broad pattern of distribution. The smile curve in Chart 5, suggests that higher gains are attributed to activities related to conceptualization, R&D, design and commercialisation of production mostly located in advanced countries. The other gainful activities relate to marketing, advertisement, brand management and after sales services.

Chat 5: Smile Curve and the Distribution of Value Added in Global Production Network



Source: YE, Ming et al. (2015)

These activities are largely managed by the parent companies of MNCs and TNCs located in developed countries. The least share of gains account for activities related to manufacturing and standardized services that are largely undertaken by the developing South. If we compare similar smile curves over a period of time we find that over time the smile curve has deepened in the bottom implying a relative increase in difference in value share between the bottom and the top two edges of the smile curve. In other words, the participation of developing countries has increased over time and therefore higher the participation the lower the gain in relative terms. A large number of case studies undertaken to analyze the particular pattern of value distribution in cases of Apple video iPod, Barbie doll, Nokia phone, T-shirts suggest that actual manufacturing activity accounts for the lowest share in value added. This can be explained further if we look into the nature of change in factor shares over time.

Capital's share has been and continues to be much higher in other countries compared to advanced countries and the rise in capital's share is also higher in other countries. The high-skilled labour seem to be the other significant beneficiary in this global production

¹⁰ World Bank (2017)

network since their share records a rise in both groups of countries. The medium-skilled workers suffered a setback in advanced countries, marking a decline of about three percentage points but their share seems to have marginally increased in other group of countries. The share of low-skilled workers declined sharply in both parts of the world. Therefore, countries such as India and China and other developing countries that have huge labour surplus and participate in the labour intensive manufacturing phases would understandably account for the smaller share of global value added and therefore they are at the sad spots of the smile curve. The share of value accrued to Chinese labour who manufactures Apple iPad and iPhones are only 2 per cent and 1.8 per cent respectively of the total value added in 2010. The share of value added accounted for Apple on the other hand is 58.5 for iPhones and 30 per cent for iPads.¹¹ The profit booked by K P McLane US company marketing polo shirts entirely produced in Bangladesh is 718 per cent and for Hermes polo shirts it is about 1800 per cent.¹²

The global production network contains hierarchy of stages supported by a global architecture of institutional arrangements. At the top there are the transnational elite who coordinate the production network as bosses of MNCs and TNCs. They control R&D and design, they build supply networks, marketing channels and creates brands of goods and services. The high-skilled professionals derive rent out of their specialized knowledge and skills while the low-skilled workers are the worst affected. Manufacturing firms located in developing countries compete with each other by way of reducing costs. With given levels of technology and material inputs the easier way out for employers in developing countries to reduce costs is to push down wages of low-skilled workers who are easily replaceable. The level of wages however is not the key determinant rather unit labour cost which is the ratio of average wage and productivity makes the difference. Lower the unit labour cost of a particular region the higher would be the probability of getting larger share of manufacturing orders. In other words, if the productivity of the worker increases and lesser the gains are being shared with workers in terms of wages the lower would be the unit labour costs. Therefore, the comparative advantage of labour surplus countries in fact depends upon how exploitative the labour regime would be. And developing countries who mostly participate in the bottom of the smile curve will compete with each other and end up with declining share in value added.

Global production network literature recognises the asymmetric distribution of value added between developed and developing countries but the remedy suggested is upgradation and innovation. Developing countries should try to move up the value ladder in order to increase their share in global value added. Apparently this sounds reasonable but essentially this proposition tends to hide the structural asymmetry that exists in the distribution of potential sources of rents that exist across the network.¹³ In fact a particular phase of production can create rent that is return over and above the competitive price if

¹¹ UNIDO (2013)

¹² Smith (2016)

¹³ For detailed discussion see Roy (2017)

involves exclusive right to some asset which could be natural resources, knowledge, machines, skills and so on. This exclusive access has to be protected by property rights. Advanced countries that are historically endowed with newer technologies and can hegemonize tastes and preferences culturally across the world maintain exclusive access on knowledge inputs through protecting property rights on them. Developing countries that are endowed with huge amount of labour force are increasingly made accessible by global capital, and in that case liberalisation policies insist opening up of economic barriers. In fact, resources that are abundant in developing countries have been made accessible to all economic actors while resources which are abundant in advanced countries are protected by patents and various institutions related to intellectual property rights. As a result, the technology gap between developed and developing countries perpetuate and since designs of the global North determine the requirements of technology, it is hardly plausible to think that developing countries would be able to garner a larger share of the value added through innovation and upgrading technology given the asymmetric structure in which global production networks are embedded into.

V. Conclusion

Increased fragmentation and spatial distribution of production undoubtedly has increased the opportunity for developing countries in participating in global production network. Increasing share of intermediate goods and services inputs in global trade on the one hand and increasing share of developing countries in manufacturing trade manifest the emerging trend. In fact, developing countries who compete with each other to get a larger share in manufacturing jobs contribute to higher profits for MNCs located in the North. Participation in global value chain does not necessarily lead to higher gains rather unit cost of inputs and intermediate goods tend to decline over time. The share of manufacturing and standard services has been the lowest in global value added, they are the sad spots in the smile curve. The share of low skilled workers had declined sharply over the years. Global production network is embedded in an asymmetric architecture of institutions which protects exclusive right to resources which are abundant in the advanced countries while labour force that has been abundant in developing countries are increasingly made accessible to global capital through liberalisation policies. Therefore, there might be incremental gains here and there through innovation and upgrading technology on particular cases but the share of value added continues to be in favour of advanced countries who not only protect their exclusive rights on knowledge inputs but also influences choice of technology in a liberalised market.

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ISID

Institute for Studies in Industrial Development

4, Institutional Area, Vasant Kunj Phase II, New Delhi - 110 070

Phone: +91 11 2676 4600 / 2689 1111; Fax: +91 11 2612 2448

E-mail: info@isid.org.in; Website: <http://isid.org.in>