

INDIAN FIRMS IN AUTOMOTIVE GLOBAL VALUE CHAINS: SECTORAL ANALYSIS



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Ankita Dash
Indian Institute of Management Bangalore

Rupa Chanda
Indian Institute of Management Bangalore

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Indian Institute of Foreign Trade
New Delhi

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This working paper is the result of the joint study undertaken by Indian Institute of Management Bangalore (IIMB) and Centre for WTO Studies (Indian Institute of Foreign Trade, New Delhi) to explore and understand the factors affecting participation of firms in India in the Automotive Global Value Chains (GVCs). It is the first part of the sectoral studies on two important sectors of the Indian economy – Automotive and Electronics – under the GVC lens.

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ABSTRACT

With the advent of liberalization and globalization, businesses are increasingly becoming multinational. Companies have started to reorganize and relocate their operations across the globe so as to gain from the comparative advantages offered by different geographies; thereby making *Global Value Chains (GVCs)* the latest paradigm in International Trade. Global Value Chains (GVCs) are still a nascent field of study both in academia and practice, more so in developing countries like India where participation in GVCs is essential and the impact is anticipated to be significant. This study was undertaken to explore and understand the factors that either encourage or hinder participation of firms in India in the sectoral GVCs for two chosen sectors – Automotives and Electronics.

This working paper presents the findings from the firms' perspective as to which factors aid or deter them from participating in Automotive Global Value Chains. The gamut of broad factors covered under this firm-level survey-based study includes institutional, regulatory, financial, trade-related, technological, sectoral and input-related elements; which are further categorized into sub-factors. Apart from firm-level characteristics (like firm size, ownership type and location) having an effect on participation, other factors like inputs (vis-a-vis their availability, quality and cost), public institutions (in terms of their efficiency, transparency, etc.), and sectoral traits (like consolidation within the sector and importance of brands) were found to significantly influence participation in auto GVCs. While trade-related factors (tariff and non-tariff measures) have a positive bearing by encouraging participation, financial factors (especially credit, taxes and foreign exchange rates), technology (ease of access and transfer restrictions), market barriers (market entry costs, capital costs, gestation time of projects, etc.) and product-related factors (like standards compliance, timely delivery) posed major challenges to participation. The study also ascertains the impact of the existing relevant laws for the automotive sector with the manufacturing policy, Motor Vehicles Act 1988 and state government incentives having the most positive impact and with labour laws having the most negative impact. In short, a comprehensive picture of the factors influencing participation of firms in India in the automotive global value chains has been attempted through this study.

Keywords: *Global Value Chains, automotive sector, factors affecting participation, firm-level analysis, India*

INDIAN FIRMS IN AUTOMOTIVE GLOBAL VALUE CHAINS – SECTORAL ANALYSIS

Ankita Dash, Rupa Chanda

1. INTRODUCTION

Global Value Chains (GVCs) are the latest paradigm in International Trade. Although GVCs have existed in practice since the early times of trade, as a concept and a field of study, GVCs have gained importance only in recent times. World trade, production and investments are increasingly being organized and analysed in this light as globalization and liberalization have been encouraging companies to reorganize and relocate their operations so as to gain from the comparative advantage offered by different geographies. This implies that firms are preferring to either source from or locate to geographies that offer them the best value for their investment. International production networks have intricately intertwined global trade and investment as a result of firms investing in productive assets globally and creating cross-border value chains of varying complexity. Such value chains, intra-firm or inter-firm, regional or global in nature, account for around 80% of present global trade.

Value-added trade contributes about 30% to the GDP of developing countries, significantly more than it does in developed countries (18%). Furthermore the level of participation in GVCs is associated with stronger levels of GDP per capita growth. GVCs thus have a direct impact on the economy, employment and income and create opportunities for development. They can also be an important mechanism for developing countries to enhance productive capacity, by increasing the rate of adoption of technology and through workforce skill development, thus building the foundation for long-term industrial upgrading.

Value chains have assumed high importance as trade in intermediates is on the rise. For many economies today especially in Asia, imports are increasingly a key complement of local production and exports. The WTO report 2013¹ trade figures in East Asia portray the following picture: intermediate goods comprise of over 50 per cent of exports and over 60 per cent of imports in Asia, since the year 2000. A range of competitively priced foreign intermediate goods has become crucial to achieving higher productivity in both industrialized countries and recent developers such as India and China.

Increasingly governments are recognizing that participating in global value chains will bring value and opportunities to their workers and economies; they have thus sought to foster

¹ Global value chains in a changing world Edited by Deborah K. Elms and Patrick Low, WTO Report, 2013

friendly policy frameworks. Policy makers are concerned with several other facets of value-addition in a country where GVCs affect macroeconomic variables, apart from employment generation and expansion of economic activity. Trade in value added can be a vital statistic to measure a nation's trade imbalances and effects on exchange rates. Trade balances are better measured with value-added (rather than gross) trade data because gross figures can exaggerate the importance of producing countries at the end of value chains, e.g., China. Changes in relative prices (including through exchange rate changes) would result in non-symmetric rebalancing effects between downstream and upstream countries.

For developing countries, the trade, investment, and knowledge flows that underpin GVCs can provide mechanisms for rapid learning, innovation and industrial upgrading (Lall, 2000²; Humphrey and Schmitz, 2002³). Participating in global value chains provides access to advanced technology and business processes of partner firms in the chains for local firms in developing countries. These local firms can also achieve greater success in their own markets by combining domestic and foreign intermediate inputs and creating economies of specialization that leverage cross-border complementarities. GVCs also tend to “compress” the development experience, making non-linear catch up possible, as has been the case in China.

There are also a few potential negative impacts on developing countries due to participation in GVCs. A developing country's share in the total value chain may be limited if the work done domestically is relatively low value adding. In addition if there is no automatic process that guarantees diffusion of technology, skill-building and upgrading, developing countries face the risk of operating in permanently low value-added activities. Finally, there are potential negative impacts on the environment and social conditions, including poor workplace conditions, occupational safety and health, and job security. The relative ease with which the governors (or lead firms) of Value Chain can relocate their production (often to lower cost countries) also creates additional risks.

Global Value Chains being a relatively recent phenomenon, this is still a nascent field of study both in academia and practice. Specific GVCs have been examined as case studies at the country level mostly to understand the layout of these value chains, productivity and competencies within the value chain and the extent of participation of that country in the value

² Sanjaya Lall (2000) QEJ Working Paper Series

³ Humphrey, J., Schmitz, H. (2002), *Journal of Regional Studies*

chain. Sectoral studies are gradually being undertaken with the intent of understanding sector-specific GVCs better in order to explore opportunities of higher participation in them. While the emphasis has been largely on increasing manufacturing abilities and efficiency, the GVC lens of scrutiny has been largely missing, especially in studies on sectors in the Indian economy.

1.1. CONTRIBUTION OF THE STUDY

This Study titled *Indian Firms in Global Value Chains – Sectoral Analysis*, jointly undertaken by Indian Institute of Management Bangalore (IIMB) and Centre for WTO Studies (CWS, IIFT), aims to understand the factors of participation of firms in India in Global Value Chains (GVCs) for two vital sectors of the Indian Economy – **Automotives and Electronics**. The primary objective of the study was to explore and understand the factors that either encourage or hinder participation of firms in India in the sectoral GVCs for these two chosen sectors. Further detailed description of the study has been provided in the Sections 4 and 5.

Though there have been sectoral studies on the Indian Automotive and Electronics Industries, the focus primarily has been to discover ways of motivating manufacturing in the country. But developing manufacturing intensity will require some time before it yields results because both these sectors have long gestation times for projects to be set up and to become operational.

In the meanwhile, partaking in global value chains with existing capabilities is a practical tactic to harness present abilities of firms in India. This field study has tried to comprehensively understand the major factors that are facilitative or inhibitive of such participation of firms in the sectoral GVCs and how further prospects can be developed/created to enhance this participation to make the extent of GVC present in the country more vibrant and robust. The factors included range from institutional to economic, legal to financial, thereby encompassing a wide range of potential explanatory variables that affect participation of firms in global value chains that probably have not been covered by any prior study. In addition, finer details of measures that affect participation like different cost heads and various laws/policies have also been gathered.

This study has also attempted to determine the extent of impact of these factors on participation by the use of principal component analysis and logistic regression. Although the final number of respondent firms was somewhat limited owing to time constraints, the sample

size was still sufficient to undertake elementary analysis to determine the key broad factors of participation. Secondary sources have been explored extensively to make the data robust and the analysis accurate.

In the first of its kind, this study attempts to understand the perceptions of (primarily manufacturing) firms about the challenges they face and opportunities they desire for furthering their role in the automotive global value chain. This study has attempted to cover a representative set of firms across both the sectors (Automotives and Electronics) in terms of scale, location, ownership type, sub-segment and listed (vs non-listed); instead of covering a limited number of firms or lead firms only as has mostly been done by previous studies.

This study employs certain concepts related to GVCs and data analysis; hence these clarifications are necessary at the very beginning. A detailed outline of the various definitions used in this study has been provided later (Section 5.3). The focus here is on the “industry-level” value chain, and not “firm-level” value chain. The core difference lies in the fact that the former involves cross-border flows of goods, investment, services, knowledge and labour that are associated with GVC processes performed by a network of firms, unlike the latter which refers to the chain of activities that a “firm” operating in a specific industry performs to deliver goods or services. An “industry” value chain includes various activities that are involved in creating goods and services beginning with the design of a product, moving onto the procurement of raw materials, and ending with the final product.

Participation of any firm in GVCs involves a certain degree of direct or indirect trade. For instance, a firm that may not be a direct exporter but is a supplier to another firm that exports can be considered as a participant of the sectoral GVC. But this study defines GVC trade as a specific type of trade which excludes firms involved in only trade (no value addition) or involved in unidirectional trade (imports only or exports only). Trade combined with domestic value addition (in India) provides the foundation for classification of firms as GVC participants. So while trade in components and end-products may be present along the value chain, actual participation in GVCs is narrowly defined. Please refer to Section 5.3 for the comprehensive description.

Firms which are identified as non-participants in their sectoral GVCs have been included in this study as a control group for analysis. They provide the baseline for comparing the effect of factors that affect involvement in GVCs vis-à-vis the participants. This improves

robustness in observational studies, especially cross-sectional studies which are susceptible and need to be corrected for selection bias. The survey aims at capturing a well-rounded view of what affects firms in India for partaking in their sectoral GVCs, for which the responses of both participant and non-participant firms are essential. Including all perceptions enriches the analysis.

This paper presents the findings for the Automotive Sector only⁴ and is organized into the following sections: establishing the context of this paper - Understanding Global Value Chains (Section 2) followed by Literature review (Section 3) and the background of the Indian Automotive Sector (Section 4). Details of the study that was implemented at the firm-level are outlined under Description of the Study (Section 5) and Survey Methodology (Section 6). The findings of the survey have been reported under the Data Section (Section 7), Data Analysis (Section 8) and Survey Findings (Section 9). Section 10 gives the summary and Section 11 concludes the paper along with outlining the limitations of this study and the scope for further research.

2. UNDERSTANDING GLOBAL VALUE CHAINS

2.1. VALUE CHAINS

Value Chains comprise of the assortment of activities that are required to bring a product from its conception to its delivery to the final consumer – transitional stages involving design, sourcing of raw materials, manufacturing of intermediate inputs, assembly of final product, marketing, distribution and support after delivery. When these series of activities are dispersed across different geographies, the value chains become global and are termed as Global Value Chains (GVCs). It has been observed that firms, of late, have increasingly started optimizing their production process by restructuring their operations internationally through outsourcing and off-shoring to different locations.

Value Chains are often confused with Supply Chains. Supply chains are rooted in Operations Management which focuses on the sourcing and organization of products, materials and funds for the various stages of a product's development cycle. Value chains, on the other hand, have developed as a Business Management concept that concentrates on adding value to a product or service and the maximization of this value along each stage. The value-addition idea extends to aftermarkets and service support, well after the concern of Supply Chain ends.

⁴ A separate paper presents the findings for factors affecting participation of firms in India in the global value chains of the Electronics Sector

While Supply Chains are generally focussed on goods/materials management, Value Chains also have services concerns along with manufacturing-related concerns. Briefly put, the major difference between a Supply Chain and a Value Chain is centred in the idea that while the former emphasizes maximization of efficiency and coordination of various activities originating from suppliers till the end-product delivery downstream, the latter is value-addition centric wherein the value flows from the customer towards upstream.

Since Asia is fast becoming the manufacturing and services hub of the world, a majority of the Asian economies have very high levels of domestic value addition in their gross exports. The data (Table 1) from the OECD's TiVA database, though slightly dated, provides an interesting insight into the trends in value addition in economies world-wide. Although there is no concrete measure/index of the extent of a country's participation in GVCs⁵, the extent of Domestic Value Addition in a sector is a fairly decent proxy for a country's contribution to that sector's GVC.

DOMESTIC VALUE ADDED SHARE OF GROSS EXPORTS⁶ (in %)							
	1995	2000	2005	2008	2009	2010	2011
AUS: Australia	87.89	84.09	87.82	86.25	86.92	87.02	85.9
FRA: France	82.71	77.17	76.56	75.23	78.41	76.26	74.87
DEU: Germany	85.14	79.78	78.66	75.23	78.13	76.66	74.46
ISR: Israel	77.41	79.05	73.96	73.05	78	76.37	74.73
JPN: Japan	94.37	92.6	88.88	84.23	88.8	87.27	85.32
KOR: Korea	77.67	70.23	66.98	58.24	62.47	60.76	58.3
MEX: Mexico	72.66	65.61	66.97	67.25	66.45	65.53	68.29
USA: United States	88.54	87.42	86.95	84.38	88.4	86.56	84.97
BRA: Brazil	92.17	88.54	88.29	87.46	90.01	89.66	89.23
CHN: China (People's Republic)	66.62	62.72	62.57	68.23	69.18	68	67.84
HKG: "Hong Kong, China"	78.31	84.34	82.42	78.02	80.8	79.86	79.59
IND: India	90.64	88.72	82.53	77.34	79.03	77.69	75.9
IDN: Indonesia	87.43	82.63	83.44	85.38	88.92	88.92	88.03
MYS: Malaysia	69.5	52.27	54.05	58.77	59.96	58.27	59.38
RUS: Russia	86.74	81.69	87.22	86.11	87.3	86.9	86.28
SGP: Singapore	57.62	54.67	60.21	62.53	58.15	58.68	58.19
ZAF: South Africa	86.83	82.22	80.51	76.2	81.19	82.08	80.53
THA: Thailand	75.71	68.08	63.16	60.75	65.42	63.43	61.01
VNM: Viet Nam	78.69	73.06	69.25	64.58	67.15	65.29	63.74
APEC: Asia-Pacific Economic Cooperation	84.97	81.79	79.84	77.79	79.83	78.34	77.49
ASEAN: Association of South East Asian Nations	72.15	63.6	63.94	66.12	67.47	66.9	67.11
Eastern Asia	83.95	78.73	71.98	70.47	72.42	71.06	69.86

Table 1: Domestic Value Added in Gross Exports – Select Countries⁷ (Source: TiVA Database)

⁵ TiVA Database had an earlier index of participation in GVCs which measured the Forward and Backward participation of nations but has been discontinued due to lack of cohesive explanation and data.

⁶ The definition of Domestic value added share of gross exports (EXGR_DVASH) is domestic value added in gross exports (EXGR_DVA) by industry *i* divided by total gross exports of industry *i*, in %. It is a 'DVA intensity measure' and reflects how much value-added is generated by an industry per unit of its total gross exports.

⁷ Trade in Value Added Database (TiVA) Data as extracted on August 31, 2016 (<https://stats.oecd.org>)

India's level of domestic value addition in its gross exports is also quite high. Net Domestic Value Addition of certain sectors like primary activities (Agriculture and allied sectors, Mining and quarrying) and Services has always been high. In Manufacturing, certain sectors like Food processing, Textiles & allied sectors, Chemicals, Rubber & plastic products and Construction have a fairly high degree of domestic value addition. However, certain other sectors like Transport Equipment, Machinery & equipment and Electronics, which though extremely significant for the domestic economy, do not feature as prominently in GVC participation for India. (Table 2)

INDIA'S DOMESTIC VALUE ADDED SHARE OF GROSS EXPORTS (IN %)							
	1995	2000	2005	2008	2009	2010	2011
TOTAL	90.64	88.72	82.53	77.34	79.03	77.69	75.9
Agriculture, hunting, forestry and fishing	97.15	97.38	95.95	95.95	96.51	96.35	95.93
Mining and quarrying	96	95.28	93.68	91.65	92.46	92.9	92.13
Total Manufactures	87.42	84.75	74.84	65.7	68.42	66.29	63.89
Food products, beverages and tobacco	92.78	92.23	88.57	89.81	89.9	89.01	87.86
Textiles, textile products, leather and footwear	90.23	90.4	85.04	81.28	83.54	81.26	80.17
Coke, refined petroleum products and nuclear fuel	73.36	57.11	54.53	45.37	48.85	46.85	43.43
Chemicals and chemical products	85.86	86.47	78.3	70.58	75	73.51	71.44
Rubber and plastics products	84.59	88.05	78.64	73.06	75.61	74.36	72.87
Basic metals and fabricated metal products	82.26	75.33	68.98	61.33	64.35	61.88	59.78
Machinery and equipment, nec	83.69	81.42	73.24	68.41	70.49	69.44	67.36
Computer, Electronic and optical equipment	84.57	78.79	72.34	67.34	67.65	69.45	68.81
Electrical machinery and apparatus, nec	84.88	80.51	73.36	67.33	69.16	68.19	66.04
Motor vehicles, trailers and semi-trailers	87.2	82.05	77.65	66.87	70.52	69.66	67.52
Other transport equipment	83.93	78.64	74.77	60.09	67.51	69.34	68.51
Electricity, gas and water supply	90.61	84.38	83.11	76.32	80.95	80.37	76.95
Construction	88.34	83.46	79.66	78.05	79.7	78.42	75.95
Total Services including Construction activities	94.25	92.56	88.84	88.04	89.16	88.89	87.73

Table 2: India's Domestic Value Added Share of Gross Exports (in % - Select Sectors) (Source: TiVA Database⁸)

⁸ Trade in Value Added (TiVA) is a joint initiative of OECD and WTO to measure the value added by each country in the production of goods and services that are consumed worldwide. The 2015 edition of the TiVA database includes 61 economies covering OECD, EU28, G20, most East and South-east Asian economies and a selection of South American countries. The industry list has been expanded to cover 34 unique industrial sectors, including 16 manufacturing and 14 services sectors. The years covered are 1995, 2000, 2005 and 2008 to 2011.

2.2. GLOBAL VALUE CHAINS (GVC)

Global Value Chains refer to the phenomena where the activities in a value chain are dispersed across geographies. In other words, a value chain becomes global when intermediary products or services utilized for value addition in any phase originate from different locations. For instance, say in the automotive value chain, Country X produces intermediates (like steel sheets, tyres, plastic goods etc.) by utilizing inputs (raw materials like steel, rubber, coke etc. and/or designing services) sourced from different nation(s) including domestically. These intermediates are then exported to Country Y for further value addition (say assembly into passenger vehicles) and finally a portion of the final cars are sold in markets of Country Z. This involvement of geographies (Countries X,Y,Z) adding value along the chain (both manufacturing and services) makes the chain global.

Firms have been able to globalize their businesses, majorly aided by advances in technology and an enabling policy environment. Operating from multiple operations has primal advantages of increased efficiency, lowered costs and faster production. Businesses today look to add value in production where it makes most sense to do so; indeed this has become a key element of corporate competitiveness. Bernard et al (2011)⁹ showed that firms that trade tend to be larger, earn higher profits, spend more on R&D, and pay higher wages than firms that do not. Firms looking for increased market access and better performance stand to gain much from participating in global value chains.

Generic Value Chains

A generic Value Chain encompasses various stages – Manufacturing value chain comprising of raw materials and inputs to manufacturing of sub-components and components, subassemblies, final product assembly for a variety of end market segments, and the ultimate sale of final products. Services inputs to manufacturing include utilities, logistics and capital and labour services. Apart from the regular supply chain and manufacturing activities, other functions that also add value to the entire process include research, product and process development, designing, marketing and after-sales services. Although specific value-adding activities might change, the generic value chain is applicable to all industries in an overall sense.

⁹ Andrew B. Bernard, J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott (2011), NBER Working Paper No. 17627

The Value Chain in each industry is unique owing to the end-market, nature of the product and industrial/sectoral structure. The very concept of Value Chain was introduced and made popular by Michael Porter in 1985¹⁰

(Fig 1). Porter’s proposition was that within a single firm there are several activities that add value and hence form a chain of value addition within the firm. This concept has been extended to the entire production and supply chain at the industry level at present to form Value Chains for an Industry. Any firm which manufactures any product or



Figure 1: Michael Porter's Generic Value Chain

supplies a service uses some input and provides its output to another firm or the market; hence it automatically becomes a part of a value chain. But the nature of the value chain – domestic or global- is determined depending on the location of the supplier(s) and customer(s).

3. LITERATURE REVIEW

Global Value Chains is a recent field of study in trade, hence extant literature on this topic is still in the nascent stage. Most of the literature available in the academic space consists of case studies of sectors in specific countries. Theorization for global value chains as a whole is still an unexplored area.

Kraemer et.al (2009)¹¹ revolutionized the way supply chains were analysed by showing the importance of value in the supply chain. Their case study on Apple’s ipod showcased by value was distributed across nations in the production chain for the iconic ipod. Shin et.al (2009)¹² examine empirically the relationship of R&D spending and location in the value chain (lead vs.non-lead firms) to firm performance in the global electronics industry. This was one of the earliest studies on identifying and testing for individual factors that affect participation in a sectoral GVC.

UNCTAD Report (2010)¹³ was amongst the earliest reports to focus on the integration of firms in Global Value Chains. This publication focuses on what governments should do to facilitate the entry of Small and Medium Enterprises into GVCs and to ensure that

¹⁰ Michael Porter (1985), “Competitive Advantage: Creating and Sustaining Superior Performance “

¹¹ Linden, G., Kraemer, K.L., Dedrick, J. (2009). Communications of the ACM, 52(3), 140-144

¹² Namchul Shin, Kenneth L. Kraemer, Jason Dedrick (2009), Journal of Innovation and Industry

¹³ UNCTAD Report (2010), “Integrating Developing Countries’ SMEs into Global Value Chains”

they benefit from such participation. It contains case studies by OECD and UNCTAD on various sectors – automotive, cinema, scientific and precision instruments, software and tourism sectors, in both developed and developing countries to try to understand the factors determining participation in GVCs.

The OECD-WTO-UNCTAD report (2013)¹⁴ was the inception point for focusing on the implications of Global Value Chains for matters of trade, investment and development. This report explored in greater depth the place of value chains in the new global economy and evolving relationships between nations through GVCs. It took a closer look at the elements of national and international policy that affected the participation of firms and economies in GVCs, including international agreements and national policies in such diverse areas as trade, investment, services, education, and infrastructure. It extensively used data from the TiVA database for its analysis.

Kimura and Ando (2005)¹⁵ came up with a conceptual framework for fragmentation of trade where the existing trends pointed to a rapid rise in the trade of intermediates. According to the authors, this fragmentation was on two dimensions – geographical distance and controllability of a firm. Cattaneo et.al (2013)¹⁶ attempted to introduce a framework and analytical tools for measuring and improving a country's performance with respect to participation in global value chains. The focus of the paper is operational and seeks to offer stratagems to developing nations, in particular those willing to participate in GVCs on how to maximize the benefits and minimize the risks of such participation.

Kowalski, P. et al. (2015)¹⁷ was amongst the earliest papers to take a look at the factors affecting participation of developing nations in GVCs. This paper has empirically analysed five developing sub-regions in Africa, the Middle East and Asia and showed that structural factors (such as geography, size of the market and level of development), trade and investment policy, logistics and customs, intellectual property protection, infrastructure and institutions are key determinants of GVC participation.

There are very few papers that analyse participation in GVCs at the firm level, even more so for the Asian countries although almost all production networks across the world

¹⁴ OECD-WTO-UNCTAD Report (2013), "Implications of Global Value Chains for Trade, Investment, Development and Job"

¹⁵ Kimura F, Ando M (2005), *International Review of Economics and Finance*

¹⁶ Cattaneo, Gereffi, Miroudot, Taglioni (2013), *World Bank Report*

¹⁷ Kowalski, P. et al. (2015), *OECD Trade Policy Papers*

source inputs from this region. Harvie et. al (2010)¹⁸ used the ERIA Survey in ASEAN Countries that focussed on SME Participation in Production Networks to analyse the firm-level characteristics that determined SME participation in supply chains. They found that primarily firm size, ownership type and productivity in addition to managerial practices and innovation attitude were important for integration of SMEs in supply chains. Wignaraja (2015)¹⁹ furthered this line of analysis by studying a larger dataset that includes both SMEs and large firms and by incorporating more variables like human capital (apart from the ones that Harvie et al. had included). He mapped the supply chains in Southeast Asian economies to find that firm size (reflecting economies of scale to overcome entry costs) mattered for joining supply chains, with large firms playing the dominant role. In addition, efficiency (building technological capabilities and skills) as well as access to commercial bank credit also influenced involvement in supply chains.

Many subsequent case studies on specific sectors of various nations ensued. A gamut of studies on the Automotive Sector and Electronics Sectors, worldwide and in India, is present, since these sectors are sunrise sectors for manufacturing. But the emphasis has been largely on increasing manufacturing abilities and productivity. The GVC lens of scrutiny has been largely missing but is gradually coming into focus. In the interest of space and relevance, only the major studies on these two sectors that were referenced for this paper have been cited.

The UNIDO Report (2003)²⁰ is the earliest most comprehensive paper which maps the layout of the global auto industry - tracing the changes in the industry in the 1990s, showing how the emergence of regional production systems resulted in regional integration as well as the effects of global and national economic downturns on the industry. It also focusses on the opportunities that were created for industrial upgrading in developing countries which were linked with their developed counterparts. Sturgeon and Kawakami (2010)²¹ were amongst the earliest to study Global Value Chains in the Electronics Industry. Sturgeon and Biesebroeck (2011)²² analysed the global automotive industry from a GVC angle to scrutinize the possible opportunities for developing countries to upgrade in the automotive value chain on the back of their growing industries and market sizes.

¹⁸Harvie C, Narjoko D, Oum S (2010), ERIA Discussion Paper Series 2010–11.

¹⁹Wignaraja (2015), Asia and The Pacific Policy Studies

²⁰Humphrey, J., Memedovic, O. (2003), UNIDO Report-Sectoral Studies Series

²¹Sturgeon T.J, Kawakami M. (2010), World Bank Policy Research Working Paper 5417

²²Sturgeon, T., Biesebroeck, J. V. (2011), International Journal Technological Learning, Innovation and Development

Humphrey (2003) describes the impact of economic liberalization on the auto industry of Brazil and India. The author shows how investment inflows changed the structure of operations in the industry, especially the ancillary sector, with global players creating new linkages with local suppliers of the emerging economies and their own suppliers at home.

Interestingly, studies on the degree of global value chain participation in Indian sectors are still absent. FICCI – Grant Thornton Report (2013) on Integrating MSMEs into the Global Value Chain is one of the earliest studies in India that takes a look at the challenges faced by India's Micro, Small and Medium Enterprises in trying to enter global value chains. It suggests specific models and approaches that MSMEs could explore to discover new market opportunities like revamped government policies, innovative marketing tools, collaboration, etc. to make these companies globally competitive.

4. BACKGROUND - INDIAN AUTOMOTIVE SECTOR

Automobiles made their debut in India as early as 1897. The Indian automobile industry, however, took birth in the 1940s with the inception of Hindustan Motors (Birla group), Premier Ltd. (Walchand Group) and Mahindra & Mahindra (Mahindra Group). In the decades following independence and before liberalization of the Indian economy in the 1990s, the industry was plagued by slow growth, dated technology and limited competition due to only a handful of players, largely due to nationalization and the license raj. The real turnaround for the industry came in the 1980s when Maruti Udyog Ltd and Suzuki (Japan) signed a Joint Venture and the indigenously produced Maruti 800 model became hugely popular. With liberalization, multinational automakers like Toyota (Japan), Nissan (Japan), Hyundai (South Korea), Piaggio (Italy), Volkswagen (Germany), Renault (France), General Motors (USA), BMW (Germany), Ford (USA) started investing, marking the beginning of the journey that has made India one of the most vibrant automobile markets

The **Indian Automotive Industry** is the 7th largest in the world at present. The industry accounts for 10.4 per cent of the country's Gross Domestic Product (GDP). India was also the 4th largest automotive market by volume in 2015 and is predicted to rise to the third position

by the end of the decade. The average annual production has touched nearly 24 Million vehicles, of which 3.6 Million units were exported.²³

4.1. AUTOMOBILES

The automobile sector contributes nearly 22% to the country's manufacturing GDP²⁴. The automobile industry in India broadly comprises of the following segments (Fig 2):

- Passenger Vehicles (including passenger cars, utility vehicles and vans)
- Commercial Vehicles (light, medium and heavy)
- Two-wheelers (motorcycles, geared and ungeared scooters, mopeds)
- Three-wheelers (including Auto rickshaws and Tractors)

With regard to individual segments of the industry, India is the largest tractor manufacturer, second-largest two-wheeler manufacturer, the largest motorcycle manufacturer and the fifth largest commercial vehicle manufacturer in the world.²⁵ The Two Wheeler segment with 81 per cent market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. The overall Passenger Vehicle (PV) segment has 13 per cent market share. According to SIAM, the volume of sales in the country is expected to touch 6 million-plus vehicles by 2020.²⁶

Category	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Passenger Vehicles	29,82,772	31,46,069	32,31,058	30,87,973	32,21,419	34,13,859
Commercial Vehicles	7,60,735	9,29,136	8,32,649	6,99,035	6,98,298	7,82,814
Three wheelers	7,99,553	8,79,289	8,39,748	8,30,108	9,49,019	9,33,950
Two Wheelers	1,33,49,349	1,54,27,532	1,57,44,156	1,68,83,049	1,84,89,311	1,88,29,786
Grand Total	1,78,92,409	2,03,82,026	2,06,47,611	2,15,00,165	2,33,58,047	2,39,60,409

Table 3: Automobile Production Trend in India (Source: SIAM)

²³ Society of Indian Automobile Manufacturers (SIAM) Statistics

(<http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=13>)

²⁴ Make in India : Sector Survey – Automobiles (<http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-automobile>)

²⁵ Make in India – Automobiles Sector (<http://www.makeinindia.com/sector/automobiles>)

²⁶ Estimates of Society of Indian Automobile Manufacturers (SIAM)

In addition, several initiatives by the Government of India and the major automobile players in the Indian market are expected to make India a leader in the Two Wheeler (2W) and Four Wheeler (4W) market in the world by 2020.

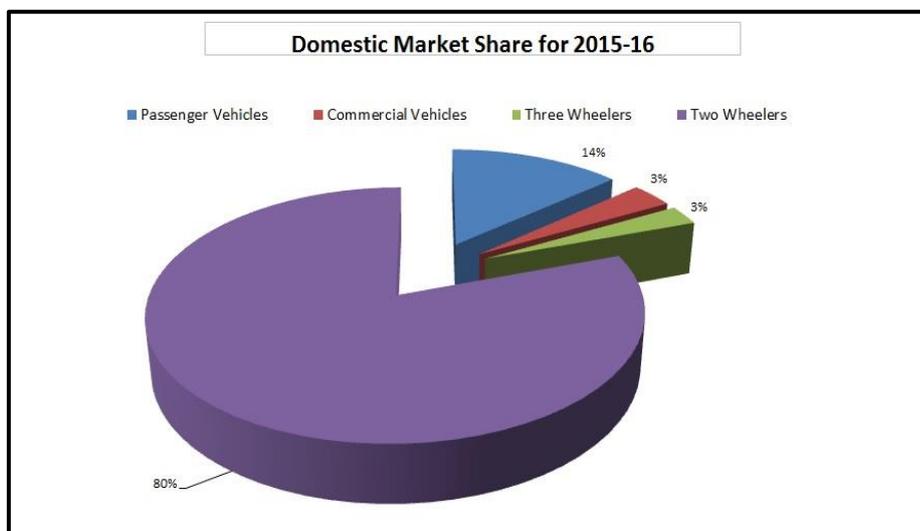


Figure 2: Market share of different segments of the Indian Auto Market (2014-15) (Source: SIAM)

India also prominently features in the auto export market and has strong export growth expectations for the near future. In FY 2014-15, around 31 per cent of small cars sold globally were manufactured in India. In April-January 2016, exports of Commercial Vehicles registered growth of 18.36 per cent over April-January 2015. The top sourcing markets and destination markets are given below (Table 3):

SEGMENT	Top 5 EXPORTS DESTINATION (Value of Exports)	Top 5 IMPORTS SOURCES (Value of Imports)
Automotive	<ol style="list-style-type: none"> 1. Mexico (US \$ 1037 million) 2. South Africa (US \$566.40 million) 3. UK (US \$316.25 million) 4. Italy (US \$ 312.4 million) 5. Sri Lanka (US \$305 million) 	<ol style="list-style-type: none"> 1. Germany (US \$83.52 million) 2. U K (US \$38.55 million) 3. Italy (US \$14.98 million) 4. Hungary (US \$14.12 million) 5. Sweden (US \$9.88 million)
Auto Components	<ol style="list-style-type: none"> 1. US (US \$ 1026.36 million) 2. Turkey (US \$ 418.98 million) 3. Mexico (US \$ 194.05 million) 4. Germany (US \$193.45 million) 5. Thailand (Us \$ 185.56 million) 	<ol style="list-style-type: none"> 1. Germany (US \$723.23 million) 2. Korea RP (US \$651.2 million) 3. China P RP (US \$638.36 million) 4. Japan (US \$479.47 million) 5. Thailand (US \$354.82 million)

Table 4: Imports and Exports in Automotive Sector for 2015-16 (Source: Ministry of Commerce and Industry)

4.2. AUTO COMPONENTS

The Auto Components industry is ancillary to auto-makers and supplies inputs ranging from raw materials to parts, components to chassis, brake lines and engines. It not only caters to domestic OEMs but also exports to OEMs abroad and after-markets worldwide. The automobile components industry contributes 25.6% to India's manufacturing GDP and 3.8% to India's overall GDP, providing indirect employment to 1.5 million people.²⁷ The automotive component manufacturing sector consists of nearly 850 firms in the organized sector and several more in the unorganized sector. The Components industry can be roughly segmented into the following:

- Engine and Engine Parts – Comprise of Engine assembly (core engine parts, fuel delivery system), Carburetors, Pistons, Piston Rings, Engine Valves, etc. Since these are highly critical and sensitive, these suppliers usually work closely with the OEMs
- Drive Transmission & Steering Parts- Comprise of power train, Gears ensemble, clutches, axle, wheels, steering systems
- Suspension & Braking Parts – Comprises of Shock Absorbers, Brakes, Brake shoes, Leaf Springs
- Electrical Parts - The main products in this category include starter motors, generators, spark plugs and distributors.
- Body and Chassis – Comprises of the exterior structural support of the vehicle
- Equipment – This includes headlights, Dashboard Instruments
- Others – Comprises of other components like sheet metal , rubber elements, plastic molded parts

²⁷ Make in India Sector Survey – Automobile Components (<http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-automobile-components>)

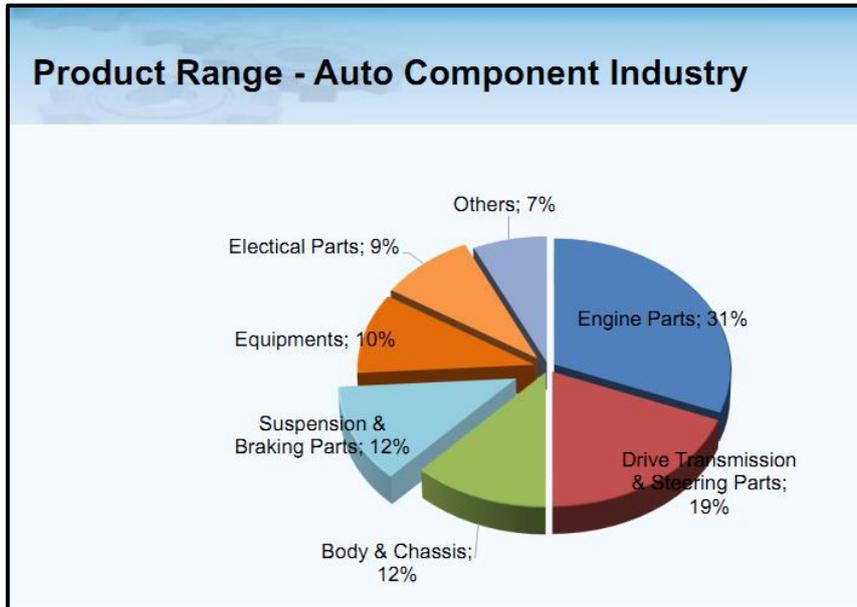


Figure 3: Segments of the Auto Component Industry (Source: ACMA)

The Auto Industry is extremely optimistic about India as a market owing to a young population with increased disposable income, low vehicle penetration, positive customer sentiment in cities and an emergent economy. Moreover, the growing interest of the companies in exploring the rural markets has further aided the growth of the sector. This industry is anticipated to witness rapid growth in the near future.

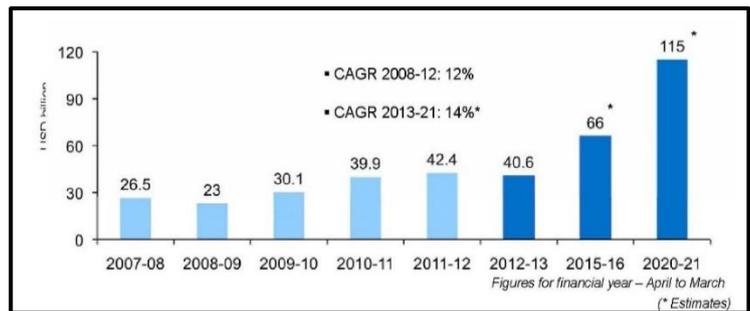


Figure 4: Auto Components Industry Turnover (Source: ACMA)

4.3. LOCATION

The automobile industry has a tendency for agglomeration, forming clusters with automotive manufacturers and automotive components, usually to benefit from a common labour supply pool, local markets, infrastructure that develops due to the growth of these industries and decreased costs of transport due to proximity of components. In India, automotive manufacturing is concentrated around the four major metropolises of the country: Delhi, Mumbai, Kolkata and Chennai.

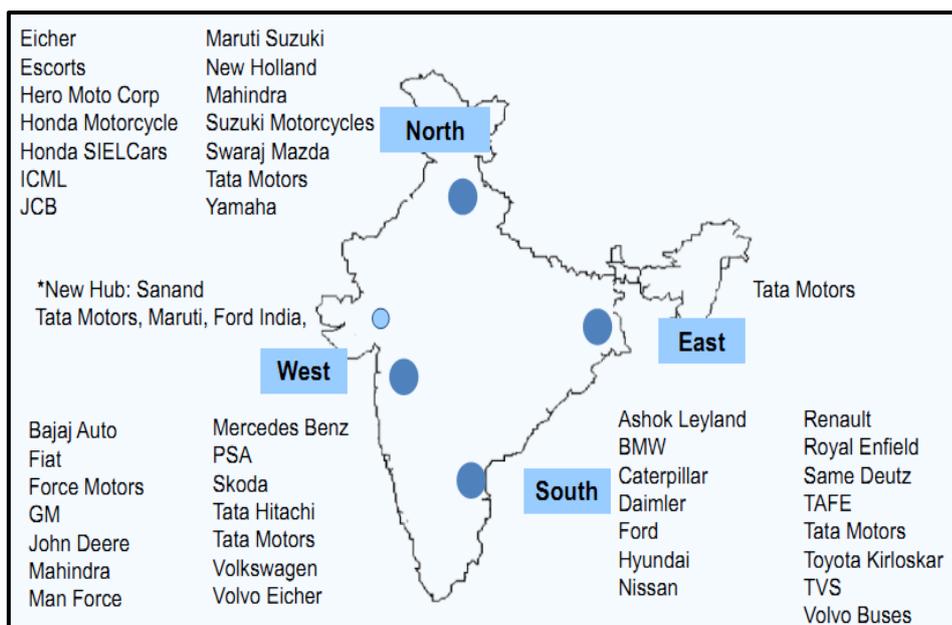


Figure 5: Automotive Clusters in India (with major OEMs) - Source: ACMA

Regional concentrations have developed around these cities, through the establishment of major industrial hubs such as Gurgaon-Manesar in suburban Delhi, the manufacturing corridor extending from Mumbai to Pune in western India and the manufacturing belt from Chennai to Bangalore in southern India. New concentrations of manufacturing are also emerging, for instance in Sanand and Halol in Gujarat. The distribution of various automobile and auto-components firms has been given in Table 5.

REGION	OEMs	ANCILLIARIES	TOTAL	% DISTRIBUTION
North	14	315	329	45%
West	17	194	211	29%
South	15	143	158	22%
East	2	30	32	4%
TOTAL			730	100%

Table 5: Region-wise distribution of Auto makers and Ancillaries in India (Source: SIAM and ACMA Directories)

For the Study, these four clusters, located at four corners of the country, were the main field of study along with firms located in the surrounding regions:

- (a) North – National Capital Region (NCR), Haryana, Punjab, UP and Rajasthan
- (b) West – Maharashtra (mostly Pune cluster and Mumbai), Gujarat
- (c) South – Tamil Nadu (mostly Chennai cluster), Karnataka (mostly Bangalore, Mysore)
- (d) East – West Bengal (mostly Kolkata), Jharkhand (mostly Jamshedpur)

4.4. AUTOMOTIVE VALUE CHAIN

This Study focusses on the participation of the auto sector in the Global Value Chain (GVC). For the purpose of the study, the Automotive Sector was sub-divided into the following value *segments*:

(a) **Raw Materials Suppliers** – which include suppliers of steel, plastic, aluminium that are used for manufacturing parts down the value chain

(b) **Sub-Components Manufacturers/Assemblers** (Tier -2, Tier - 3) – which include the components and sub-components manufacturers like Piston Rings, Engine Valves, Leaf Springs, Shock Absorbers, Headlights, Sheet metal components and plastic moulded parts. Lower tier suppliers are usually generic manufacturers and operate on very thin margins; thereby depending on volumes for profits.

(c) **Components Manufacturers/Assemblers (Tier-1)** - which include sub-systems manufacturers/assemblers like engine and power line, brake system, gear system, fuel injection system. Tier-1 suppliers work very closely with OEMs and usually develop along with them as dedicated suppliers.

(d) **Original Equipment Manufacturers (OEMs)** - which are essentially the final assemblers and own brand names like Maruti, Mahindra, Honda, Volvo, Hero, Honda. OEMs are the drivers of efficiency and innovation throughout the value chain and are considered to be the most important cog in the wheel.

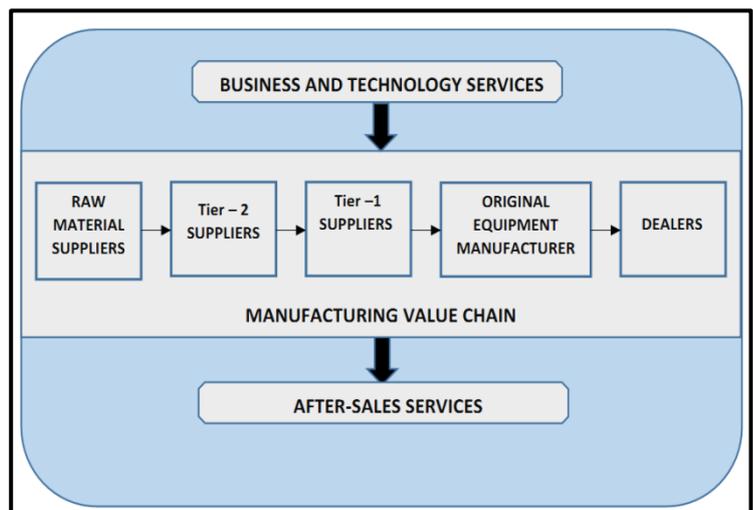


Figure 6: Automotive Value Chain (Source: Authors' conceptualization)

Investment Information and Credit Rating Agency of India (ICRA)

has a range of studies on the Indian Automotive Sector – on challenges and opportunities, competitiveness, impact of free trade regime, etc. ICRA Report (2003) studies the competitiveness of the Indian auto industry, by global comparisons of macro-environment, policies and cost structure. The Working Group on Automotive Sector for the 12th Five Year Plan (2012-17) which worked to formulate Automotive Mission Plan II (2017-27) has proposed several measures to increase the capacity, competitiveness, efficiency and exports of the Automotive sector by bringing about changes in the policy environment of the nation.

Confederation of Indian Industry (CII) and A.T. Kearney had released a report in 2013 that highlighted ways to overcome challenges faced by the Indian Automotive Industry and build a world-class automotive supply chain in India.

The National Skill Development Corporation (2015)²⁸ brought out a skill-gap report on India's automotive sector highlighting the requirement for labour in the industry and the gaps in the apparatus for skill generation that exist in the country. A similar report on the Electronics and IT Hardware Sector in India was released by NSDC in 2015. ASSOCHAM in association with Ernst & Young (2016) has released reports on how to convert India into a global manufacturing hub for Automotives and Electronics. These reports focus on the overall challenges faced by the Auto and Electronics sector in India and possible suggestions to overcome them. Confederation of Indian Industry (CII) and E&Y have similarly released a report in 2016 that proposes a roadmap for making India a world class hub for automotive manufacturing.

5. DESCRIPTION OF THE STUDY

5.1. THE OBJECTIVE

The primary objective of the Study titled *Indian Firms in Global Value Chains – Sectoral Analysis* is to understand the factors of participation of firms in India in Global Value Chains (GVCs) for two vital sectors of the Indian Economy – **Automotives and Electronics**. As described earlier, India has a significant presence in the Services Value Chains (Table 2) based on the degree of domestic value addition, but it is yet to make a mark in the manufacturing value chains vis-à-vis its counterparts in BRICS and ASEAN. In order to achieve the goal of becoming a global manufacturing hub, India's domestic value addition in manufacturing needs to go up considerably. This paper focusses on the Automotive sector. The Electronics sector is covered in a subsequent paper.

28 NSDC-KPMG Report (2015)

5.2. CHOICE OF AUTOMOTIVE SECTOR FOR THE STUDY

The rationale behind choosing Automotives as the sector for study is as follows:

(a) *Significance*- Automotives (automobiles and auto components) is a significant element of the manufacturing sector in the Indian Economy in terms of its contribution to GDP and output as well as its potential for employment and growth.

SECTOR	CONTRIBUTION TO GDP	EMPLOYMENT
Automotives and Auto Components	10.4%	19 million (directly and indirectly)

Table 6: Importance of Automotive Sector in Indian Economy (All figures for FY 2015-16. Source: India Brand Equity Foundation (IBEF), Nasscom, DEiTY)

(b) *Participation in GVCs* - The span of Value Chains for Automotives is quite wide and intense globally but India's presence is not substantial yet. Using the degree of domestic value addition as a proxy for GVC participation, the higher the domestic value addition, the more the country is integrated into the GVC by contributing a higher amount of value-added activities to the chain, domestically.

VALUE ADDITION INDICATOR	TRANSPORT EQUIPMENT
Value added as a percent of production	25.89%
Domestic value added share of gross exports (EXGR_DVASH) ²⁹	68%
Industry domestic value added contribution to gross exports (EXGR_TDVAIND) ³⁰	2.89%

Table 7: Value Addition Statistics for the Automotives in India – 2011 (Source: TiVA Database)

(c) *Pivotal industry in terms of linkages within sectors* - The Grubel–Lloyd index³¹, which measures the level of intra-industry trade of a particular item (arises if a country simultaneously imports and exports similar types of goods or services), for Automotives (Transport Equipment and Motor Vehicles) is fairly high.

²⁹ Domestic value added share of gross exports (EXGR_DVASH) is defined as domestic value added in gross exports (EXGR_DVA) by industry *i* **divided by total gross exports of industry *i***, in %. It is a 'DVA intensity measure' and reflects how much value-added is generated by an industry per unit of its total gross exports.

³⁰ Industry domestic value added contribution to gross exports (EXGR_TDVAIND), in %, is calculated as Domestic Value Added Content of Gross Exports of industry *i* **divided by total Gross Exports of all industries**. Sum of EXGR_TDVAIND across industries equals Domestic Value Added Content of all industries (EXGR_DVASH). While EXGR_DVASH measures the intensity of DVA in an industry's exports, **EXGR_TDVAIND captures the magnitude compared to other industries**.

³¹ Introduced by Herb Grubel and Peter Lloyd in 1971 to measure the degree of Intra-Industry Trade. The formula for the index of a product "*i*" is $GLi = 1 + \frac{|Xi - Mi|}{(Xi + Mi)}$ where X_i = Exports and M_i = Imports. $GLi = 1$ indicates only intra-industry trade while $GLi = 0$ indicates only inter-industry trade.

SECTOR	GRUBEL-LLOYD INDEX
Agriculture, Hunting, Forestry and Fishing	0.222547
Mining and Quarrying	0.313648
Food, Beverages and Tobacco	0.812232
Textiles and Textile Products	0.184938
Leather, Leather and Footwear	0.185807
Wood and Products of Wood and Cork	0.656832
Pulp, Paper, Paper , Printing and Publishing	0.619258
Coke, Refined Petroleum and Nuclear Fuel	0.498961
Chemicals and Chemical Products	0.951918
Rubber and Plastics	0.683457
Other Non-Metallic Mineral	0.556309
Basic Metals and Fabricated Metal	0.689843
Machinery, Nec	0.95135
Electrical, Electronics and Optical Equipment	0.712225
Transport Equipment	0.693494
Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	0.642215
Manufacturing, Nec; Recycling	0.907903
Electricity, Gas and Water Supply	0.052474
Construction	0.000151
SERVICES	0.303765

Table 8: Grubel-Lloyd Index for Sectors in Indian Economy, FY 2015 (Authors' Calculation)

(d) *Tariff Structure* - Most importantly, from the trade perspective, the chosen sectors – Automotives and Electronics- have very diverse sectoral tariff structures which makes them interesting to analyse in terms of the impact of policy on their GVC participation. While Automotives is somewhat protected owing to high rates of import duty (ranging from 10% for Components to 125% for Fully Assembled (New or Used) Cars), the Electronics Sector has an inverted duty structure where it is cheaper to import final products than import components and manufacture domestically.³² The peak rate of Basic Customs Duty (BCD) is 10% while the BCD on 217 tariff lines covered under the Information Technology Agreement (ITA- 1) of WTO is 0%. All components/products required in the manufacture of ITA- 1 items also have been exempted from basic customs duty subject to actual user condition. This has been the state of affairs for quite a while now. But after the introduction of the “Make in India” campaign by

³² Rates of Customs and Excise Duties in later sections

the Central Government, several significant announcements regarding the modification of taxes and the tariff structure in the Electronics Sector have been made in the Annual Budgets.

5.3. DEFINITIONS

This Study defines Global Value Chains in a more concise and precise manner. Harvie et. al (2010)³³ in their study on East Asian production networks have defined SME participation in supply chain trade as a firm which is either a supplier to Multinational Corporation(s), an importer of intermediate goods or an exporter of some of its products. Since the definition of GVCs generally still lacks clarity in academic literature and that is probably the reason why a Value Chain is often mistaken for a Supply Chain, this Study has used the following definitions to analyse the trends in the factors that are affecting the participation of firms in India in the global value chains of Automotives and Electronics:

(a) Value Chain (VC): While each sector can be deemed to have a Value Chain, this Study has considered value chains for each final product. For instance, the value chain for a Mahindra Vehicle is separate from the Value Chain for a Toyota Vehicle. Similarly, the Value Chain for a Television is different from the Value Chain for a Solar Project. Thus each sector has multiple value chains based on the final product as sold in the market (under a specific category and a brand name). The “value chains” studied here refer to the “industry” or “sectoral” value chain (often performed by networks of firms involved in producing goods and services) and not “firm” value chain (chain of activities that a “firm” operating in a specific industry performs to deliver goods or services).

(b) Global Value Chains (GVC): Value Chains involving at least three geographies, with India being one. This study focusses only on the small fraction of the sectoral GVCs which have their presence in India. In other words, if any value added activity (either manufacturing or services) in the sectoral value chain that is performed in India directly utilizes a product/service sourced from another country and the output (part of or entirely) of a value added activity in India is shipped to another country, the value chain is deemed to be a GVC.

In simpler terms, “Global” refers to the spread of the industry value chain activities across (atleast) three geographies including India, “Value” refers to value addition done by the firm in India either through manufacturing or by providing services and “Chain” refers to the

³³ Harvie C (2010), International Journal of Business and Development Studies

series of activities involved in bringing a product from its conception to delivery in the end market.

In today's world of high intermediates trade, there are hardly any value chains that are not global. The only exception -when a value chain is not global- is when all the value added activities, right from inception of the product to the final sale is within the country. Since this might probably be non-existent in practice, the participation of firms was defined somewhat narrowly to determine whether firms in India are a part of any sectoral GVC or not.

(c) Participation of a firm in GVC: A firm has been deemed to be a part of its sectoral GVC if it is directly engaged in imports and exports of intermediates/final products (i.e., if its supplier and customer are located in other countries). The various possible categories where firms engage in trade are:

- Firms sourcing inputs domestically and manufacturing products in India for foreign markets (Exports Only),
- Firms importing inputs for manufacturing and selling domestically in India (Imports Only),
- Firms importing inputs for manufacturing and selling domestically in India as well as in foreign markets (Imports and Exports)

The firms that are categorized under Imports and Exports have been deemed as participants in the Automotive GVC. To further streamline this definition, the degree of imports and/or exports is considered only if it is above 5% of the total input sourcing or output supply for a firm, as was decided in consultation with the industry experts.

(d) Firm - A company that may be a standalone entity or a fully owned subsidiary or a part of a consortium. For the firm level characteristics, the information has been sought as a Stand Alone Entity only, even when it is a subsidiary or part of a consortium. For all other purposes, the legal identity has been taken into consideration. For instance, if the question is pertaining to factors enabling greater participation of the Firms in GVCs, then the answer expected is from the point of view of the Company (in case of Stand Alone entity) or from the view of the Parent Company (in case of a subsidiary or consortium).

6. SURVEY METHODOLOGY AND SCOPE

The methodology consisted of seeking information regarding participation of firms in India in sectoral GVCs through a combination of in-depth discussions and a firm-level survey. The in-depth discussions were held with relevant industry associations, i.e., Society of Automobile Manufacturers (SIAM) and Automotive Component Manufacturers' Association of India (ACMA) for the Automotive Sector. For the Electronics Sector, industry associations like Electronics Industry Association of India (ELCINA), Indian Electronics and Semiconductor Association (IESA) and Manufacturers' Association for Information Technology (MAIT) provided comprehensive information via personal interviews.

MODE	AUTOMOTIVES			ELECTRONICS		
	INDUSTRY EXPERTS	OEMs	COMPONENTS	INDUSTRY EXPERTS	OEMs	COMPONENTS
IN-DEPTH DISCUSSIONS	3	6	10	3	10	13
FIELD SURVEY	-	4	90	1	34	74
SUB TOTAL	3	110		4	131	
TOTAL FIRMS IN DIRECTORIES	730			1042		
TOTAL FIRMS APPROACHED	400			600		
RESPONSE RATE	27.5%			21.8%		

Table 9: Distribution of Respondents for the GVC Survey for Automotive Sector

Apart from Sectoral bodies, in-depth discussions with several Industry experts belonging to Lead Firms in respective segments were conducted. Some of these experts occupied comparable important positions in the Industry Associations as well, which resulted in an all-round perspective of the sector as well as an insightful understanding of factors of participation in GVCs for their individual firms. These in-depth discussions were supplemented with a firm-level survey to accumulate more ground-level information.

6.1. TARGET LIST OF FIRMS

The source of the list of firms was the industry directories – SIAM Directory 2012 and ACMA Directory 2015. SIAM is the apex industry body of principal vehicle and vehicular engine manufacturers and ACMA is the apex body of the auto components industry that represents nearly 85% of the industry by turnover. These directories contained the particulars of nearly

730 member auto firms – Company Names, Location details, Management details, Contact information, Products Manufactured, Customers, etc.

In the attempt to make the sample of firms a representative set, conscious effort has been made in choosing the firms across the different attributes, i.e., in terms of segment, primary business, size, region, type of location, ownership structure and manner of participation. Since the final responses could not be controlled for, representativeness of firms was targeted in the sample list of firms (target list) to whom the survey was sent. Segments for the two sectors – Automotives and Electronics –with players in all key parts of the GVCs in these industries and also ensure that the target list was a rough reflection of the distribution of firms in the master list (as per the Association directories). The distribution of the final respondent firms across these attributes has been outlined later in the Data section (Section 7)

6.2. RESPONDENTS

The point of contact in the firms for the field survey was also selected carefully after extensive consultations with the industry experts. Since Global Value Chains is yet to be a term or concept in common parlance of an industrial employee, the survey sought out persons in such positions that have exposure to Corporate Strategy, Sourcing Business and Operations Management. The typical respondent of the survey was at the level of either Vice President (VP)/Director (Corporate Affairs or Business Strategy or Operations) or General Manager (Manufacturing) or Plant Heads. The target has been to interact with decision makers who are aware of the firm's present operations, position in the GVC and future outlook towards participation of their firm in GVCs of respective sectors. Multiple respondents within each firm were approached to minimize response bias.

This survey was implemented by the student researcher via telephonic interviews, online questionnaire and visit to Auto Expo (New Delhi, February 2016). A mix of modes was employed in order to maximize the response rate. Telephonic interviews, while detailed and complete, were usually difficult to set up because of appointment related issues. Hence an online questionnaire was also floated which firms filled at their convenience. But in terms of response rates, telephonic and face-to-face interviews typically had a very high response rate as compared to the online survey.

Along with this, two survey agencies were employed to conduct the survey more extensively, on behalf of IIM Bangalore, through online mode and face-to-face interviews with the relevant respondents. These agencies were – (a) Feedback Consulting, conducting the

survey in the Western and Southern Region primarily; and (b) Spectrum Research, conducting the survey in the Eastern and Northern Region primarily. IIM Bangalore provided these survey agencies with the target list of companies along with contact details and a letter of introduction to be produced, if needed, on behalf of IIM Bangalore.

6.3. QUESTIONNAIRE

Survey of relevant literature – academic papers, industry reports and news articles- was the first step towards identifying and mapping out broad factors affecting the participation of firms in global value chains. The ensuing in-depth discussions with industry experts provided deeper insights into the structure, functioning, challenges and anecdotal nitty-gritties of each sector which helped narrow down and polish the individual factors. Two separate survey questionnaires – one for each sector- were designed after extensive consultations with the Project Guide and industry experts to extract relevant evidence on the factors of participation in GVCs from the firms’ perspective.

The questionnaires consisted of both closed questions (rating and ranking questions where firms were asked to rate /rank factors) as well as open-ended questions (where firms were asked to describe their perceptions related to broad factors and relevant trends). A pilot survey was floated where industry experts and a few firms were asked to fill the questionnaires. Feedback was taken on several facets like length of the questions, time required to fill the questionnaire, comprehensiveness of the questionnaires, missing factors/questions etc. The suggestions for change were discussed and incorporated in the final questionnaires (attached in the appendix) which were then sent to the field.

7. SURVEY DATA - DISTRIBUTION OF FIRMS

Care was taken to ensure diversity in the target list of firms in terms of the attributes described below. Descriptive statistics for the responses under these attributes have been given below:

7.1. SECTORAL SEGMENTS

The initial target number for firms for each sector was 100 covering both Original Equipment Manufacturers and Components manufacturers/assemblers (further sub-divided into Tier-1, Tier-2, Tier-3).

Since the grouping of the Auto Components firms into the sub-segments (Tiers) is not straight forward (as there is no clear cut definition for these), a two-step approach was followed.

The respondents were asked to categorize themselves as OEMs, Tier-1, Tier-2, Tier-3 or Raw Materials Suppliers. Then based on the product-category (output) of the firm and client base, we independently classified the components firms following the procedure adopted by Saranga et.al. (2013)³⁴.

- (a) Tier -1: Produced components/sub-systems and had a major share (60% or more) of the customer base as OEMs
- (b) Tier -2: Produced components and whose majority customer base consisted of Tier 1 firms
- (c) Tier -3: Firms which produced sub-components and whose majority customer base consisted of Tier 2 firms and produced sub-components

SECTOR	INITIAL MINIMUM TARGET	NO. OF FIRMS COMPLETED (TOTAL SAMPLE SIZE)
AUTOMOTIVES	Total = 100	Total = 110
1. OEMs	10-12	11
2. Auto Ancillaries	90	99
(a) Tier – 1 Suppliers		37
(b) Tier – 2 Suppliers		38
(c) Tier – 3 Suppliers		18
(d) Raw Material Suppliers		6

Table 10: Distribution of Respondent Firms across Automotive Segments

The self-categorization by the firms was cross-checked with our classification and discrepancies, wherever observed, were clarified by industry experts. It was actually discovered that the firms had a very good sense of which segment they belonged to, as the cross-checks yielded very few discrepancies.

7.2. PRIMARY BUSINESS

The *Primary business* of the firms referred to the activity that yielded more than half of their revenue and were broadly categorized as Manufacturing, Trading and Both Manufacturing and Trading. Apart from manufacturers, trader-only firms were also included in the target firms’ list, that simply

PRIMARY BUSINESS	AUTOMOTIVES
Manufacturing	107
Trading	1
Both Manufacturing and Trading	2
TOTAL	110

Table 11: Primary Business-wise distribution of Automotive Respondent Firms

³⁴ Haritha Saranga, Arnab Mukherji & Janat Shah (2013), IIM Bangalore Review

imported (or exported) products and supplied them to firms here (or abroad) without involving any value addition through manufacturing. The Primary Business essentially gives the context in which firms have responded, as in whether the factors affecting participation in GVCs are from a manufacturing perspective or trading or simply others.

7.3. SIZE (SCALE)

The definition of size (scale) is as per the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 wherein the Manufacturing enterprises are categorized according to Investment in Plant and Machinery. This definition is often used in empirical work as value added or output as a measure of size are likely to be more liable to variations in macroeconomic conditions. Besides, firms in Automotives association directories are also categorized using this definition.

SCALE	AUTOMOTIVES	% of FIRMS IN SAMPLE
(a) Small	12	10.9
(b) Medium	54	49.1
(c) Large	44	40.0
TOTAL	110	100%

Table 12: Size-wise distribution of Automotive Respondent Firms)

7.4. REGION

The automotive industry has a tendency to agglomerate at one location, creating a cluster. The survey covered the four primary Auto regions in India in the North, East, West and South. For instance, the Northern region comprises of NCR along with the states of Haryana, Punjab, Uttar Pradesh and Rajasthan.

SECTOR	NORTH	EAST	WEST	SOUTH	TOTAL
AUTOMOTIVES	52	12	24	22	110
% OF FIRMS IN SAMPLE	47%	11%	22%	20%	100%

Table 13: Region- wise distribution of Automotive Respondent firms

7.5. LOCATION

The survey covered the four primary Auto clusters in India. In addition to clusters, firms in nearby locations have also been covered to account for any intangible effects of locating in a cluster. The additional categories included Industry Centre (an industrial area where often an OEM first establishes itself and develops its supplier base around it), Special Economic Zones (SEZs), Export Oriented Units (EOUs)/ Export Processing Zones (EPZs) (as demarcated by the Government of India) and Others (Semi-Commercial Areas).

TYPE OF LOCATION	AUTOMOTIVES	% of FIRMS IN SAMPLE
Industry Centre	64	58.1
Cluster	45	40.9
Special Economic Zone (SEZ)	1	1
Export Processing Zone (EPZ)/Export Oriented Unit (EOU)	-	-
Others	-	-
TOTAL	110	100%

Table 14: Location-wise distribution of Respondent Firms

7.6. OWNERSHIP STRUCTURE

Ownership structure might be one of the reasons influencing participation in GVCs. (Wignarajan, 2015)³⁵. For instance, fully owned Indian subsidiaries of foreign firms have much easier entry into the global value chain due to their parent company as compared to fully Indian firms. To make the target list of firms representative, firms under various categories of ownership type were considered - No foreign ownership (Fully Indian firm), Foreign Partner(s) having less than 50% share and Foreign Partner(s) having more than 50% share (Foreign firms, fully owned subsidiaries)

OWNERSHIP STRUCTURE	AUTOMOTIVES
No foreign ownership	75
Foreign partner(s) having less than or equal to 50% ownership	15
Foreign partner(s) having more than 50% ownership	20
Total	110

Table 15: Ownership Structure - wise distribution of Automotive Respondent Firms

Although the collected data suggests that the majority of the respondent firms are Indian, the survey attempted to cover firms with different types of ownership. This study is about firms in India and their participation in sectoral GVCs and not about Indian firms alone. It is vital to understand the factors that encourage or dissuade foreign entities from setting up their business in India as well, if one has to ultimately design policies to encourage more foreign firms into the economy.

³⁵ Wignaraja, Ganeshan (2015), Asia and the Pacific Policy Studies.

7.7. MANNER OF PARTICIPATION IN GVCs

A firm has been deemed to be a part of its sectoral GVC if it is directly engaged in imports and exports of intermediates/final products (i.e., if its supplier or customer is located in another country). The various categories with respect to degree of trade are:

- Exports Only - Firms sourcing inputs domestically and manufacturing products in India for foreign markets (Exports > 5% of Total Output; No (or <5%) Imports),
- Imports Only - Firms importing inputs for manufacturing and selling domestically in India (Imports > 5% of Total Inputs; No (or <5%) Exports),
- Both Imports and Exports - Firms importing inputs for manufacturing and selling domestically in India as well as in foreign markets (Imports > 5% of Total Inputs; Exports > 5% of Total Output)
- Neither Imports nor Exports - Firms sourcing inputs domestically for manufacturing and selling domestically in India (No (or < 5%) Imports of Total Inputs; No (or < 5%) Exports of Total Output)

TRADE	AUTOMOTIVES
Import Only	26
Export Only	22
Both Import and Export	19
Neither Import nor Export	27
Did not Reveal/Missing	16
TOTAL	110

Table 16: Trade - wise distribution of Respondent Automotive firms

Any firm that is part of the manufacturing or services process in the Automotive Industry functions to cater to other firms in the sector or to the end-customer. As a result, that firm becomes part of a value chain. To be part of a Global Value Chain, the firm either is located in or engages with entities present in other geographical locations. A firm in India (Indian or Multi-National) can be part of the Automotive GVC by engaging in imports of products (components or assembly kits) and exports of products (components and/or finished goods) thereby usually serving both the domestic and foreign markets.

MANNER OF PARTICIPATION	AUTOMOTIVES
(a) Indian Firm sourcing domestically and manufacturing/assembling components in India for foreign markets (Exports Only)	16
(b) Indian Firm Importing inputs for manufacturing/assembling and selling domestically in India (Import Only)	17
(c) Indian Firm Importing inputs for manufacturing/assembling in India for domestic market and exports (Both Import and Export)	32
(d) MNC sourcing domestically and manufacturing/assembling components in India for foreign markets (Exports Only)	2
(e) MNC importing inputs and manufacturing/assembling for the domestic Indian market (Import Only)	6
(f) MNC Importing inputs for manufacturing/assembling in India for domestic market and exports (Both Import and Export)	10
(g) None of the above	27
TOTAL	110

Table 17: Manner of Participation – wise distribution of Automotive Respondent Firms

8. DATA ANALYSIS

8.1. PRELIMINARY ANALYSIS - FIRM SPECIFIC FACTORS

Firm level information related to scale (size) of the firm, ownership structure, location, primary business and segment of operation were collected as part of the firm description. This information was then cross-verified against data available from secondary sources like company websites, PROWESS Database and suppliers' aggregator websites like TradeIndia and MoneyControl. The descriptive statistics of these characteristics were already provided above (Tables 8-15)

Since these variables are mostly categorical (nominal) variables, cross-tabs provide interesting insights into how these firm-specific characteristics are related with the manner of participation of firms in the sectoral GVCs.

8.1.1 Size (Scale) of the Firm

Most of the respondent firms in the automotive survey were involved in some form of trade (either imports, or exports or both) (Table 15). About a quarter of the automotive sample (24.5%) was not a part of any Automotive GVC, i.e., these firms source their inputs domestically and supply to domestic customers only (neither imports nor exports). A majority of such firms were of Medium or Small scale. Most of the large respondent firms (both Indian firms and MNCs) are direct participants in the Automotive GVC by being involved in both

imports and exports. On the other hand, more small firms are absent as opposed to being present in GVCs, which indicates that size matters for participation in GVCs.

With regard to position in the Automotive GVC (Fig 7), most of the respondent automotive firms were Tier -2 components suppliers with majority being Medium and Small firms. More than half of the large ancillary firms are Tier-1 suppliers (48%) and OEMs. Although there are a significant number of medium Tier-1 suppliers as well, the fact that small firms are missing as Tier-1 suppliers and OEMs, only strengthens the hypothesis that size has a role to play in the manner of participation of firms in the Automotive GVCs as well.

Firm size, as defined by the Micro, Small and Medium Enterprises Definition Act (MSMED), 2006 wherein the manufacturing enterprises are categorized according to investment in plant and machinery, is possibly reflective of the potential to achieve economies of scale by the firm. Hence the domino effect on lowered costs of production (lower average and marginal costs (Zhao & Li, 1997)) and lower costs of delivery make the firm a reliable supplier. Additionally, larger firms are expected to have access to more resources at their disposal to meet the entry costs into value chains such as technology and accreditation expenses (Srinivasan & Archana, 2011)³⁶. Wignarajan (2015) has showed that firm size has a positive effect on the probability of joining supply chain trade in a nonlinear form.

The survey responses seem to indicate that the size of the firm does have a role to play in enabling it to be a reliable supplier. Size also has secondary effects in terms of building capacity for future, signalling to competitors its future strategy, firm's access to resources like finance and ability to undertake risks in case of need. SMEs can possibly overcome the handicap of size by forming clusters or targeting niche markets. Usually on achieving a certain volume of production, costs of production (especially fixed costs) become less significant over time as compared to early stages of participation.

³⁶ T. N. Srinivasan and Archana V. (2011), Economic and Political Weekly

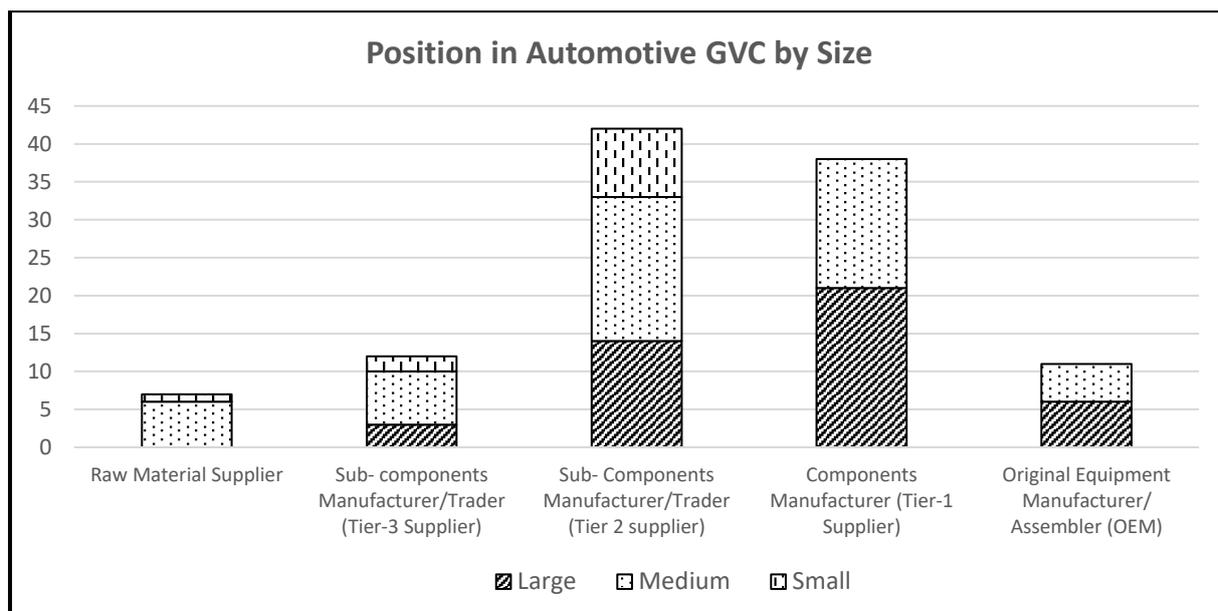


Figure 7: Position of Respondent Firms in Automotive GVC by Size (Source: Based on Survey Findings)

8.1.2. Type of Ownership

Ownership type is another firm-specific characteristic that has an effect on participation of firms in value chains (Wignarajan, 2015). Ownership type in this study was categorized into three groups – No foreign ownership, foreign partner(s) owning less than 50% and foreign partner(s) owning more than 50%. Although roughly a third of the respondent firms (32%) have foreign partners, still they reveal their side of the story (Table 26).

Most fully Indian firms (no foreign ownership) are either involved in both imports and exports or are absent in Automotive GVCs. This means – (a) The firms engaged actively in both imports and exports have managed to meet the requirements of being an international supplier and/or supply to multiple OEMs both within the country and abroad; hence are active on the international supply scene and, (b) the firms not present in GVCs are domestic dedicated suppliers to certain OEMs only and hence are absent as international suppliers. For instance, a large portion of the supplier base of domestic OEMs like Maruti, Mahindra & Mahindra and Tata have developed organically with the OEMs and supply exclusively to them.

More than half of the firms with foreign partners (51.4%) are involved in both imports and exports. This is most likely because transnational companies tend to maintain ties with their home countries, especially foreign OEMs, who often have the suppliers in their home countries follow them to new destinations (follow-sourcing) or source material from their home countries.

With regard to position in the GVCs (Fig 8), most fully Indian firms are present in Tier-2 position (sub-components manufacturing) in the Automotive GVC. This sub-segment is a low value addition segment as the profit margins are quite low due to intense competition and commoditized products resulting in very little innovation. For simple components, assemblers usually provide drawings of the components to the local component manufacturers for production requirements. Most firms with foreign partners (partially owned firms or MNCs) are present as either Tier-1 suppliers, which work closely with OEMs, or are OEMs themselves indicating that having foreign partners or parents has some benefit.

Firms with foreign ownership (partially or fully owned subsidiaries) have the advantage of relatively easier entry to foreign markets owing to the presence of a foreign partner or parent. As compared to their local counterparts, they also have relatively easier access to sophisticated and more advanced technology, latest technical know-how, better management proficiency and overall capabilities. The immediate environment of operation and competition influences the capability of firms as strategies evolve in response to challenges faced. With foreign partners or parent, this competition becomes global and firms have to adhere to international standards in order to remain competitive in the international markets.

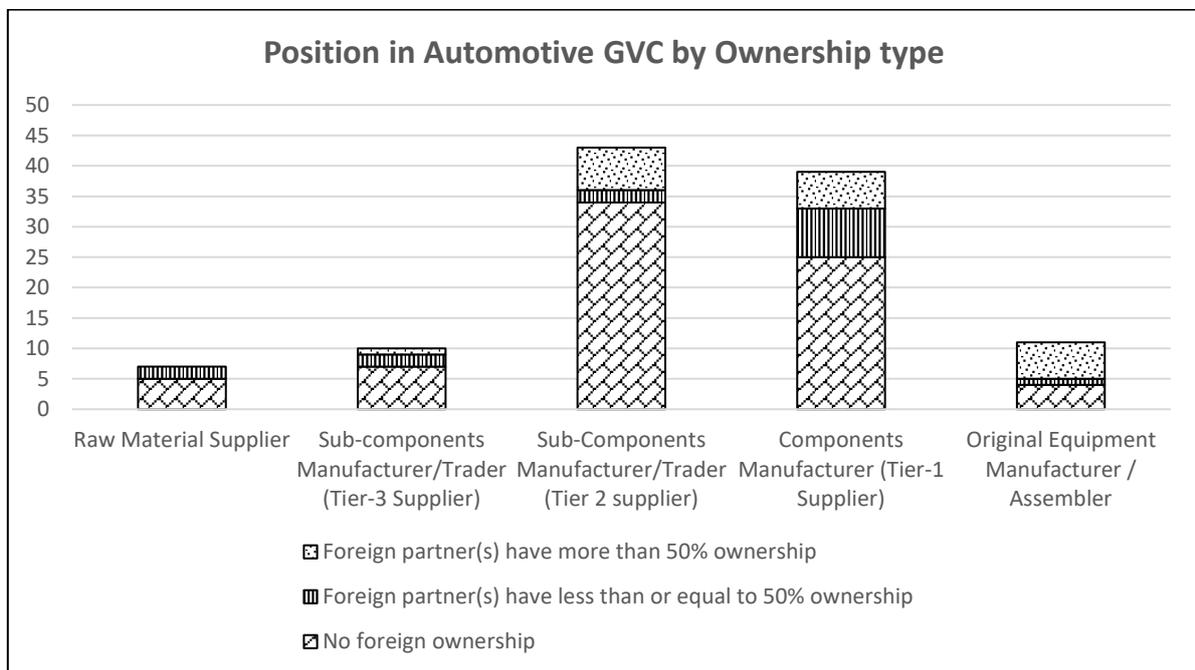


Figure 8: Position in Automotive GVCs by Ownership type (Source: Based on Survey Findings)

MANNER OF PARTICIPATION IN AUTOMOTIVE GVC	SIZE			OWNERSHIP TYPE			TYPE OF LOCATION			TOTAL
	Large	Medium	Small	No foreign ownership	Foreign partner(s) have less than or equal to 50% ownership	Foreign partner(s) have more than 50% ownership	Cluster	Industry Centre	Special Economic Zone (SEZ)	
Indian Firm Importing inputs for manufacturing and selling domestically in India (Imports Only)	9	8	0	14	3	0	7	10	0	17
Indian Firm manufacturing components in India for foreign markets (Exports Only)	6	6	4	14	2	0	6	10	0	16
Indian Firm Importing inputs and Manufacturing for Domestic Market AND Exports	14	16	2	24	8	0	15	17	0	32
MNC importing inputs and manufacturing/assembling for the domestic Indian market (Imports Only)	1	5	0	0	0	6	1	5	0	6
MNC manufacturing components in India for foreign markets (Exports Only)	2	0	0	0	0	2	1	1	0	2
MNC importing inputs and manufacturing/assembling for the Domestic Indian Market AND Exports	5	4	1	0	0	10	6	3	1	10
None of the above (No imports or exports)	7	15	5	23	2	2	9	18	0	27
Total	44	54	12	75	15	20	45	64	1	110

Table 18: Manner of Participation of firms in Automotive GVC by Size (Scale), Type of Ownership and Type of Location (Source: Based on Survey Findings)

8.1.3. Type of Location

The type of location has the potential to affect a firm’s ability to participate. For this study, the various types of location where the respondent firms are present are clusters, industry centres (specially demarcated industrial zones), Special Economic Zones (SEZ) and Export Processing Zones (EPZ)/Export Oriented Units (EOUs) (Table 18).

Most of the respondent automotive firms are located in Industry Centres – regions specially demarcated as industrial estates and may or may not belong to a specific OEM. This might be explained in two ways. Firstly, this might reflect the general tendency of the sector for agglomeration. Or alternatively, response rates to the survey may have been high in certain industry centres. Interestingly, a high percentage of the firms not involved in GVCs are located in the industry centres, implying they are dedicated suppliers to OEMs located in those industrial areas.

A significant portion of firms located in industry centres (29%) and clusters (33%) are active participants in GVCs engaged in both imports and exports. There is only one respondent firm located in an SEZ. Usually SEZs are demarcated for specific purposes and there are only 2 Auto SEZs (Mahindra City SEZ and New Chennai Township Pvt Ltd. in Tamil Nadu) in the country, although there are other SEZs which are meant for multiple products.

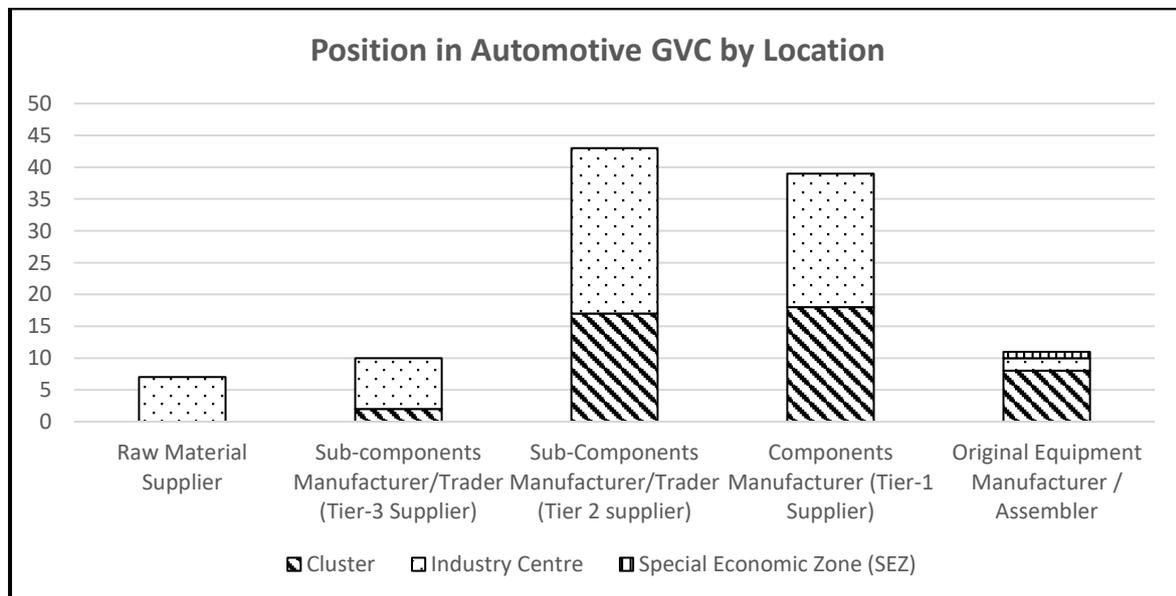


Figure 9: Position in Automotive GVC by Location (Based on Survey Findings)

Location determines the type of facilities available due to the prevailing policies (like tax breaks, free land), externalities due to presence of other firms (like clusters have a common

resource pool) and infrastructure (like electricity and water). For instance, firms located in specially demarcated zones like the Export Processing Zones (EPZs) or Export Oriented Units (EOUs) are offered special incentives to promote exports.

Similarly, firms in Industry centres, pivoted around lead firms, may have better prospects for GVC participation due to opportunities created by the lead firms, as opposed to firms in clusters that have been unsuccessful in positioning themselves in the import/export market through collective bargaining.

Clusters are usually of firms producing similar kinds of products (firms in the same segment of GVC) that make use of the common resource pool like skilled labour and infrastructure. Generally these firms are SMEs present in the components manufacturing space (Tier – 3, Tier-2 and a few Tier – 1) that can overcome shortcomings like size and finance through agglomeration. Industry centres, on the other hand, generally evolve gradually around a lead firm (generally an OEM) to generate comparative advantages like low transportation cost, low lead time and easier communication as well as ensure quality systems and standards of the supplier base. Usually for the more complex and technologically advanced components, like engines and power lines, OEMs prefer to work very closely with the Tier-1 suppliers; hence encourage their preferred suppliers to set shop nearby (follow sourcing).

MANNER OF PARTICIPATION		SIZE OF FIRM		TYPE OF LOCATION		OWNERSHIP TYPE	
Strength of Association		Value	Approximate Significance	Value	Approximate Significance	Value	Approximate Significance
Nominal by	Phi	.382	.189	.370	.238	.960	.000
Nominal	Cramer's V	.270	.189	.262	.238	.679	.000
N of Valid Cases			110		110		110

Table 19: Test for Effect Size of Relationship between Firm-level characteristics and Manner of Participation in Automotive GVCs (Source: Based on Survey Findings)

POSITION IN GVC		SIZE OF FIRM		TYPE OF LOCATION		OWNERSHIP TYPE	
Strength of Association		Value	Approximate Significance	Value	Approximate Significance	Value	Approximate Significance
Nominal by	Phi	.463	.009	.495	.003	.446	.016
Nominal	Cramer's V	.327	.009	.350	.003	.315	.016
N of Valid Cases			110		110		110

8.2. METHODOLOGY

The Automotive survey had 110 final respondents (after eliminating case-wise missing values) and 56 sub-factors (which include all the laws/policies governing the Automotive sector grouped together under one factor) of participation in Automotive GVCs. Though these sub-factors were categorized into broad heads in the survey questionnaire, based on the researcher's deliberations with the project guide and industry experts, further analysis was carried out to discover if any underlying structure could be discovered from this primary data that could contribute to theory building in this topic of study.

With such a huge number of variables, the dispersion matrix is too large for proper study and interpretation. There will probably be too many pairwise correlations between the variables to consider that cannot be deciphered using graphical displays or cross tabs alone. In addition, multicollinearity between factors is hard to avoid with such a large number of variables. For a better and more meaningful understanding of the data, it is essential to simplify the data set by reducing the number of variables to a few, interpretable linear combinations of the data. Krishnakumar and Nagar (2008)³⁷ have outlined various dimension reduction methods and their statistical properties.

The main variable of study (the dependent variable) is "***Participation***" which is a binary variable taking the value of 0 for firms which are absent and 1 for firms that are present in the automotive global value chain. Logistic regression is the most commonly used method for modelling a binary response variable. But regression methods require adequate sample size³⁸ for robust results. Additionally, logistic regression imposes the requirement for independence amongst the explanatory variables for stability (absence of multicollinearity). Aguilera et al. (2006)³⁹ have outlined a method to deal with the dimension problem of explanatory variables and to improve the estimation of the logistic model parameters under multicollinearity through the use of a reduced set of optimum principal components of the original predictors as covariates of the logistic model.

³⁷ Krishnakumar J., Nagar A.L. (2008), *Social Indicators Research*, (2008) 86:481-496

³⁸ Gregory T. Knofczynski, Daniel Mundfrom (2008), *Educational and Psychological Measurement* Vol. 68

³⁹ Aguilera, Anna., Escabias, Manuel., Valderrama, Mariano. (2006), *Computational Statistics & Data Analysis*

8.2.1. PRINCIPAL COMPONENT ANALYSIS

The dimension reduction technique of **Principal Component Analysis (PCA)**⁴⁰ was employed to reduce the number of sub-factors into more manageable numbers. PCA is a standard statistical tool for reducing a large dataset of observations of assumingly correlated variables into a set of linearly uncorrelated variables called *principal components*. Under this method, the first principal component obtained explains the highest amount of variation in the data and subsequent components attempt to explain the remainder variances under the condition of orthogonality.

PCA was used instead of another popular statistical method for dimension reduction - Factor Analysis (FA). FA is usually used in scenarios where researchers have a decent guesstimate about the underlying latent variables (that cannot be directly measured but is measured indirectly through observed variables known as manifest variables) and employ Exploratory Factor Analysis (EFA) for identifying the number and type of those factors. Confirmatory Factor Analysis is then used to confirm their proposed theoretical model. PCA is an ideal tool for scenarios where no assumptions about the underlying causal model have been made.

Principal Component Analysis (PCA) reduces the number of variables by computing the linear combination of directly measured variables that accounts for the largest variation in the sample. These variables that are directly measured are also known as indicators or manifest variables. Say the directly measured variables (indicators) are $X_1, X_2 \dots X_p$. PCA calculates the principal components, $Z_1, Z_2 \dots Z_n$ as shown below:

$$Z_1 = a_{11}X_1 + a_{12}X_2 + \dots + a_{1p}X_p$$

$$Z_2 = a_{21}X_1 + a_{22}X_2 + \dots + a_{2p}X_p$$

⋮

$$Z_n = a_{n1}X_1 + a_{n2}X_2 + \dots + a_{np}X_p$$

The first principal component, Z_1 explains the maximum variation in the sample data. Each subsequent principal component explains the highest amount of variation in the remainder data. The principal components so obtained are also known as *latent variables*, because they cannot be measured directly. PCA gives weights (coefficients a_{ij}) to various manifest variables for

⁴⁰ Dunteman, George. (1989), Sage Publications Inc.

computing the weighted linear combination, based on the covariance matrix if analysed variables are comparable.

8.2.1(a) Suitability of PCA

Whether PCA can be applied or not is determined by the Bartlett test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy. The Bartlett test, which compares the correlation matrix with an identity matrix (matrix with only 1's along the diagonal and the remaining elements are all zero) tests if the observed values have zero correlations between them. For PCA to be recommended suitable (rule of thumb), the Bartlett's Test of Sphericity must be less than 0.05.

Value	Importance of KMO Statistic
0.00 to 0.49	unacceptable.
0.50 to 0.59	miserable.
0.60 to 0.69	mediocre.
0.70 to 0.79	middling.
0.80 to 0.89	meritorious.
0.90 to 1.00	marvelous.

Table 20: Interpretation of KMO Statistic for PCA

The KMO test measures the proportion of variance between variables that can be attributed to a common underlying variance. KMO test provides the sampling adequacy for each variable in the model and the complete model. KMO has values between 0 and 1. As reference, Kaiser⁴¹ put the following thresholds given in Table 20.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	4831.804
	Df	1176
	Sig.	.000

Table 21: Test of adequacy for Principal Component Analysis

The results of the KMO test and Bartlett's Test have been given in Table 20. Both the results indicate that sampling was adequate ($KMO > 0.8$) and that the sample had adequate correlations to justify a valid PCA (Bartlett's test p-value = 0.00).

8.2.1(b) Principal Components

From all the factors in the survey, individual laws governing the Automotive sector were not included in the PCA analysis because attempting to combine laws with other factors did not make any theoretical sense.

⁴¹ Kaiser, H. (1974) "An index of factor simplicity" *Psychometrika* 39: 31–36.

From the remaining 55 factors, 6 factors did not load significantly onto any component (primary factor loading below 0.4) in the initial run. So, they were removed from the PCA analysis and considered as independent variables in subsequent investigation.

The remaining 49 factors were used for Principal Component Analysis with Varimax and Promax rotations. Varimax is an orthogonal rotation method that assumes that the factors (principal components) are independent of each other (hence orthogonal). In case even if the factors are not, it forces them to be orthogonal. Promax, on the other hand, is an oblique rotation method that allows

Total Variance Explained			
Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	14.070	28.714	28.714
2	8.419	17.182	45.896
3	3.305	6.745	52.641
4	2.264	4.621	57.262
5	1.864	3.805	61.066
6	1.834	3.744	64.810
7	1.482	3.025	67.835
8	1.342	2.740	70.575
9	1.103	2.252	72.827

Table 22: Total variance explained by principal components

the factors to be correlated. Tabachnick and Fidell (2007)⁴² have provided the basis for determining the type of rotation to be used based on factor correlations in the correlation matrix. If correlations exceed 0.32 then oblique rotation should be used.

A total of 9 principal components were found for the factors of participation in Automotive GVC that had eigenvalues greater than 1 and explained the maximum amount of variation in the sample. The total cumulative variance explained by these first 9 components was nearly 73% in the data. Subsequent components added only nominal variance explained to the total variance (less than 2%), hence 9 principal components were decided to be considered for further analysis. Promax rotation delivered the best defined factor structure although the difference between the structures generated by the two rotations was almost minimal (all variables loaded onto the same factors, only the factor loadings were slightly different).

8.2.1(c) Factor (Principal Components) Loadings and Reliability

According to Kline (2002)⁴³, with a sample size of around 100 respondents, loadings of 0.30 or higher can be considered important. This is the rule of thumb usually followed for PCA loadings.

⁴² Tabachnick, B. G., Fidell, L. S. (2007). Pearson Allyn & Bacon.

⁴³ Kline, P. (2002). An easy guide to factor analysis. London: Routledge.

Cronbach's alpha score⁴⁴ is reported as a measure of internal consistency. For high internal consistency, high value of Cronbach's alpha is desirable (preferably above 0.6). Coefficients below 0.5 are unacceptable. The various factor loadings along with the Cronbach's alpha (in the third row) have been reported below (Table 22). Factor loadings < 0.3 have been suppressed.

Table 23: Principal Component Analysis (with Promax rotation) (Source: Based on Authors' Calculations)

	PRINCIPAL COMPONENT								
	1	2	3	4	5	6	7	8	9
Cronbach Alpha (Reliability)	0.95	0.93	0.88	0.73	0.71	0.67	0.97	0.94	0.61
Basic Infrastructure – Cost	0.97								
Basic Infrastructure – Quality	0.94								
Skilled Labour - Quality	0.86								
Skilled Labour - Availability	0.82								
Basic Infrastructure - Availability	0.81								
Skilled Labour - Cost	0.76								
Raw Materials - Cost	0.73								
Technology - Cost	0.72								
Technology Quality	0.72								
Raw Materials - Availability	0.66								
Raw Materials - Quality	0.64								
Technology - Availability	0.56								
Risks from Value Chain		0.98							
Competition in Value Chains		0.97							
Investment Environment		0.88							
Ownership restrictions		0.75							
Structure of Value Chains		0.74							
Bureaucratic Redtape		0.70							
Public Institutions - Transparency		0.62							
Difficult Domestic Laws		0.62							
Dispute Resolution Mechanism		0.57							
Non-trade Barriers			0.85						
Trade Agreements			0.76						
Import Tariffs of Trading Partners			0.73						
Burdensome Customs Documentation			0.71						
Standards of Trading Partners			0.69						
Import Quotas			0.60						
Import Licenses			0.53						
Export Licenses			0.41						

⁴⁴ Cronbach's alpha is a measure of reliability that is calculated by correlating the score for each scale item with the total score for each variable and then comparing that to the variance for all individual item scores. It ranges between 0 (items are fully independent) and 1 (items have highly co-variances). Higher Cronbach's alpha coefficient imply greater shared co-variance of the items; hence implying these items most likely measure the same underlying concept.

Table 23: Principal Component Analysis (with Promax rotation) (Source: Based on Authors' Calculations) (Contd..)

	PRINCIPAL COMPONENT								
	1	2	3	4	5	6	7	8	9
Cronbach Alpha (Reliability)	0.95	0.93	0.88	0.73	0.71	0.67	0.97	0.94	0.61
Supply Chain Barriers				0.76					
Access to latest Technology				0.69					
R&D				0.68					
Technology transfer restriction				0.65					
Degree of global presence				0.51					
High Capital Costs					0.84				
High Market Entry costs					0.75				
Long gestation time					0.63				
Advance Planning Strategy					0.58				
Standards Compliance						0.84			
Constant Technology upgradation						0.69			
Timely delivery of products						0.48			
Inventory Management - Cost							0.79		
Inventory Management - Quality							0.68		
Inventory Management -Availability							0.68		
Intermediates - Cost								0.76	
Intermediates - Quality								0.74	
Intermediates - Availability								0.70	
Consolidation in Sector									0.93
Brand-driven Sector									0.67
Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.									

Almost all factors in this PCA albeit two (Export Licences and Timely delivery of products) had primary loadings of more than 0.5. A majority of items (variables) had clean significant loadings onto one factor only. A few variables had cross-loadings (i.e. loading onto more than one factor) more than 0.3. But in each case, the primary loadings were stronger and greater than 0.3, so the cross-loadings were eliminated.

The Cronbach's alpha for all 9 components is more than the desired threshold ($\alpha > 0.6$). Components 5 and 9 just meet the minimum criteria of $\alpha > 0.6$ probably because the number of items under each of these scales is less (3 and 2 respectively).

The component correlation matrix provided below, indicates that the components were largely independent of each other with almost all correlations below 0.3. These 9 components explain the maximum variance of the observed 49 factors and are used as independent variables

for further analysis. Based on the items that loaded onto each of these components, they have been renamed as shown in Table 24.

Component Correlations									
Component	1	2	3	4	5	6	7	8	9
1	1.000								
2	-0.454	1.000							
3	0.354	0.082	1.000						
4	-0.061	0.439	0.173	1.000					
5	0.004	0.203	0.276	0.191	1.000				
6	-0.119	0.337	0.135	0.213	0.194	1.000			
7	0.200	-0.053	0.146	0.118	0.258	-0.139	1.000		
8	0.067	0.132	0.117	-0.028	0.160	0.255	0.147	1.000	
9	-0.095	-0.200	-0.295	-0.059	-0.306	-0.197	-0.098	-0.333	1.000

Table 24: Correlations between principal components

These labels correspond to the broad factor headings that had been formulated at the inception of the study. Interestingly almost all sub-factors in the initial categorization under the broad heads loaded onto similar components. Intermediates and Inventory Management

which were earlier classified under the broad factor – Inputs, now became two independent components. (Components 7 & 8). Rest of the initial variables in the initial Inputs category loaded onto the same component (Component 1) and have been labelled as Input-related.

The broad category of Sectoral factors in the original classification became three components – Market Barriers (Component 5), Product-Related (Component 6) and Sectoral Structure (Component 9).

COMPONENT	LABELS
1	Inputs-related
2	Institutional
3	Trade-related
4	Technological
5	Market Barriers
6	Product-related
7	Inventory
8	Intermediates
9	Sectoral Structure

Table 25: Labels of Principal Components

Variables in the broad head Institutional factor (laws and public institutions) remained the same under both initial categorization and PCA (Component 2) as did Trade-related factors (covering tariff and non-trade barriers variables) (Component 3) and Technological factors (variables related to technology access and restriction and R&D) (Component 4). The original names were retained for these components.

There were 6 factors that were excluded because they were complex variables (loaded onto different factors with similar loadings) and did not contribute to the simple structure. The item “Ease of diversification of products” loaded onto Inventory (Component 7) and Market Barriers (Component 5) with factor loadings 0.7 and 0.53 respectively. Similarly, the item

“International Transport Costs” loaded onto Inventory (Component 7) and Institutional (Component 2) with factor loadings 0.54 and 0.32. “Tax rates” loaded onto Institutional (Component 2) and Technological (Component 4) with loadings 0.39 and 0.32 respectively. Cost of doing business loaded onto Technological (0.34) and Inventory (-0.31). Access to credit loaded onto Technological (0.4) and product-related (0.41).

To summarize, a total of 9 principal components were obtained from PCA that subsumed 49 factors affecting participation that were included in the survey. These principal components represented the broad determining factors encompassing the socio-economic, institutional and policy-related structural elements of the overall environment of operations of the industry and hence were vital for determining the ease (/difficulty) of participation of firms in the automotive GVC. Whether these broad factors encouraged or impeded participation in GVCs has been determined by logistic regression analysis in the following section. Use of the broad factors provided the overall sense of what affected engagement in auto GVCs at the macro level and has valuable policy implications. In addition, it also simplified analysis given the relatively small sample size and higher number of explanatory factors.

8.2.2. PRINCIPAL COMPONENT LOGISTIC REGRESSION (PCLR) WITH PROPENSITY SCORE ANALYSIS

Principal Component Analysis (PCA) provided the broad factors affecting participation of firms in automotive GVCs in lieu of numerous sub-factors. To determine whether these broad factors had a positive or negative impact on participation, further analysis needed to be done. Hence logistic regression was employed only for the principal components to determine the importance of each of these components.

Before logistic regression, propensity score analysis (PSA) was carried out to address the concerns associated with observational studies. Observational studies, as opposed to experiments, are often criticised for non-randomized comparisons. The foundation for such criticism stems from the fact that baseline features (basic characteristics) of the subjects in the treated group often differ from those of untreated subjects. For instance, there might be greater number of large firms in the GVC participant group (as they have more resources at their disposal) as opposed to higher number of small firms (that face resource crunch) in the non-participant group. To compare broad factors affecting these two cohorts (that differ in sizes) might not be illustrative unless they are made similar.

Observational studies also suffer from selection bias, which is again a case of non-randomization. How subjects are selected into groups is often scrutinized to determine whether the sample is representative of the population that it intends to analyse. A subject may have an inherent predisposition to self-select itself into a group (either treatment or control). For instance, older firms that have been in business for a longer period of time have a greater likelihood of being GVC participants versus a relatively newer firm which might find it difficult to position itself in GVCs due to lack of history of operations that prove its capabilities.

PSA (as proposed by Rosenbaum and Rubin, 1983)⁴⁵ accounts for these systematic differences between treated and untreated subjects by implementing a balancing score. Using propensity score weighting, covariates or control variables (that are essentially independent explanatory variables) are balanced across treatment and comparison groups in the sample to create a weighted sample. This ensures that comparison takes place between groups with analogous covariate characteristics (and not a situation where apples are compared with oranges). PSA also overcomes the shortcoming of selection bias by balancing the distribution of observed baseline covariates (or control variables) conditional on the propensity score between the groups of subject. This ensures that that the difference in outcome is attributable to the treatment alone and not due to inherent variances between the studied groups, in further analysis.

For this study, the treatment group comprised of the firms that were GVC participants and the control group consisted of non-participant firms. The covariates that were addressed through PSA were the firm-level characteristics – *age*, *size* (large, medium, small), *type of location* (cluster, industry centre, others) and *ownership type* (Indian, foreign). These baseline characteristics were attempted to be addressed in the initial stage of the survey by trying to build a representative list of firms to be approached. But since the responses could not be controlled for, PSA was used to address sample selection and non-randomization issues.

PSA involves first checking for the balance of covariates for the firms in both the groups (GVC participants and non-participants). If the coefficient of the covariate is significant, then there exist substantial differences between the firms in the two groups. Balance needs to be enforced by calculating the propensity score (predicted probability of being included in the

⁴⁵ Rosenbaum, Paul R.; Rubin, Donald B. (1983). "The Central Role of the Propensity Score in Observational Studies for Causal Effects". *Biometrika*. 70 (1): 41–55

treatment group) and then using these as weights for further multivariate analysis (logistic regression in this case). Table 26 below shows the balanced weighted sample.

	BEFORE PSA	AFTER PSA
COVARIATE	p-value	p-value
Age	0.276	0.885
Cluster	0.129	0.972
Industry Centre	0.079	0.956
Large	0.129	0.936
Medium	0.205	0.843
Ownership	0.053	0.967

Table 26: Propensity Score Analysis for firm characteristics as covariates

Logistic regression is a commonly used method for modelling a binary response variable – in this case “*Participation*” (which has the value 0 (or 1) when the firm is not present (or present) in the automotive global value chain respectively). The Principal Component Logistic Regression (PCLR) model as proposed by Aguilera et al. (2006) is an extension of the Principal Component Regression (PCR) that uses the principal components obtained from PCA as predictor variables for the logistic regression. They also suggest that the optimum number of components to be used in the logit model should be chosen based on conditional likelihood ratio tests from introducing principal components in a stepwise manner and then deciding their ability to explain the dependent variable (“*Participation*”) based on the likelihood ratio. This technique has been used for predictions in operations management research literature (Mendes & Miller (2013)⁴⁶, Saeed & Mahdi (2013)⁴⁷ etc)

The rule of thumb for the minimum sample size for logistic regression is 10 cases per independent variable⁴⁸. With a sample size of 110, the maximum number of predictor variables that could be included in the logit model for robust results was 11. Since 9 principal components explained the maximum variance in the data and all 9 components when included gave the best fit in the conditional likelihood tests, these were included as the predictor variables. The focus was on understanding the effect of these principal components on participation of firms in automotive global value chains. Interpreting the Odd’s ratio for these principal components was tricky since these were the amalgamation of several sub-factors. But the Odd’s ratio still indicated the general direction of impact and the relative magnitude of the impact of these broad factors on participation of firms in the automotive global value chains.

⁴⁶ Glauco Henrique de Sousa Mendes, Gilberto Miller Devós Ganga (2013), Regression Journal of Technology Management & Innovation

⁴⁷ Mehrjoo, Saeed., Bashiri Mahdi. (2013), Journal of Industrial Engineering International

⁴⁸ Pampel, Fred. (2000), Sage Publications

Better odds indicated better chances of participation in GVCs. The results of the logit regression are given in Table 27.

					Number of obs = 110	
					LR chi2(9) = 43.31	
					Prob > chi2 = 0.000	
					Pseudo R ² = 0.2377	
Participate	Coeff (B)	Robust Std.Err.	Sig.	Odds Ratio (exp (B))	95% C.I.for exp(B)	
					Lower	Upper
Inputs-related	0.43	.407	.295	1.537	-.3717319	1.226382
Institutional	0.731	.502	.100	2.077	-.2531073	1.715663
Trade-related	1.11	.296	.000	3.034	.5327395	1.693548
Technological	-0.200	.299	.503	0.818	-.7885081	.3866208
Market Barriers	-0.831	.168	.000	0.435	-1.162238	-.5010901
Product-related	-0.248	.241	.303	0.780	-.7221553	.2246675
Inventory	0.022	.306	.942	1.022	-.5778428	.622619
Intermediates	-0.3011	.203	.139	0.740	-.7000547	.0977087
Sectoral Structure	0.344	.146	.019	1.410	.0572959	.6325019
Constant	-0.623	.197	.317	0.536	-.5853654	.1896501

Table 27: Principal Components Logistic Regression results (Source: Authors' Calculations)

The pseudo-R² of a logistic regression does not measure the goodness of fit of the model. However, it is useful in indicating the degree to which the explanatory variables are useful in predicting the response variable and is usually referred to as a measure of effect size. The pseudo-R² value of 0.24 indicates that the model is decent in predicting participation in automotive global value chains.

For assessing the goodness of fit of a model, the Hosmer–Lemeshow test is usually used. Similar to a χ^2 test for goodness of fit, it tests the hypothesis if the participation in the sample is not significantly different from the predicted participation by the model. For this model, the Hosmer-Lemeshow test (df = 8, P=0.212) shows that the null hypothesis cannot be rejected; hence the model is a good fit for the data.

Since the total number of responses (sample size) in our survey for the Automotive sector was not sufficient for regression analysis with all the indicators, and the logit regression performed here contained only the 9 principal components derived from the 49 major factors, the logit power analysis was performed to determine the achieved power of the multiple logistic regression model given the α (=0.05), sample size (= 110) and effect size (Odd's ratio) using GPower 3.1 software. The achieved power for the various variables at $\alpha = 0.1$ is given in Table 26. Most of the independent variables (except the non-significant ones) have achieved power

above the desired level of 0.8. Although post hoc power procedures have been questioned based on the argument that most investigations will have the maximum posteriori power of 0.5 (Zumbo (1998)⁴⁹, Hoenig and Heisey (2001)⁵⁰), the observed power is still cited as evidence of the adequacy of the study.

DEPENDENT VARIABLE	SOURCE	PARAMETER ESTIMATE	ODD's RATIO	p-value	POWER
Participation	Inputs-related	0.43	1.537	.295	0.863
	Institutional	0.731	2.077	.100	0.83
	Trade-related	1.11	3.034	.000	0.987
	Technological	-0.200	0.818	.503	0.106
	Market Barriers	-0.831	0.435	.000	0.919
	Product-related	-0.248	0.780	.303	0.286
	Inventory	0.022	1.022	.942	0.104
	Intermediates	-0.3011	0.740	.139	.114
	Sectoral Structure	0.344	1.410	.019	0.5

Table 28: Achieved power in PCLR

The regression results (Table 25) showed that Trade-related factors and Market Barriers were the two most significant factors that affected participation of firms in auto GVCs. The Odds ratio for **Trade-related factor(s)** indicated that this component had a substantial positive impact on the odds of participation (“yes” category). This was expected as participation in global value chains (in general as well as according to the definition employed in this study) involves a high degree of trade (imports as well as exports). Without facilitative trade factors, participation would not be smooth. The trade-related components included factors like licenses, quotas, tariffs, non-trade factors and procedural requirements. Any positive change in these factors (which will lead to a positive change in the Trade-related component) will nearly quadruple the odds (203% increase in odds) that participation in auto GVCs will increase.

Market Barriers component, on the other hand, had a substantial negative impact on the odds of participation. The Market Barriers component included high capital costs, high market entry costs, long gestation time and advance planning strategy. With intensification of Market Barriers (i.e., with an increase in market barriers), the odds of participating in automotive GVCs decline by 56.8%. This is intuitive as market barriers such as huge capital requirements, access to resources, antagonistic moves by incumbent competitors etc. act as deterrents to new enterprises in entering the market, especially in becoming a part of the automotive global value chain. The probability of participation in the automotive global value

⁴⁹ Zumbo, B.D., Hubley, A.M. (1998), The Statistician

⁵⁰ Hoenig, J.M., Heisey, D.M. (2001), The American Statistician

chains can be improved by lowering these market barriers, for instance through easier access to finance and technology which will lower the entry costs significantly.

The other significant variables affecting participation are Institutional and Sectoral components. The **Sectoral Structure** component was also positively significant. The odds of participation in global value chains increase by 41% with improvement in the sectoral structure. This component represents consolidation in the sector and the importance of brand in the industry. Higher consolidation is usually beneficial to the existing players since it increases the supplier power over buyers (when there are fewer suppliers). But consolidation also helps build scale and capabilities (through mergers and acquisitions) that increase competitiveness and profitability; hence firms are able to upgrade along the value chain. Smaller firms that get acquired might find this an indirect way of participating in global value chains. The most common precedent is acquisition of firms that have high technical and innovation capabilities in order to deliver next-generation technology. On the other hand, improving a firm's brand name ensures participation as brands espouse faith amongst buyer firms and influence their purchasing decisions in a positive manner. Veloso and Kumar (2002)⁵¹ have comprehensively outlined literature on OEM supplier characteristics which includes emphasis on supplier brand image as a criterion for selecting component supplier firms.

The **Institutional** component had a significant positive impact on the odds of participation at $\alpha = 0.1$. With improvement in this component, the odds of participation of firms improve by nearly twice (107.7% increase in odds). The Institutional Component comprised of general institutional setup for business in the economy (like bureaucratic procedures, public institutions, dispute resolution mechanism, investment environment and domestic laws) and value chain features (like risks from integrating in global value chains, competition in value chains and ownership restrictions). All these factors have a potential for adversely affecting firm performance, and hence participation in global value chains, by creating a non-conducive business environment. Hence an improvement in these factors, like removing red-tape, ensuring transparent and reliable public institutions, introducing efficient dispute resolution, providing a promising investment environment, having facilitative domestic laws, and reducing the risks from integration in GVCs promote participation.

Although not statistically significant even at $\alpha = 0.1$, the impact of the rest of the principal components – Inputs-related, Technological, Product-related, Intermediates and

⁵¹ Veloso F., Kumar R. (2002). Asian Development Bank ERD Working Paper Series No. 3

Inventory Management – is worth discussing. Except for Inputs-related and Inventory Management, the rest three components have a negative effect on the odds of participation. Improvement in **Inventory Management** in terms of quality, cost and availability increases the odds of participation by 4%. Inventory optimization has been a very vital focus area in supply chain management, especially leading to management systems like just-In-Time (JIT). These new systems emphasize correct sizing of inventory to minimize costs, meet buyer demands within short lead times and improve overall operational efficiency. Hence any enhancement in inventory management increases a supplier firm's abilities to meet customer demand for inputs; thereby improving the chances of the firm for greater participation.

The **Inputs-related** component subsumed the availability, cost and quality of inputs like raw materials, technology, labour and infrastructure. This component had a high positive impact on participation with improvement in inputs (easy availability, low cost and high quality) increasing the odds of participation of firms in the automotive GVCs by more than 50% (53.7% increase in odds). Inputs determine the nature of output and thereby the overall profitability of a firm, and hence assume high significance in supply chain management. Pal et al. (2013)⁵² provide a comprehensive literature review on supplier selection criteria employed by firms. Most firms focus on reducing purchasing risks and maximising value of input, hence focus on availability, cost and quality of inputs. Meeting these criteria helps develop close and long term relationships between buyers and suppliers. Easy availability of inputs (like raw materials, technology, etc.) ensures a sustained production process (no shutdowns due to stock outs), low cost ensures competitiveness and high quality ensures high output product quality and overall profitability. Production delays resulting from shortage of inputs and faulty products recall result not only in massive losses to firms in the form of warranty costs and recalls charges but also affect the reputation of firms (suppliers and buyers) that hampers future prospect of participation in GVCs. Rare materials, volatile supply markets, poor quality inputs, restricted infrastructure, etc. are deemed as deterrents to participation in global value chains.

The **Technological** component has a negative impact on the odds of participation. With improvement in the technological component, the odds of participation of firms in auto GVCs decline by 18%. Since this component is a mix of technological barriers (technology transfer restriction, supply chain barriers) and technology enhancers (access to latest technology,

⁵² Pal O., Gupta A.K., Garg R.K. (2013), International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering

research and development), the effect is somewhat ambivalent. Similarly, the **Product-related** component also has a negative impact on the odds of participation, with the odds declining by 22% with improvement of this component. It subsumes factors like standards compliance, constant technology upgradation and timely delivery of products. In a sense, all three factors are impediments faced by firms, especially smaller ones that do not have ready access to resources like technology. Supplier qualifications include stringent demands on supplier quality (certification like ISO), ability to meet buyer specifications and ability to diversify products based on consumer demand (Beil (2009))⁵³. So any firm that desires integration into a value chain has to meet certain benchmarks.

Surprisingly, the **Intermediates** component had a negative bearing on the odds of participation of firms in the auto GVC. An improvement in this component in terms of availability, cost and quality of intermediates reduced the odds of participating by 26%. Intermediates are extremely vital inputs for the entire production process in the automotive value chain and this fact is corroborated by the rise in trade in intermediates. These intermediates range from simple parts (bolts, springs) to highly sophisticated components (power trains). A decrease in the odds of participation probably indicates that the country is still dependent on imports for the more sophisticated parts (which demand higher quality and ready availability), rather than building domestic competence (Baldwin (2011))⁵⁴. This prominence of imports of intermediates over exports is probably responsible for the negative effect of intermediates on participation.

The use of PCA has several advantages like addressing the measurement problems, complexity of data and multicollinearity in data. But PCA suffers from certain shortcomings as well. For instance, generalization of variables under principal components leads to loss of information (impact of individual factor on the dependent variable of study- *participation*). Similarly, factors under a single principal component might not make theoretical sense, since the components are determined by maximum variation of factors. But given the relatively small sample size and large number of potential predictor variables, PCA was the best method to be employed to ensure reduced dimensionality and independence of explanatory variables. Additionally, use of only principal components for the logistic regression might seem somewhat restrictive. But given the sample size and the fact that majority of factors were

⁵³ Beil, D. R. (2010), Wiley Encyclopaedia of Operations Research & Management Science.

⁵⁴ Baldwin R. (2011), NBER Working Paper Series, Paper No. 17716

accounted by the principal components, use of PCs for regression seemed justified. The potential predictor variables entered the regression through the principal components and still exhibited their impact on participation of firms in auto global value chains.

9. FIRMS' PERCEPTION OF SIGNIFICANT FACTORS

This study also aimed to present the opinion of the firms regarding the facilitation, challenges and opportunities that the firms faced for participation in auto GVCs. In the preceding section (Section 8), PCLR provided insights into how broad factors (determined by PCA) affected participation, giving a sense of the direction (positively or negatively) and the relative impact on the odds of participation. Since the use of PCA abstracted away information regarding individual factors affecting participation in automotive GVCs that were contained within the survey questionnaire, this section has been included to provide insights into how firms responded to these individual factors that were ascertained as significant in the logistic regression.

A brief snapshot of the majority responses to individual factors has been provided in the table below. This reveals the overall picture vis-à-vis the general perception of these firms. The complete responses along with detailed discussions have been provided in Annexure 1.

BROAD FACTORS	FACTORS OF PARTICIPATION	DEGREE OF IMPORTANCE ⁵⁵
<i>Input-related Factors</i>	Raw Materials - Availability	Highly Important
	Raw Materials - Quality	Important
	Raw Materials - Cost	Important
	Intermediates - Availability	Highly Important
	Intermediates - Quality	Highly Important
	Intermediates - Cost	Important
	Basic Infrastructure – Quality	Important
	Basic Infrastructure - Availability	Important
	Basic Infrastructure - Cost	Important
	Skilled Labour - Quality	Important
	Skilled Labour - Availability	Important
	Skilled Labour - Cost	Important
	Technology Quality	Highly Important
	Technology - Availability	Highly Important
	Technology - Cost	Important
	Inventory Management -Availability	Important
	Inventory Management - Quality	Important
	Inventory Management - Cost	Important

⁵⁵ As reported by the majority of firms in the survey questionnaire. Reveals the firms' perception.

BROAD FACTORS	FACTORS OF PARTICIPATION	DEGREE OF IMPORTANCE ⁵⁶
Market Barriers	High Capital Costs	Not Important (SMEs) Highly important (Large firms)
	High Market Entry costs	Not Important
	Long gestation time	Slightly important
	Advance Planning Strategy	Not Important
Institutional Factors	Risks from Value Chain	Moderately Important
	Competition in Value Chains	Important
	Structure of Value Chains	Important
	Investment Environment	Important
	Bureaucratic Red-tape	Moderately Important
	Public Institutions - Transparency	Important
	Dispute Resolution Mechanism	Important
	Ownership restrictions	Slightly Important
Domestic Laws	Highly Important	
Trade-related Factors	Non-trade Measures	Not Important
	Trade Agreements	Highly Important
	Import Tariffs of Trading Partners	Important
	Burdensome Customs Documentation	Highly Important
	Standards of Trading Partners	Important
	Import Quotas	Not Important
	Import Licenses	Not Important
Export Licenses	Not Important	
Technological Factors	Access to latest Technology	Moderately Important
	Research & Development	Not Important (Tier-2, Tier-3 firms) Important (Tier-1, OEM)
	Technology transfer restriction	Moderately Important (SMEs) Not Important (Large Firms)
	Supply Chain Barriers	Moderately Important
Product-related factors	Standards Compliance	Important
	Constant Technology upgradation	Slightly Important
	Timely delivery of products	Highly Important
	Ease of diversification of products	Moderately Important
	Long design to revenue cycles	Highly Important
Sectoral Characteristics	Consolidation in Sector	Important
	Brand-driven Sector	Highly Important
Financial Factors	Cost of doing business	Important
	Tax rates	Moderately Important
	Access to credit	Extremely Important
	Cost of credit (Interest Rates)	Negatively and Highly Important
	Perception about Indian firms	No Impact
	Cultural Factors	No Impact

⁵⁶ As reported by the majority of firms in the survey questionnaire. Reveals the firms' perception.

BROAD FACTORS	FACTORS OF PARTICIPATION	DEGREE OF IMPORTANCE ⁵⁷
Regulatory Factors	Import Policy of India	No Impact
	Export Policy of India	No Impact
	Import Policies of Trading Partners	No Impact
	Foreign Direct Investment (FDI) policy	No Impact
	Emission Norms (BS norms)	No Impact
	Intellectual Property Rights (IPR) regime	No Impact
	Government Subsidies	No Impact
	Manufacturing Policy	Positive and Highly Important
	Motor Vehicles Act 1988 (MVA	Positive and Highly Important
	Investment and Tax incentives of Governments	Positive and Highly Important
	State Laws	Positive and Highly Important
	Environmental Laws	Positive and Highly Important
	Trade agreements	Highly Important
	Competition Policy	Moderately Important
	Labour laws	Negative and Highly Important

Table 29: Factors affecting participation of firms in India in the Automotive GVCs and their importance (Source: Based on survey findings)

In addition to the detailed responses of auto firms (Annexure 1), a separate analysis of the reactions of firms that are direct participants of Auto GVCs was also undertaken in order to gain a greater clarity of major factors that aide or hinder participation. This complete analysis along with a brief discussion is provided in Annexure 2.

10. SUMMARY OF KEY FINDINGS

As supported by prior literature, firm size and ownership structure were found to influence not only participation in value chains but also the position of the firm in the global value chain. Size (large, medium, small based on investment in plant and machinery) reflects a firm's potential to achieve economies of scale, access to resources and ability to undertake risks; hence large firms have a comparative advantage over medium and small firms with a higher probability of being in a global value chain. Firms with foreign ownership (partially or fully owned subsidiaries) have the advantage of relatively easier entry to foreign markets owing to the presence of a foreign partner or parent. As compared to their local counterparts, they also have relatively easier access to sophisticated and more advanced technology, latest technical know-how, better management proficiency and overall capabilities.

⁵⁷ As reported by the majority of firms in the survey questionnaire. Reveals the firms' perception.

In addition, the type of location of the firm also affected participation in auto GVCs. Clusters of firms producing similar kinds of products (firms in the same segment of GVC) make use of the common resource pool like skilled labour and infrastructure and potentially overcome shortcomings like size and finance through agglomeration (specially SMEs). Industry centres, on the other hand, that evolve around a lead firm have easier access to global value chains owing to the opportunities created by the lead firm.

To summarize the above discussion on the wide spectrum of factors affecting participation in auto GVCs, a brief snapshot of the broad factors along with the constituent factors and their importance as reported by the majority of the respondent automotive firms has been provided above (Table 29, Section 9). In the discussion above, the broad factors revealed the comprehensive trends in terms of how participation is affected by them (Section 8) and the ensuing discussion revealed the importance of individual factors as reported by the respondent automotive firms (Section 9).

The results of the micro-econometric analysis, performed on the broad factors of participation (as determined by the principal component analysis) revealed that Trade-related factors and Market Barriers had the strongest influence on participation, albeit in different directions. Apart from licences and quotas (which were considered as unimportant), other trade-related factors like trade agreements, and criteria of trading partners (tariffs and standards compliance) have been positively and highly significant in increasing the odds of participation of firms in auto GVCs. Burdensome documentation procedures, though important, have been perceived as a deterrent. Firms desire proper and timely information regarding change in import and export policies, if any. Quicker turnaround time at ports of clearance would aid firms in timely delivery of products and avoid losses due to production stoppages. Standardization of clearance rates at the ports (instead of having different rates for different shipping lines) would also lessen the clearance cost burden. Apart from these, positive trade-related factors set an encouraging trend as greater participation in global value chains itself means enhanced trade and facilitative trade factors are a step in the right direction.

Market Barriers, on the other hand, had a negative impact on participation.. As expected, market barriers comprising of high market entry costs, high capital costs, long gestation time of projects and need for an astute advance planning strategy affect participation of firms in auto GVCs negatively, though most of these individual factors have been rated as slightly important or unimportant by a majority of firms. A closer look at the numbers revealed that the majority of firms for these specific factors referred to only around one-third of firms

(33% - 36%) and the responses of the remainder firms were uniformly distributed from slightly important to highly important. As a result, the broad factor has most likely reflected the overall importance of these factors pooled together correctly.

Inputs have been considered important (to highly important) by the firms for participation in auto GVCs and positively significant as per the econometric analysis. Only intermediates, though highly important, were found to have a negative effect on participation, probably owing to the greater dependence on imports and rather low export volumes of intermediates. Inputs, in terms of quality, cost and availability, determine the operations and output of firms, and hence are vital for determining participation.

Similarly Institutional factors have been found to be positively significant both based on econometric analysis as well as firm perceptions. Domestic laws have been perceived to play a major role in aiding or deterring participation of firms in automotive GVCs. Policies like the manufacturing policy, the Motor Vehicles Act 1988 (MVA), Investment and Tax incentives of Governments, State Laws, Foreign Exchange rate, and Environmental Laws have had positive impact. Incentives by the Government to encourage manufacturing within the country (with the recent “Make in India” campaign) coupled with tax/duty breaks, investments spurs, guidelines to meet international standards and sustainable industry practices have encouraged participation in automotive global value chains.

State Governments have also played a vital role in encouraging this industry in the global markets by providing incentives like relaxation or exemption of stamp duty on sale or lease of land, concessional rate of interest on loans for capital expenditure, tariff incentives for infrastructure, concessional tax rate periods, backward area subsidies, special incentive packages for mega projects, etc. But greater stimuli for attracting foreign investors, especially to prior untapped regions, are desired by a lot of firms. For instance, the Eastern region only has one major 4-wheeler OEM resulting in a very small supplier base, as opposed to the three other major clusters. Special packages by state governments could potentially help attract other major OEMs and enlarge this supplier base resulting in the virtuous circle of more industrialization, employment and growth.

Labour laws, on the other hand, have had the most negative impact on participation in Automotive GVCs. Archaic and restrictive labour laws governing hiring, layoffs, wages and basic operational environment have made the workforce composition skewed towards contractual labour which has actually started to turn counter-productive. In addition, skilled

labour is also becoming a scarce commodity as technological advancements in the industry have fast outpaced skilling and training. The Government could step in to fill this void by creating more sector-specific training institutes and/or operate in a PPP mode for creation of skill development resources.

Apart from domestic laws, other public institutions are also vital for healthy participation of firms in automotive GVCs. Transparency, efficiency, effectiveness and absence of corruption enhances the dependability of these institutions and instils confidence in the general business climate of the economy. Procedural simplicity and efficient dispute resolution mechanism are important steps for institutional assurance. For instance, single window clearances on environment and other compliances, quick building approvals and certificate issuance services by local authorities, reliable land acquisition, etc. are measures that inspire confidence in investors.

Technology has had a negative impact on participation, as revealed by the logistic regression. Research and Development (R&D) and technology transfers have probably not been at the desired level, as these have been considered as moderately important especially by the small and medium firms. Apart from needing a huge investment, R&D also requires trained manpower and innovation skills. R&D spending is still mostly restricted to OEMs and a few large Tier-1 suppliers. Firms in the lower segments of the GVC hardly invest in R&D and are reliant on these lead firms for technical support including design aspects, production efficiency, quality improvement, development cycle of products etc. The Government has already started providing subsidy for investment in R&D, technology and machinery to encourage more research. Another possible solution to this problem could be the creation of joint R&D facilities for the entire industry. Firms and the Government could pool resources to jointly develop processes and innovations for standardized products and provide technical support to those who desire it within the industry. Becoming shareholders in the development process could improve individual firm's efficiency and raise overall industry productivity. Additionally, the Government could also promote investor outreach programmes with several countries to bring global practices to India.

The sectoral factors, comprised of consolidation and importance of brands in the sector, have been found to be positively significant in both modes (econometric analysis as well as firms' perception). Product related factors, considered to be important by the respondent firms, has been found to have a negative impact (though insignificant) on participation. This set of factors represents the high standards and expectations in the industry in terms of

technology, abilities and reliability and therefore probably is considered a deterrent to participation as these are difficult to meet.

Financial factors have been considered to be highly important and deterrents to participation by majority of firms. These red flags are important for policy makers to deal with as ease of access to credit and investment are extremely vital for the auto industry for operations and growth, as is cost of credit. SMEs specially desire preferential treatment from formal sources of credit in the form of lower interest rates and fewer procedural expectations (like collaterals) and from the Government in the form of special financial packages. Dissemination of information concerning subsidies and incentives at the industry level would be a great first step towards firms availing the existing inducements.

The tax rates have also been considered prohibitive by most firms. Tax reductions, especially on State Sales Tax and Central Excise duties on some products, have been wanted by several firms. With the advent of Goods and Services Tax (GST), the distortions due to different sales tax rates in different states and the complexity of inter-state sales tax will be done away with, though concerns remain regarding the implementation details and input tax credit procedures. Firms also desire easy and early clearance of refundable taxes deposited with Government that would lead to availability of much needed funds for operations. For instance, quick release of funds at the time of import shipment and change of import policy focussed mainly on security deposits would greatly ease the problem of blocked funds.

11. CONCLUSION

This paper attempted to understand the major factors of participation of firms in Automotive Global Value Chains (GVCs) from a firm-level perspective. It conducted econometric analysis of broad factors influencing value chain participation (thereby determining the degree and direction of impact) and analysed the perceptions of enterprises regarding the influence of extended factors concerning the business environment. These insights will be useful in planning for the future with the goal of encouraging greater participation in global value chains and increased domestic value addition.

The main takeaways from this study are – (a) Government remains a significant facilitator of participation of firms in India in the automotive global value chains. Apart from addressing macro-level issues (domestic laws, trade agreements, public institutions, etc.), government intervention is required even at the micro level. Assistance as desired by the firms is in the form of financial incentives (including credit and taxes), access to technical support, basic

infrastructure development and skilling of manpower. (b) Small and Medium Enterprises desire preferential treatment in order to be able to increase participation in and upgrade along the automotive global value chain. SME-centric policies should be an area of focus for the Government. For instance, promoting agglomeration of SMEs in clusters could potentially overcome the deficiencies they face due to their small size and enhance their access to resources like finance and labour. (c) “Brand India” needs to be marketed internationally for ease of access to foreign markets, potential clients and investments. Platforms for highlighting products by firms in India at an international level should be encouraged. Frequent manufacturing suppliers-buyers meets should be organized globally through transnational visits, Auto Expos in different countries, government exchange programmes, etc. that will lead to exchange of information and technology and building of a potential foreign client base.

Limitations of the Study

There are certain limitations in the methodology used in this study. Firstly, the analysis done in this paper is only on cross-section data collected first-hand from surveying automotive firms. Changes over time can only be highlighted by collecting data over time to create a panel. Panel data analysis would be invaluable. Secondly, the data used for analysis is responses as reported by the firms. While robustness of the data was ensured to the best possible extent through use of secondary sources and industry experts, there are still data points (like costs, ratings of factors) that were accepted as reported by the firms. Thirdly, the econometric procedure used only the 9 broad factors obtained from the principal component analysis that comprised of 49 factors included in the study. The rest of the factors included in the study (most importantly the domestic policies and laws) were analysed for their importance based on the firms’ perceptions and in-depth discussions. These factors can be included in the econometric exercise if the sample size increases with responses from more firms. Fourthly and finally, there might be other factors affecting participation that this study could not incorporate although given that 55 factors affecting participation of firms in automotive global value chains were included, there has been a serious attempt to cover as many factors as possible (though this increased the length of the questionnaire substantially). These shortfalls can be addressed in further research.

Extensions of the Study

There are several areas where further research can be carried out. Firstly, the impact of sectoral laws/policies can be explored in greater depth as policy decisions can then be adjusted accordingly to encourage greater participation in automotive GVCs. With the launch

of several new programs like “Make in India” and “Skill India” and roll out of GST, the Government has been undertaking proactive steps to facilitate greater manufacturing and value addition in the country. But unless a detailed analysis of these measures is undertaken, their effectiveness cannot be determined. Yet another dimension of analysis can be the scrutiny of state level policies. The state-level analysis can be done by selecting one state at a time and analysing the impact of policies on firms operating there vis-à-vis sister-firms in other states. Firms with manufacturing plants at multiple locations will be the best candidates for this kind of study.

In addition to reviewing the impact of domestic laws, the role of trade agreements and foreign investment policies in facilitating participation in global value chains can also be explored. Trade agreements play a significant role in determining international access and the transfer of resources (including technology, investment, personnel, knowledge etc.) and entry to newer markets which are essential for improving capabilities of firms in India and are also desired by the firms. Agreements of trade and investment with current trading partners and prospective partners have the potential of impacting participation of firms in India in automotive global value chains and should be studied closely.

Next, this study can be extended to cover other regions and other sectors. The focus of this study has been mostly on the clusters present in two chosen sectors. But there are firms that also operate in other states and at other types of locations like Special Economic Zones (SEZ), Industry centres promoted by State Governments, Export Processing Zones (EPZ), etc. Attempts can be made to cover more firms at these locations and analyse whether the type of location (clusters vs others) have any impact on participation. Cluster Theory is a well-studied branch in Economics. This study can empirically corroborate propositions in cluster theory.

Additionally, a cross-country comparative study can also be proposed to understand if the factors that were discovered as vital for participation in GVCs in India also hold true in other similar developing nations, other BRICS nations for instance (Brazil, Russia, China, and South Africa). Automotives and Electronics Sectors at a global level are also agglomerated. But the general axis of power (aka higher value addition positions) in Global Value Chains is gradually shifting from the developed world to the emerging economies. What has caused this shift of power and to what extent government policies and the ecosystem in emerging economies have aided this shift is an interesting topic that should be explored further.

REFERENCES

- Aguilera, Anna., Escabias, Manuel., Valderrama, Mariano. (2006), "Using principal components for estimating logistic regression with high-dimensional multicollinear data", *Computational Statistics & Data Analysis* Vol 50 Issue 8, Pages 1905-1924
- Annual Survey of Industries (India) 2015
- Baldwin R. (2011), "Trade And Industrialisation After Globalisation's 2nd Unbundling: How Building And Joining A Supply Chain Are Different And Why It Matters", NBER Working Paper Series, Paper No. 17716
- Basant, Rakesh, Morris Sebastian (2000), "Competition Policy in India Issues for a Globalising Economy", *Economic and Political Weekly*
- Beil, D. R. (2010), "Supplier Selection" *Wiley Encyclopaedia of Operations Research & Management Science*.
- Bernard, A., Jensen, J.B., Redding S.J., Peter K. S. (2011), "The Empirics of Firm Heterogeneity and International Trade, NBER Working Paper No. 17627
- Carter, Joseph., Maltz Arnold, Maltz Eliot, Goh Mark, Tingting Yan (2010), "Impact of culture on supplier selection decision maker", *International Journal of Logistics Management*, Vol.21, No.3, pp 353-374
- Cattaneo, Gereffi, Miroudot, Taglioni (2013), "Joining, Upgrading and Being Competitive in Global Value Chains", *World Bank Report* (2013)
- Das, Subhrabaran., Das, Piya. (2012), "Role Of Research And Development In Indian Automobile Industry", *Asian-African Journal of Economics and Econometrics*, Vol. 12, No. 1, 2012
- Dunteman, George. (1989), "Principal Component Analysis (Quantitative Applications in Social Sciences) – Book 69", Sage Publications Inc., revised edition
- Economic Survey 2015-16, Chapter 8 "Preferential Trade Agreements" Pg 118-129
- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). "The Governance of Global Value Chains", *Review of International Political Economy*, 12(1), p. 89.
- Glauco Henrique de Sousa Mendes, Gilberto Miller Devós Ganga (2013), "Predicting Success in Product Development: The Application of Principal Component Analysis to Categorical Data and Binomial Logistic", *Regression Journal of Technology Management & Innovation* Vol.8 No.3
- Gregory T. Knofczynski, Daniel Mundfrom (2008), "Sample Sizes When Using Multiple Linear Regression for Prediction", *Educational and Psychological Measurement* Volume 68 No. 3 431-442
- Harvie C (2010), "East Asian Production Networks - The Role and Contribution of SMEs", *International Journal of Business and Development Studies* 2(1), 27–62.

- Harvie C, Narjoko D, Oum S (2010) Firm Characteristic Determinants of SME Participation in Production Networks. ERIA Discussion Paper Series 2010–11. Jakarta: Economic Research Institute for ASEAN and East Asia.
- Hoenig, J.M. and Heisey, D.M. (2001), “The abuse of power: The pervasive fallacy of power calculations for data analysis”, *The American Statistician*. 55-1. 19-24
- Humphrey, J., Schmitz, H. (2002), “How does insertion in global value chains affect upgrading in industrial clusters?”, *Journal of Regional Studies*
- Humphrey, John., Memedovic, Olga (2003) , “The Global Automotive Industry Value Chain: What Prospects for Upgrading by Developing Countries”, UNIDO Report-Sectoral Studies Series
- Kimura F, Ando M (2005), “Two-Dimensional Fragmentation in East Asia: Conceptual Framework and Empirics”, *International Review of Economics and Finance* 14(3), 317–348.
- Kline, P. (2002). *An easy guide to factor analysis*. London: Routledge.
- Kowalski, P. et al. (2015), “Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies”, *OECD Trade Policy Papers*, No. 179, OECD Publishing, Paris.
- Krishnakumar J., Nagar A.L. (2008), “On Exact Statistical Properties of Multidimensional Indices Based on Principal Components, Factor Analysis, MIMIC and Structural Equation Models”, *Social Indicators Research*, 86:481-496
- Lall, S. (2000), “The Technological Structure and Performance of Developing Country Manufactured Exports 1985-1998”, *QEH Working Paper Series*
- Linden, G., Kraemer, K.L., Dedrick, J. (2009). “Who captures value in a global innovation network? The case of Apple's iPod.” *Communications of the ACM*, 52(3), 140-144
- Make in India – Automobiles Sector (<http://www.makeinindia.com/sector/automobiles>)
- Make in India: Sector Survey – Automobiles (<http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-automobile>)
- Make in India Sector Survey – Automobile Components (<http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-automobile-components>)
- Mehrjoo, Saeed. Bashiri Mahdi. (2013), “An application of principal component analysis and logistic regression to facilitate production scheduling decision support system: An automotive industry case”, *Journal of Industrial Engineering International*,
- Michael Porter (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, Published by Simon & Schuster
- Namchul Shin, Kenneth L. Kraemer, Jason Dedrick (2009), “R&D, Value Chain Location and Firm Performance in the Global Electronics Industry”, *Journal of Innovation and Industry*

- National Skill Development Corporation (NSDC) Report 2013-17, 2017-22
(<http://www.nsdcindia.org/sites/default/files/files/Auto-and-Auto-Components.pdf>)
- NSDC-KPMG Report (2015), Human Resources and Skill requirements in the Auto and Auto Components Sector (2013-17, 2017-22)
- OECD-WTO-UNCTAD report (2013), “Implications of Global Value Chains for Trade, Investment, Development and Job”
- Pal O., Gupta A.K., Garg R.K. (2013), “Supplier Selection Criteria and Methods in Supply Chains: A Review”, International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering Vol: 7, No: 10
- Pampel, Fred. (2000), “Logistic Regression: A Primer (Quantitative Applications in the Social Sciences)”, Sage Publications
- Saranga, H., Mukherji, A., Shah, J. (2013), “Determinants of Inventory Trends in the Indian Automotive Industry: An Empirical Study”, IIM Bangalore Review
- Siggel, E., Agrawal, P. (2009), “The Impact of Economic Reforms on Indian Manufacturers: Evidence From A Small Sample Survey”, Institute of Economic Growth Working Paper Series No. E/300 – Commissioned by Competition Commission of India (CCI)
- Society of Indian Automobile Manufacturers (SIAM) Statistics
(<http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=13>)
- Srinivasan, T. N., Archana V. (2011): ‘Determinants of Export Decision of Indian Firms’, Economic and Political Weekly, February 12, vol xlvi, No 7
- Sturgeon Timothy J., Kawakami, Momoko (2010), “Global Value Chains in the Electronics Industry: Was the Crisis a Window of Opportunity for Developing Countries?” World Bank Policy Research Working Paper 5417
- Sturgeon, Timothy. Biesebroeck, Johannes Van. (2011), “Global value chains in the automotive industry: an enhanced role for developing countries?” Int. J. Technological Learning, Innovation and Development, Vol. 4, Nos. 1/2/3
- Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics (5th ed.). Upper Saddle River, NJ: Pearson Allyn & Bacon.
- UNCTAD Report (2010), “Integrating Developing Countries’ SMEs into Global Value Chains”
- Veloso F., Kumar R. (2002). “The Automotive Supply Chain: Global Trends and Asian Perspectives”, Asian Development Bank ERD Working Paper Series No. 3
- Wignarajan (2015), “Factors affecting Entry into Supply Chain Trade : An analysis of firms in South East Asia”, Asia and The Pacific Policy Studies,2 : 623-642
- World Bank Enterprise Survey (2014)
- Zumbo, B.D. and Hubley, A.M. (1998), “A note on misconceptions concerning prospective and retrospective power”, The Statistician. 47-2. 385-388.

ANNEXURE – 1: SURVEY FINDINGS – AUTOMOTIVE FIRMS' PERCEPTION

This section has been included to portray how firms responded to the individual factors that constituted the broad factors (as discovered by PCA). In other words, this section provides insights into the firms' perceptions of their side of the story.

Views of the firms were collected by the survey through multiple modes - online survey, telephonic interviews and face-to-face interviews. A combination of these modes was adopted since the response rates varied across them – high, medium and low in case of face-to-face interviews, telephonic interviews and online survey, respectively. The overall response rate (as measured against the total number of firms in the association directories) was 15.1% for the Automotives survey.

The questions in the survey questionnaire were largely divided into broad factors of participation and relevant sub-factors were finalized after extensive discussions. These broad factors and the subsequent sub-factors under each category have been outlined below, along with the descriptive statistics of responses obtained. Factors which more than 50% of the firms deem important (or extremely important) have been perceived as significant.

A1.1. IMPRESSION AND CULTURE RELATED FACTORS

9.1.1. Image of Indian firms

Image or impression plays a vital role in the choice of sourcing and supplier firms. Very often, sellers' and/or buyers' perception about a firm is based on the past performance of the firm derived from either a history of direct experience or word-of-mouth in the business. The general impression about Indian firms (in terms of trustworthiness and affordability), the image of Indian products (in terms of quality, cost and reliability) and generally the brand image of India as a major manufacturing hub on the world scene could affect the firms' prospects of participating in GVCs. This question was intended to gauge if Indian firms faced image-related issues in participation in GVCs.

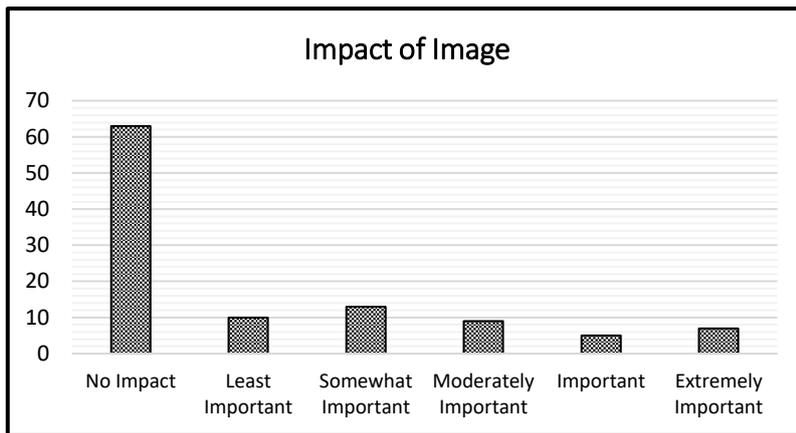


Figure 10: Effect of Perception of Indian Firms on Participation in Automotive GVCs (Source: Based on Survey Findings)

According to the responses (Fig 1), most firms feel that the buyers' perception about Indian firms does not play any role in affecting participation. This could mean- (a) Indian firms enjoy a good image as suppliers with high reliability and worthy standards; (b) Automotive firms pivot their

decision of selecting suppliers on the basis of certain other set parameters like financials, prior history of performance, present capabilities like standards certification, technology, production capacity and employee strengths, and ability to adapt and update based on customer requirements.

9.1.2. Cultural Factors

Very often cultural factors affect the way in which certain firms execute their business. These factors are a reflection of their nation's culture, organizational culture or general philosophy of operations. Cultural factors impact business decisions regarding who the firm's clients and suppliers should be, how and where business should be conducted and strategy regarding future goals. For instance, certain OEMs wish to make their entire value chain domestic by sourcing from their local suppliers and catering to the domestic market alone. Some MNCs in India prefer to source from their home countries only as a result of their organizational tradition. This question was asked to gauge if cultural factors influence the sourcing/supplying patterns of automotive firms. Carter et.al. (2010)⁵⁸ have showed that culture influences the decision of procurement managers in choosing suppliers from different geographies.

⁵⁸ Carter, Joseph., Maltz Arnold, Maltz Eliot, Goh Mark, Tingting Yan (2010), " Impact of culture on supplier selection decision maker", International Journal of Logistics Management, Vol.21, No.3, pp 353-374

Based on the responses (Fig 2), cultural factors also seem to be of no major consequence to

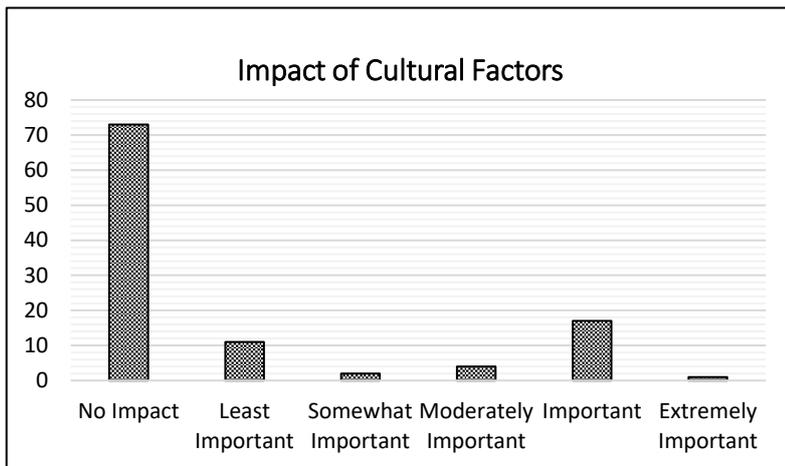


Figure 11: Impact of Cultural factors on Participation in Automotive GVCs
(Source: Based on Survey Findings)

most firms in participating in the Automotive GVC, though a small proportion of firms do deem these as important. A closer look at the type of firms attaching importance to cultural factors revealed that most of these firms were large. Most medium and nearly all small firms felt cultural factors were not important determinants of participation in

GVCs. Larger firms, which have more resources at their disposal, have the luxury of upholding cultural factors as part of their business strategy. There were no other trends with respect to other firm characteristics including ownership type, type of location or position in GVC.

A1.2. INSTITUTIONAL FACTORS

Institutional Factors determine the general climate of doing business in an economy through the prevailing political, economic, social and legal institutions. Though it is difficult to determine precisely which institutions affect the participation of firms in global value chains, a range of sub-factors relating to the impact of existing institutional setup and practices were covered in the survey.

9.2.1. Domestic Laws and Policy-related

Laws and policies are generally considered to be important for participation in GVCs by the automotive firms because they not only affect the current operations but also future strategies. A law/policy has the capability to create opportunities or challenges for businesses. Questions on the level and type of impact (positive or negative) of specific laws/policies (comprising of both State Government and Central Government policies) governing the Auto sector and the

overall level of difficulty of domestic laws were posed to the firms to understand the degree of impact of these policies on their integration in value chains.

More than 50% of the respondent firms considered the domestic laws as important or extremely

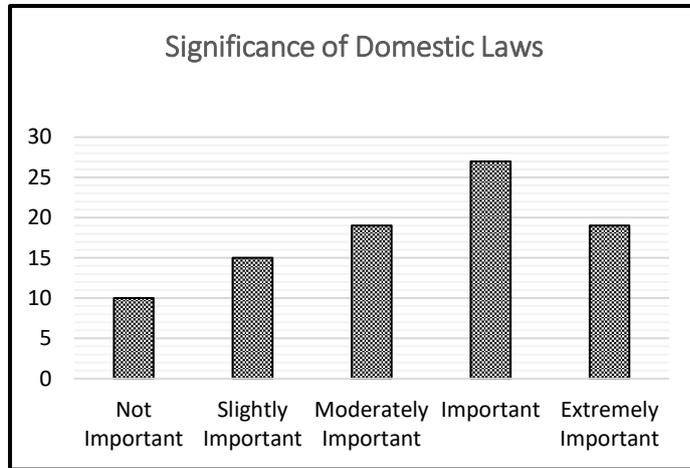


Figure 12: Significance of Domestic Laws in Participation in Auto GVCs
(Source: Based on Survey Findings)

important for participation (Fig 3). For a deeper understanding of the impact, the most important laws specific to the Automotive Sector that could have a bearing were shortlisted after extensive discussions and the pilot survey. The reaction of the respondent firms to individual laws/policies has been shown below (Fig 13). There are three broad categories of impact – (a) No Impact; (b) Positive Impact (High and Moderate); and (c) Negative Impact

(a) **No Impact:** The laws/policies which the respondent firms feel have no major impact on participation in the Auto GVC are the trade-related laws, the Foreign Direct Investment (FDI) policy, Emission Norms (BS norms), Intellectual Property Rights (IPR) regime in the country and subsidies from Governments. (Fig 4)

Interestingly, the import and export policies in India for Automotives seem to have no major impact on participation in Automotive GVCs. It is to be noted that import and export policies refer to not only tariff-related measures but also to procedural requirements and expectations as set mutually or through trade agreements. Tariff related actions seem to have had a positive impact on the sector - the import tariffs for high-end automobiles (like luxury vehicles) and used cars only are very high (100-125%). Other segments (including components) face lower tariffs rates; and this has promoted both manufacturing and assembly in the country for not only the domestic market but also for foreign markets. There are no particular prohibitions on imports or exports in the auto sector, including no license requirements or quotas. Exports have been encouraged through the Focus Market Scheme/Focus Product Scheme (currently subsumed under the MEIS Scheme) to improve export competitiveness in select international markets, reduce freight cost and increase market

penetration. These included new markets like Africa and Latin & South America. Currently special provisions for the Auto industry for major markets have been granted in the Merchandise Exports from India Scheme (MEIS). Here transferable duty scrips issued on realized FOB value of exports can be freely used for payment of customs duties for imports of inputs/products, excise duties on domestic procurement and service tax. The value of exports has been higher than that of imports over several years now, with both showing rising trends. Though it might be stipulated that very little has been achieved procedurally, trade policy has been generally favourable for the sector.

In the auto and the auto components sector, automatic approval of 100% FDI is allowed, so FDI policy for the sector is quite open and encouraging; hence it does not seem to be a constraint for participation in GVCs. As per Department of Industrial Policy and Promotion (DIPP) data, FDI inflows worth US\$ 14.32 billion to the sector have taken place over the past decade and a half (April 2000 - December 2015). Most of the global automakers have either set shop in India or have entered into strategic partnerships with domestic automakers. Almost all international automakers are increasing their footprint in the country by opening more plants in new locations or expanding existing facilities. The FDI policy seems to be facilitative of this move.

Emission norms have been reported to have no impact by majority of the respondent firms probably because a major portion of this survey was implemented before the announcement of the adoption of BS-VI norms and consequent deadlines by the Government of India. But other firms have reported a positive impact of these norms on participation. Emission norms in the country were introduced for environmental concerns to regulate the tolerable emission limits of noxious gases (hydrocarbons, carbon monoxide, and nitrous oxides) and particulate matter. The Bharat Stage emission norms were introduced in 2000 along the lines of their global counterpart, the Euro norms. Recent government orders are to transition to Bharat Stage-VI from Bharat Stage-IV (and Bharat Stage III in Tier-2 and lower cities). This will require substantial changes in technology pertaining to engine, effusion treatment and exhaust system, and fuel injection and combustion systems. The most affected section will be the diesel vehicles market which will require major overhaul of technology in order to meet BS-VI requirements. OEMs along with Tier-1 and Tier-2 suppliers have remarkable scope for generating high value addition through innovation of novel technologies in these segments as do suppliers in automotive electronics (microprocessors) manufacturing and measurement and testing services (emission systems testing).

India has been a faithful adherer of WTO's Agreement on Trade Related Aspects of Intellectual Property (TRIPs) as well as other international treaties and conventions implemented by World Intellectual Property Organization (WIPO). Over the past decade, the process of filing for intellectual property rights have become streamlined and simplified. In addition, special incentives to SMEs (in form of reduced fees) and foreign applicants have been provided. So this might be the reason why the IPR regime in India has been considered to have no impact on participation. The other possible explanation could be the lack of sufficient innovation, especially amongst the Tier-2 and Tier-3 suppliers. Among firms that did feel the IPR regime is important for participation, majority felt that the IPR regime in the country has had a positive impact.

Surprisingly, subsidies from the government (like free or subsidised land, cheap utilities) do not seem to have any major impact on participation according to most respondent automotive firms. One possible explanation could be the absence of or lack of access to such facilities for a majority of these firms. State governments normally have special incentives for attracting industrial projects to their respective states. But chances are the targets are typically large potential investors, instead of SMEs. As a result, a large portion of the respondent firms may have been neglected or are ignorant.

(b) *Highly Positive Impact:* The policies that have the most positive impact are the manufacturing policy, the Motor Vehicles Act 1988 (MVA), Investment and Tax incentives of Governments, State Laws, Foreign Exchange rate, and Environmental Laws. (Fig 4)

The manufacturing policy and incentives by Government as established by the Auto Policy exempt manufacturing and imports from licensing and approvals. Foreign equity investment up to 100% has been approved under the automatic route, with no prior commitment criteria for minimum investment and rebates on R&D expenditure have been set up to be availed by firms. The Automotive Mission Plan (2006-16, 2016-26) have set firm goals with respect to domestic output (attaining a level of USD 145 Billion, accounting for more than 10% of the GDP and providing additional employment to 65 Million additional jobs by 2026) and exports (increasing exports of vehicles by 5 times and components by 7.5 times) by encouraging manufacturing within the country, increasing technology modernization, improving skilling within the industry and generally establishing India as the world's favoured destination for design and manufacture of automobiles and auto components.

Impact of Policies on participation in Automotive GVC

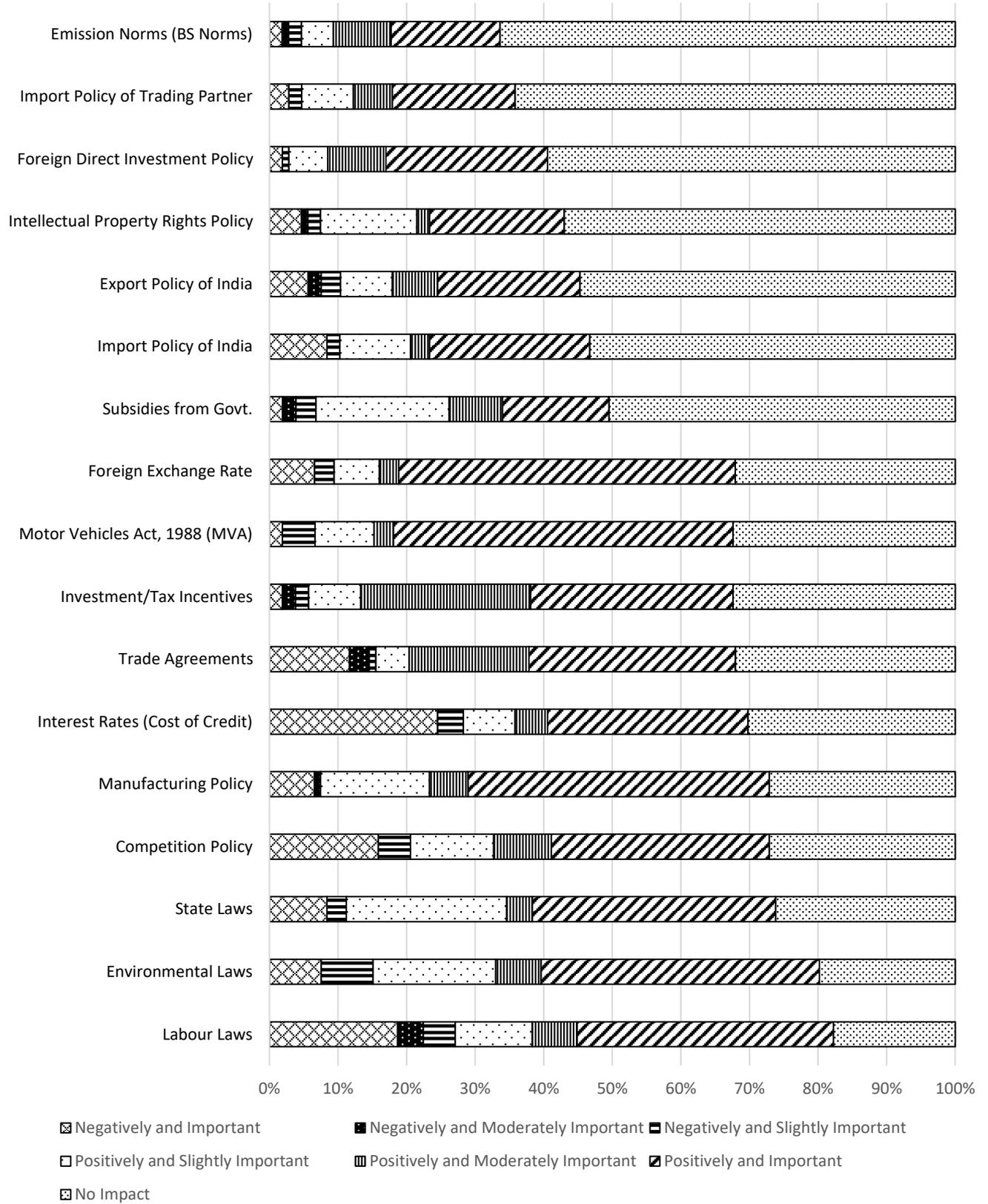


Figure 13: Impact of Policies on participation of Automotive GVCs (Source: Based on Survey Findings)

In addition to this, state governments have their individual additional incentives like relaxation or exemption of stamp duty on sale or lease of land, concessional rate of interest on loans for capital expenditure, tariff incentives for infrastructure, investment subsidies/tax incentives like tax breaks or concessional tax rate periods, backward areas subsidies, special incentive packages for mega projects. The impact of state laws, environmental laws and Investment & Tax incentives by the Government is also positive according to most respondent firms. Tax holidays in the form of exemptions for a defined period (of various taxes like Income Tax, Excise Duty, Stamp Duty) and/or reduced tax rates for a subsequent limited period is often a most favoured tool of governments to attract investment at particular locations. For instance, Pantnagar in Uttarakhand developed as an auto hub because of incentives like 100 per cent income tax exemption for the first five years, 30 per cent for the next five, and 100 per cent exemption of excise duty for 10 years. Several components manufacturers including OEM Bajaj Auto (two wheelers production) cashed in on the opportunity.

State Governments have also become highly expedient in granting environmental clearances to projects within fixed time windows in order to promote industrialization. In fact, states now demarcate special areas for industries like agricultural wastelands that have low adverse environmental impact, hence do not require clearances or special estates that have been earmarked for industries; hence are granted automatic clearances. These incentives for increased manufacturing also reflect highly and positively in participation in global value chains.

The Motors Vehicles Act 1988 (MVA) controls all facets of road transport including registration and licenses of vehicles, safety standards of motor vehicles, traffic regulation, liability, offences and penalties etc. Central Motor Vehicles Rules (1989) contain the provisions of MVA that have specific standards for passenger safety and reduced accident impact, to be met by the manufacturers. In accordance with traffic conditions, road behaviour and driving habits in unique Indian setting, these rules include performance parameters for various vehicle apparatus like brakes, gear, wheels, lighting, safety glass, seat belts etc. As a result, MVA has a direct impact on both the manufacturers and the end customers. In a sector where end-customers are very price sensitive, any adverse impact on them will affect the manufacturers indirectly too. Increasing tightening of safety criteria has apparently had a positive impact on participation in automotive GVCs because Indian standards are increasingly

converging with global standards; as a result value addition in these segments is an attractive proposition where manufacturers will have to develop innovative methods to meet these criteria at nominal prices.

(c) **Moderate Impact:** Trade agreements and Competition Policy seem to have equivocal effect on participation in Auto GVCs according to the respondent firms. Almost an equal number of firms were divided in their opinion between positive and negative impact of such policies. (Fig 4)

India has a number of trade agreements like (Free Trade Agreements (FTAs), Regional Trade Agreements (RTAs), Preferential Trade Agreements (PTAs) and Comprehensive Economic Cooperation Agreements (CECA/CEPA)) mostly with its Asian counterparts. India has bilateral FTAs with its SAARC neighbours (Sri Lanka (1998), Afghanistan (2003), Bhutan (2006) and Nepal (2009)), East Asian trading partners (Korea (2009), and Japan (2011)) and South East Asian partners (Thailand (2004), Singapore (2005), Malaysia (2011)). In addition, there are regional trade agreements - the South Asian Free Trade Agreement (SAFTA, 2004), the India-Association of Southeast Asian Nations Agreement (ASEAN, 2010), the SAARC PTA, BIMSTEC FTA. India also has FTAs with South America (MERCOSUR) and African nations. The Economic Survey 2015-16⁵⁹ has reported that the effect of FTAs has been significant and positive for trade by India. The volume of trade has increased with FTA countries more than would have happened otherwise, with the increase more in imports than exports, mostly because India had larger tariff reductions than its FTA partners since it had relatively higher prior tariffs. But the impact of individual FTAs on the automotive sector is yet to be studied in detail. A closer look is needed to reveal the extent of impact of these FTAs on the automotive GVC participation.

But there are certain trade agreements (proposed or otherwise) that are perceived by automotive firms as beneficial or detrimental. For instance, most firms are opposed to the India-EU FTA as anti- Make in India. Firms believe this FTA will adversely affect local value addition and employment; hence the protective measures against completely built units (CBUs) of vehicles and engines should continue by keeping these in India's negative list (Items under negative list are protected from duty reduction). On the other hand, a lot of firms want FTAs with Latin and South America (emerging markets like Mexico and Brazil) that will help make access to these markets smoother.

⁵⁹ Economic Survey 2015-16, Chapter 8 "Preferential Trade Agreements" Pg 118-129

Competition Policy in India has helped develop a deregulated and competitive business environment in India. But its ability to keep up with the changing demands of the evolving business landscape has been under question for a while now. Morris and Basant (2000)⁶⁰ have outlined the strengths and shortfalls of this policy in dealing with current demands – the competition policy is a strange juxtaposition of simplicity and complexity. High levels of skill, perseverance and commitment are required to enforce it on the ground. Siggel and Agrawal (2009)⁶¹ through a small sample survey discovered that Indian auto makers were positively competitive, although more foreign firms described the impact of a competitive environment as favourable as opposed to firms without any foreign partners.

A similar trend was observed in the responses of this GVC study regarding the Competition Policy. While most respondent firms feel that the Competition Policy in India has had a positive impact, the concerns of those firms which feel it has a negative impact need to be closely examined. The most important factor that seems to be affecting automotive firms (those who have responded as negative) is the undue advantage that Multinational Firms enjoy in terms of access to investments, technology and resources owing to their international reach. Many SMEs in fact desire some sort of protection from the Government for furthering their cause, such as the permission to form alliances for collective bargaining. Additionally, due to non-harmonization of competition policies across countries, Indian firms face tougher competition world-wide from firms that have enormous governmental patronage, for instance Chinese firms (especially SMEs) that enjoy huge incentives, thereby making their products cheaper.

(d) **Negative Impact** - The most negative impact on participation in Automotive GVCs is that of the Labour laws and Cost of credit (Interest rates).

Labour laws in India aim to protect and safeguard the interest of the workforce. Labour is a concurrent subject under the Indian Constitution; hence there are both Central and State Government legislations on important facets of labour. A brief compilation of relevant laws has been provided below (Table 1):

⁶⁰ Basant, Rakesh, Morris Sebastian (2000), Economic and Political Weekly

⁶¹ Siggel, E., Agrawal, P. (2009), Institute of Economic Growth Working Paper Series No. E/300 – Commissioned by Competition Commission of India (CCI)

BROAD CATEGORY	LAWS/POLICIES
Industrial Relations	<ul style="list-style-type: none"> • Trade Unions Act, 1926 • Industrial Employment Standing Order Act, 1946 • Industrial Disputes Act, 1947
Wages	<ul style="list-style-type: none"> • Payment of Wages Act, 1936 • Minimum Wages Act, 1948 • Payment of Bonus Act, 1965
Working Hours, Conditions of Service and Employment	<ul style="list-style-type: none"> • Factories Act, 1948, • Motor Transport Workers Act, 1961 • Contract Labour (Regulation & Abolition) Act, 1970. • Industrial Employment (Standing Orders) Act, 1946
Equality and Empowerment of Women	<ul style="list-style-type: none"> • Maternity Benefit Act, 1961 • Equal Remuneration Act, 1976.
Deprived and Disadvantaged Sections of the Society	<ul style="list-style-type: none"> • Bonded Labour System (Abolition) Act, 1976 • Child Labour (Prohibition & Regulation) Act, 1986 • Children (Pledging of Labour) Act, 1933
Social Security	<ul style="list-style-type: none"> • Workmen's Compensation Act, 1923. • Employees' State Insurance Act, 1948. • Employees' Provident Fund & Miscellaneous Provisions Act, 1952. • Payment of Gratuity Act, 1972. • Employers' Liability Act, 1938 • Personal Injuries (Compensation Insurance) Act, 1963 • Personal Injuries (Emergency Provisions) Act, 1962 • Unorganized Workers' Social Security Act, 2008

Table 30: Labour Laws in India (Source: National Crime Investigation Bureau and Ministry of Law and Employment)

Most of these labour laws are archaic and restrictive laws governing hiring, layoffs, wages and minimum operational environment. This absence of up-to-date and transparent labour market reforms have made the workforce composition skewed towards contractual labour, as it is easier to manage temporary employees as opposed to permanent ones. More contract labour also means less worker unions; hence a lower probability of strikes, mass leaves or incited violence. Nearly 70% of the Indian auto industry's total workforce now consists of contract labourers⁶², which has actually started to turn counter-productive. Large numbers of contract workers have been able to organize themselves and force their management into agreeing to their demands, albeit sometimes with violence.

⁶² Annual Survey of Industries 2015

State governments have proved ineffective in monitoring or updating the existing laws. Auto companies are mostly afraid of labour strikes and litigations from non-compliance. For India which considers itself labour-intensive and labour as a rich resource, labour laws need to be improved in terms of flexibility to employers, better deal for employees and effective governance.

The cost of credit (interest rates) is also considered as a deterrent for participation by a large number of firms. The interest rates for formal sector lending institutions are typically considered high and have a double impact on auto firms. The firms have a direct impact in terms of borrowing costs which tends to increase the cost of business (as interest expenses go up). High interest rates on auto loans also affect consumer spending by depreciating the value of money (purchasing power). As a result, consumer demand declines and affects sales of automobiles; thereby affecting the auto firms as well. Lower interest rates as well as ease of access to credit are ideal for encouraging production activity and thereby participation in GVCs.

9.2.2. Public Institutions

Firms have to deal with executive, legislative and judiciary institutions like the bureaucracy and courts in the course of their business. Efficacy and effectiveness of public institutions in an economy signals the type of business climate in the nation. To gauge the importance of these public authorities in firms' participation, general questions on the bureaucratic system (existence of red tape), dispute resolution, and transparency of public institutions were posed to the respondents.

Transparency of a public institution refers to the openness, clarity and dependability with which public authorities function. Since businesses operate within regulatory frameworks where the role of the public authorities can at times assume very high significance, most firms (40%) felt that transparency of public institutions was an important factor

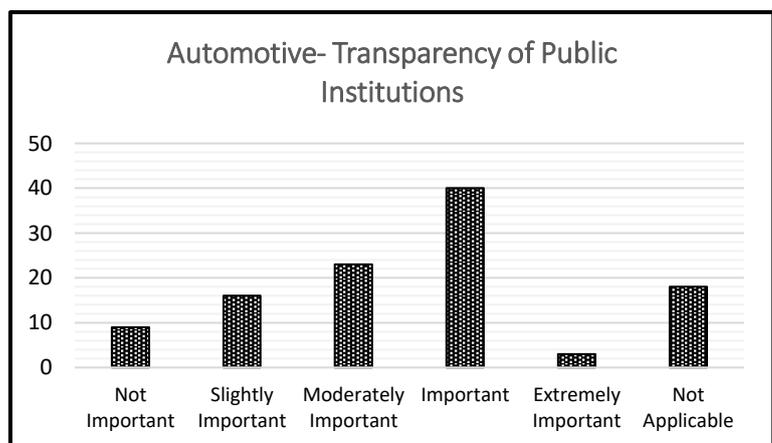


Figure 14: Importance of Transparency of Public Institutions (Source: Based on Survey Findings)

for participation (Fig 5). Public institutions need to be organized, predictable, open and accountable in dealings; only then can they incite confidence in them.

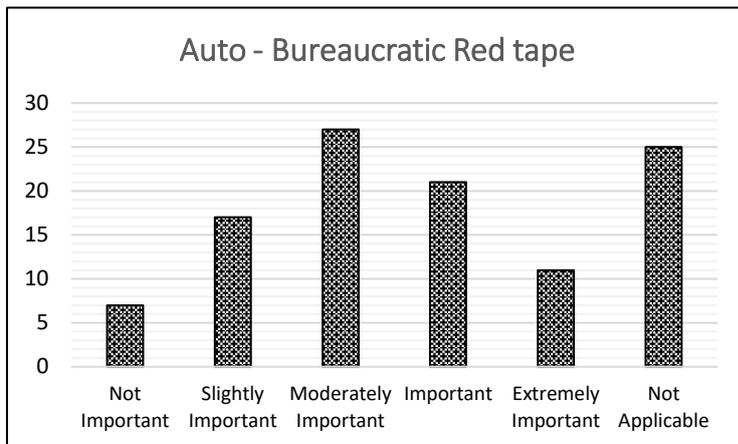


Figure 15: Importance of Bureaucracy for Participation in Automotive GVC
(Source: Based on survey Findings)

Bureaucratic procedures are vital for establishing and functioning businesses in India. Furthermore, trade with foreign countries requires several bureaucratic diktats to be followed. As a result, this factor potentially could be a determinant of participation in GVCS. According to the responses (Fig 6), most of the respondent

automotive firms felt that bureaucratic red-tapism was either not applicable (30%) or was at best moderately important (40%). Most firms feel that the government (especially the state governments) have proactively taken measures for speedy execution of approvals and clearances in order to encourage industrialization. Several procedures have been organized online (like e-filing, e-approvals) and dedicated cells for handling specific requests setup in order to facilitate businesses. For instance, the state governments where the auto clusters are located have e-Governance policies to facilitate not only Citizen-centric services but also Government to Business (G2B) services. The absence of the general sentiment that bureaucracy was not that important is welcome news for participation as it indicates that the business environment in the country is not highly controlled by red tape or needless officialdom.

Dispute resolution is also very important for auto businesses. In the Automotive industry, a lot of business collaborations in the form of joint ventures, contracts, crossholdings etc. take place. Additionally, a lot of innovation is demanded by the sector that gives rise to intellectual property rights. Sometimes there are also tax-related issues (domestic and trade related) between firms and the governments. At the international

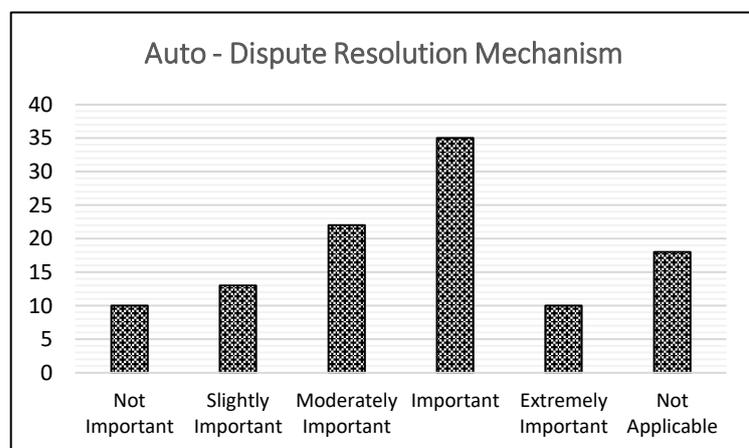


Figure 16: Importance of Dispute Resolution for Participation in Auto GVC
(Source: Based on Survey Findings)

level too, disputes between nations in WTO also arises. Often countries employ legitimate actions against dumping (anti-dumping), subsidization (countervailing duties), and surges in imports (safeguard measures) which are contested by other nations. In short, there is a lot of scope for disputes in the sector. Hence dispute resolution mechanisms become very vital. Most respondent firms (nearly 41%) have marked this as important for participation (Fig 7). Firms typically are averse to the conventional dispute resolution route which is courts, as that could result in inordinately long, expensive and eventually ineffective drawn out battles and controversies. Alternative dispute resolution mechanisms like arbitration, mutual agreement procedures, advance pricing agreements, etc. are being explored for settling disputes confidentially.

9.2.3. Value Chains

The Global Value Chain environ is also crucial for firms' participation in them. Each value chain has its own environment (for instance, the environment of a value chain of an MNC OEM will be very different from the value chain of a domestic OEM because of cultural and organizational sensitivities). But there are certain characteristics which are common to all value chains at a very broad level. Questions on the impact of general structure and governance of GVCs, competition intensity within GVCs and potential risks from integrating into GVCs were posed to the respondents to gauge the effect of these sub-factors on participation in GVCs.

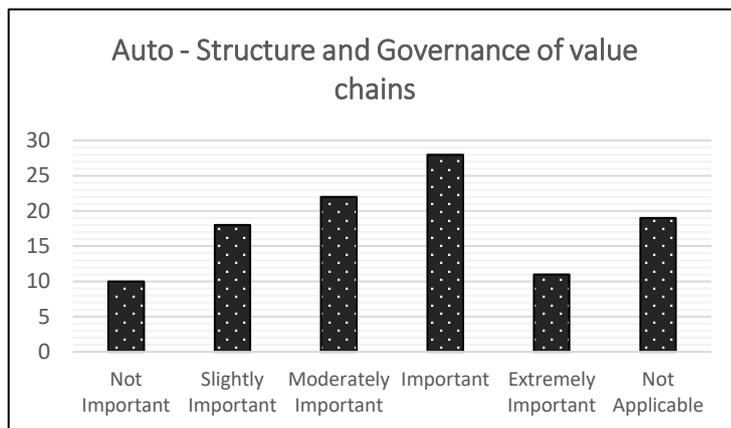


Figure 17: Importance of Structure of Value Chains for Participation
(Source: Based on Survey Findings)

Structure and Governance of value chains refers to the relationships between various actors in the value chain and how power (or control) is exercised within the chain. Decisions regarding what, how and how much to produce are often taken by the most influential player in the value chain and that determines the structure of the chain. Gereffi et.al

(2005)⁶³ described various governance forms of global value chains:

⁶³ Gereffi, G., Humphrey, J., & Sturgeon, T. (2005) **Review of International Political Economy**

(a) *Market Governance*: This involves transactions of relatively simple nature with open information dissemination on product specifications; producers can make products with minimal input from buyers.

(b) *Modular Governance*: This occurs when a product requires the firms in the chain to undertake complex transactions that are relatively easy to codify; higher level of information transfer takes place between the supplier and the buyer.

(c) *Relational Governance*: Based on network-style governance, interactions between buyers and sellers based on shared trust regulated through reputation, social ties, etc.

(d) *Captive Governance*: Here small suppliers are dependent on a few buyers who in turn wield a great deal of power and control. Usually the lead firm exerts a great deal of supervision and control.

(e) *Hierarchical Governance*: Marked by development and manufacturing of products in-house and branded by vertical integration and managerial control within the lead firms. This usually happens when products are highly complex, specifications cannot be collated, or proficient suppliers are absent.

Most firms (40%) felt the structure of the global value chain was important as it determined the context within which they had to operate (Fig 8). Usually OEMs (and sometimes Tier 1 suppliers) being the lead firms exert a lot of influence in determining the nature of their value chain; hence they felt this was important. For smaller firms in lower tiers (36%) which were eager to join or perform in global value chains, the structure was at best moderately important.

Competition to join and within automotive global value chains is fierce. Less value-addition segments operate on very thin margins and therefore have to stay competitive in order to survive within the chain. Firms face competition in upgrading along the chain as well, not only from aspiring co-upgraders but also from existing members in that segment. Often, high competition intensity is a deterrent for participation as firms may not be well equipped to handle competition; which is felt by most of the respondent firms (46%) (Fig 9). In global value chains, the competition is not only from

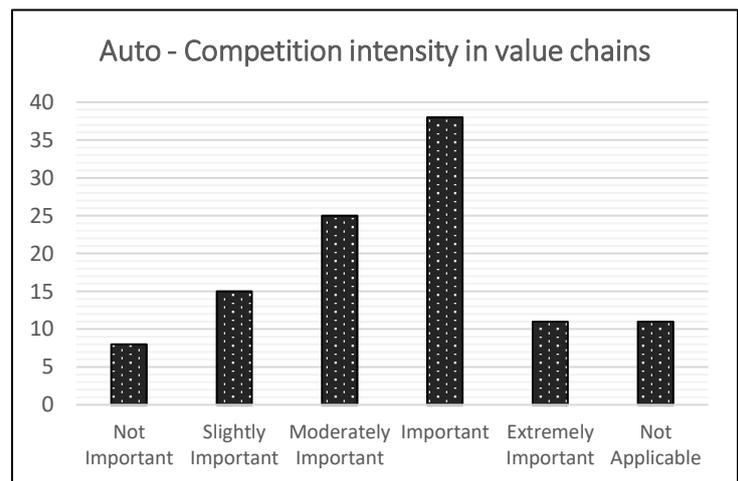


Figure 18: Importance of Competition Intensity of GVC (Source: Based on Survey Findings)

domestic firms but also from global counterparts. Hence a firm needs to be prepared to handle international standards that are less lenient.

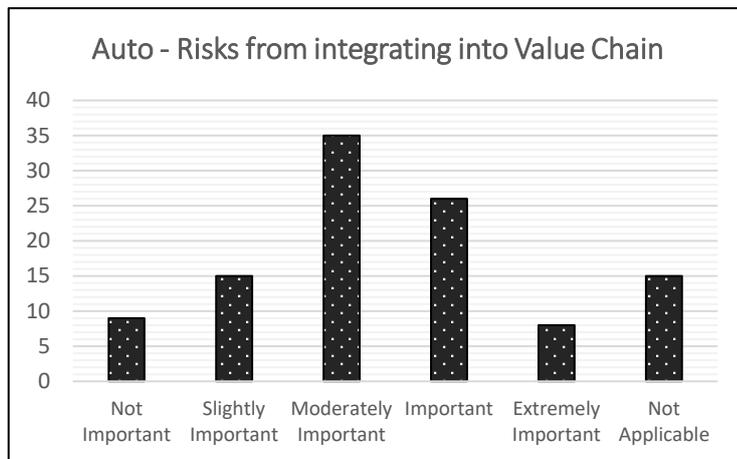


Figure 19: Importance of risks in GVCs for participation (Source Based on Survey Findings);

Integration into global value chains means effectively participating in the international market. Participating in global value chains makes firms more vulnerable to the vagaries of the global market. Apart from meeting global standards in terms of quality, reliability, price and delivery schedules, firms are also exposed to international economic shocks. Most automotive

firms (45.5%), however, feel that these risks are slight-moderately important while about a third (30.1%) firms feel this is important (Fig 10). This could be because of – (a) firms higher up the value chain (OEMs and Tier-1) have higher risks (owing to higher degree of exposure in terms of value) while most firms in the lower value added tiers are not as exposed; (b) all value chains are global in the broadest sense (there will always be at least one segment/player in a different geography), so participation in any value chain is risky for a firm.

A1.3. SECTORAL FACTORS

Sectoral Factors are innate to the sectors and are usually determined by the nature of the product, end markets and target customers. Automotives have quite a few distinctive features in that they are highly technology-intensive, the product life has become shorter with customers expecting newer and advanced products every 3-4 years, and high capital investments are necessary for setup and sustenance. The sub-factors which were identified for both sectors after extensive discussions included:

9.3.1. Market Barriers

The Automotives sector has high barriers to market entry (challenges faced by new entrants to penetrate the market). The biggest hindrance is in terms of scale of investments due to the very high capital costs for setup and subsequent significant operational costs (including skilling of labour and R&D).

Market entry costs refer to the fixed costs of entry into supply chains that precede the setup stage. These include information collection regarding target markets, marketing, technology expenses, distribution channels and regulatory clearances. Nearly a third of the firms (35.3%) felt that this was not important for participation (Fig 11). The possible reason could be because these costs are no longer that high for the components segment. Amongst the firms that felt market entry cost was a significant determinant (21%) were quite a few OEMs. They face this cost more than other firms.

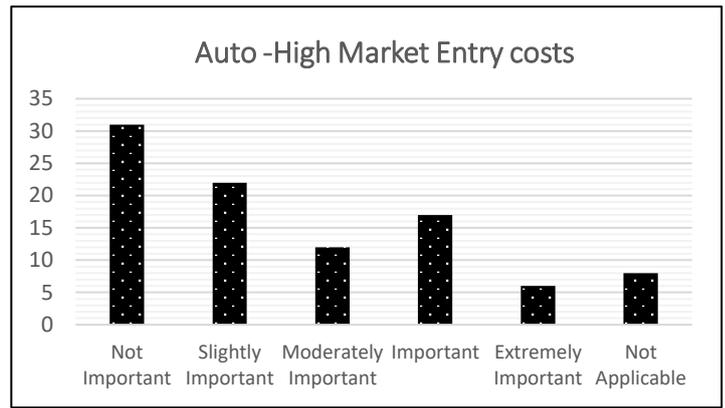


Figure 20: Importance of High Market Entry Costs for participation (Source: Based on Survey Findings)

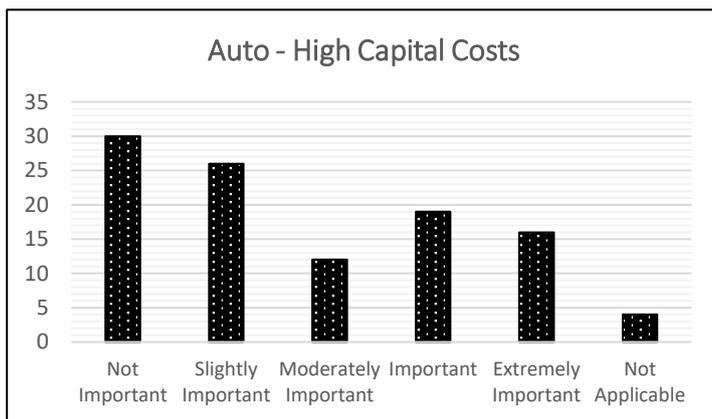


Figure 21: Importance of high Capital Cost for participation (Source: Based on Survey Findings)

Capital costs are the initial costs for setup that includes land, manufacturing plant, equipment, etc. and are very high. The impact of this factor was ambiguous from the responses. While most firms (32%) felt this is an important determining factor for participation, about 31% of the firms also felt that this was not important. A closer look at the profile of firms that felt this was not

important revealed these were mostly medium and small-sized firms. They probably feel so because of the relatively low degree of investment required (hence their size).

Owing to the nature of the sectors, projects also tend to have certain unique characteristics that can potentially affect participation. Projects in the Auto sector typically have long gestation time for setup and skilling for projects, the time between initiation of the project and production is high. Majority of

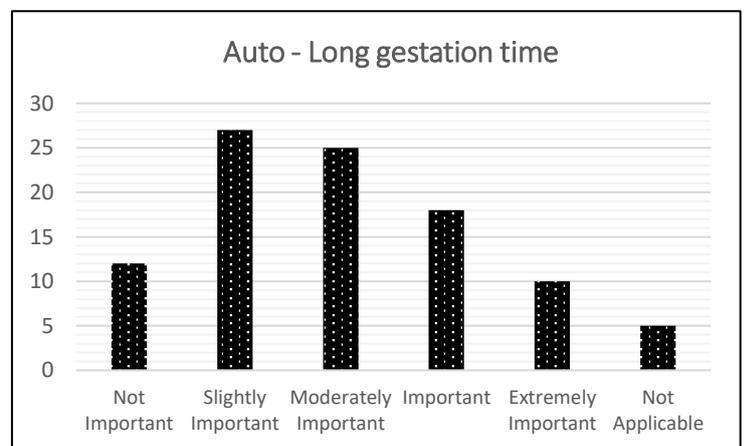


Figure 22: Importance of Gestation Time (Source: Based on Survey Findings)

respondent firms (47.3%) feel that the long gestation time for projects is slightly-moderately important (Fig 13). This is probably because most of this long gestation time is for the initial setup. Once the production process is in place and functional, there is an inherent flexibility built-in which ensures that the firm has some degree of tractability in meeting minor changes in customer demand. For instance, the same assembly line can handle production of several variants of vehicle. The same goes for components manufacturing as well.

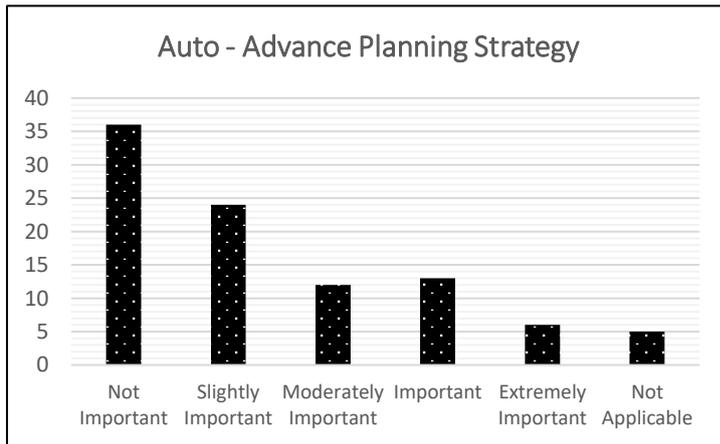


Figure 23: Importance of Advance Planning Strategy (Source: Based on Survey Findings)

There is high emphasis on advance planning strategy as well in businesses. Since ventures in this sector require heavy investments, without proper planning and vision, operating in a value chain can prove to be challenging. Most firms (37.3%), however, feel that advance planning was not an important determinant for participation in Auto GVCs (Fig 14). This was an

interesting insight because when deciding suppliers, buyers tend to look at their plans of future in order to decide the sustainability of the relationship.

9.3.2. Structure of Sector

Certain traits of the sector themselves affect participation like consolidation within sector (if high then leads to fewer firms surviving in each segment) and brand-driven sector (which leads to additional impetus on creating a brand image first).

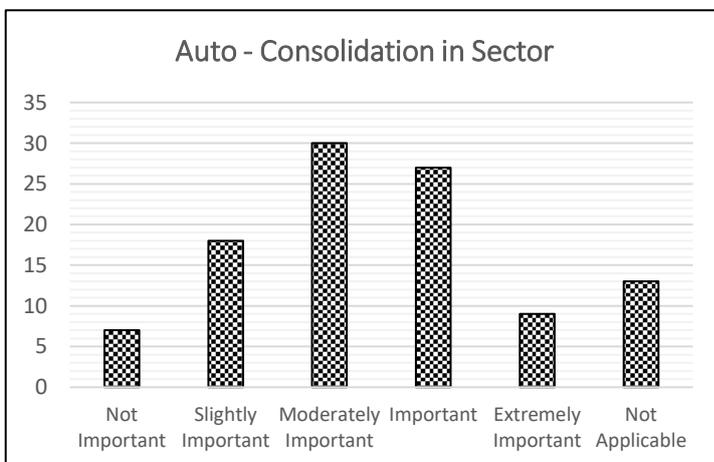


Figure 24: Importance of Consolidation in Auto Sector (Source: Based on Survey Findings)

Most respondent auto firms (33%) felt that consolidation in the sector was an important determinant for participation in Auto GVCs (Fig 15). Higher consolidation will mean tougher norms for participation. As it is, the OEM segment of the automotive GVC is highly consolidated with hardly any new entrants in the last few decades.

Once established, OEMs tend to solemnize their value chain with trusted suppliers. This leads to consolidation in value chains as well. This could spell bad news for aspiring entrants. But as seen earlier, supplier related decisions by buyers are usually based on performance metrics of the supplier. So despite signs of consolidation, firms still stand a chance for participating in GVCs.

The OEMs are the brand owners in the Automotive GVC. Branding helps in establishing familiarity, sets expectations of customers and differentiates a firm from its competitors. Customer perception is highly brand dependent, hence the auto sector is highly brand driven.

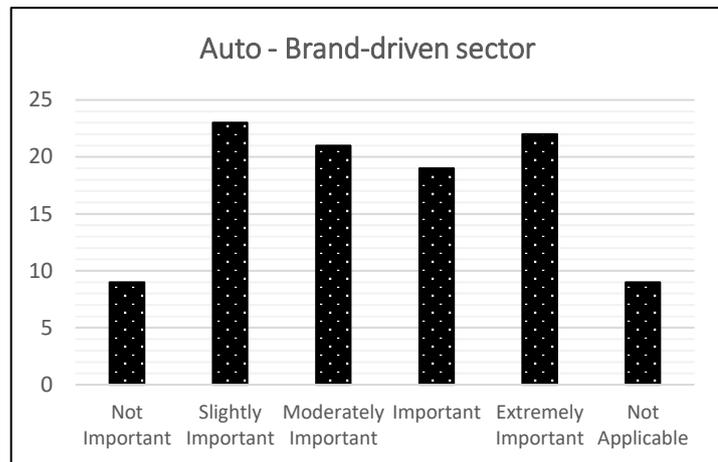


Figure 25: Importance of Brands in Auto Sector (Source: Based on Survey Findings)

Majority of the firms feel that this is an important factor for participation

though the degree of importance varies equally amongst the respondents (Fig 16). High importance of branding gives the older players an edge over newer entrants (first mover advantage). Many small firms tend to neglect the significance of developing a brand image, which should not be the case when competing globally. Brands inspire confidence.

9.3.3. Nature of products

Analogous to projects, the products in these sectors also have certain unique traits that can affect participation. The Automotive sector highly values Quality, Delivery and Cost criteria (QDC). Integration in global value chains in Automotives places great emphasis on the quality of products, thereby necessitating certification and standards-related compliance; timely delivery of products and ease of diversification of products on the request of the customer.

The Indian Automotive industry has technical specifications for the domestic sector. The CMVR – Technical Standing Committee is the nodal committee for deciding the industry standards. The ISO/TS 16949 Automotive Quality Management is the international technical specification and quality management standard for the automotive industry.

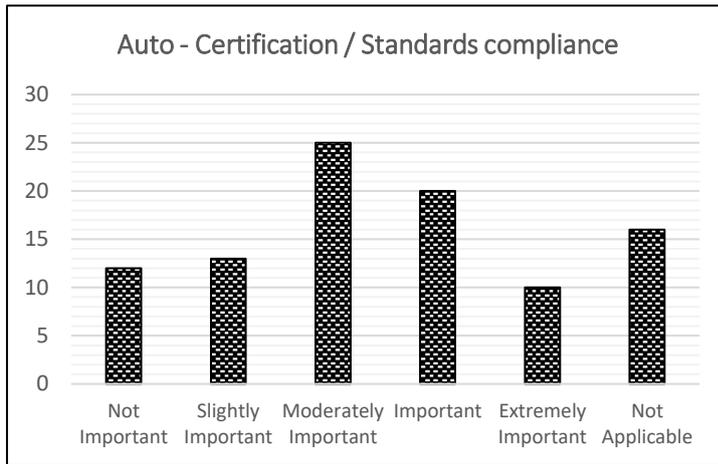


Figure 26: Importance of Certification and Standards (Source: Based on Survey Findings)

It combines standards from across Europe and the US that helps accomplish best practices for installing, designing, developing, manufacturing, and servicing automotive products. The ISO 9001 is the global standard for quality management while the new PAS 7000 standard is a supplier pre-qualification standard aimed at managing supply chain risk. This

enforces provisions for supplier information, capabilities and performance to be shared with all supply chain partners; as a result build trust with buyers and establish brand image for suppliers. Most firms (50%) realise the importance of certification and standards compliance for participation in Auto GVCs (Fig 17).

The focus of the industry is definitely on embracing global best practices. Apart from getting quality certifications (ISO 14001, ISO 9001, TS 16949), automotive firms are also adopting modern shop-floor practices like Total Quality Management (TQM), 5-S; 7-W, Kaizen, 6 Sigma and Lean Manufacturing to become more competitive globally.⁶⁴ Such steps that ensure firms in India meet international standards improve the prospects of these firms for joining or upgrading along the global value chain.

Timely delivery of products is yet another aspect for measuring reliability of a supplier. With Just-in-Time (JIT) inventory practices in vogue and quick turnaround times, timely delivery assumes even more significance. Delay in any segment in the value chain tends to have domino effect downstream. Majority of the firms (40%) deem this factor extremely important for participation (Fig 18). Firms

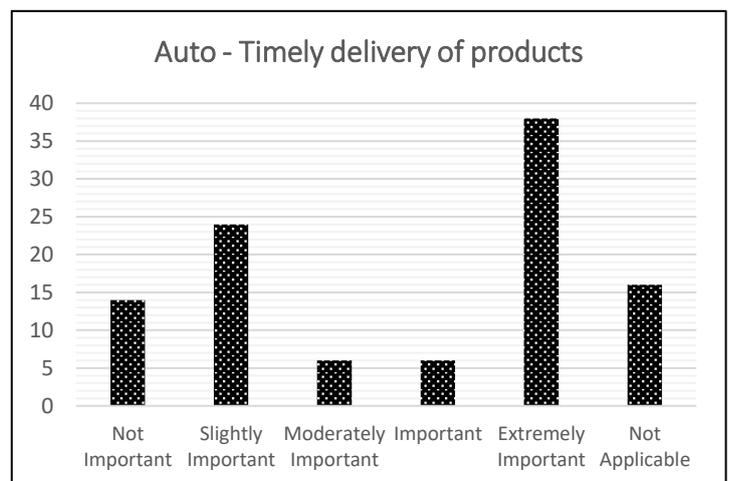


Figure 27: Importance of Timely Delivery (Source: Based on Survey Findings)

⁶⁴ According to ACMA

have issues with structural delays like long clearance times at ports, and transportation due to poor infrastructure. Firms do prepare themselves for unwarranted delays resulting from unforeseen events like natural calamities, labour strikes or accidents.

The automotive sector is highly technology dependent and technology constantly keeps changing to meet revised consumer expectations. Due to this constant flux, there is need for firms to be flexible enough to constantly upgrade their technology to the latest in the market.

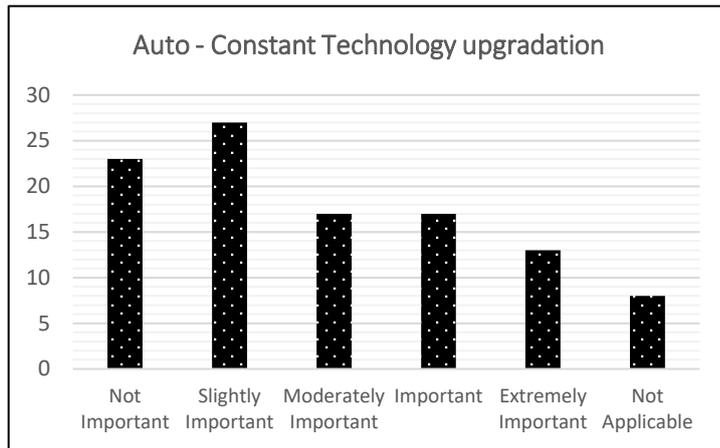


Figure 28: Importance of Technology Upgradation (Source: Based on Survey Findings)

Surprisingly, most firms feel that this is slightly important, which implies that most firms do not face the need for technology upgradation (Fig 19). This might hold true for smaller (and some medium) firms producing standardized generic components. But OEMs and larger Tier-1 firms have considered this factor to be important for participation in GVCs. Often, OEMs and Tier-1 are pioneers

of new technology in the sector, targeted at meeting customer expectations.

Similar to technology upgradation, firms should also have the flexibility to diversify their product range in case the customer desires it. This might be a slightly - moderately important factor for participation according to most firms (44.5%) (Fig 20) Such demands might not be common place for the lower tier suppliers due to the generic nature of their products, hence the need for diversification might not be felt by most firms. OEMs, though, feel this is an important trait for participation in GVCs, because this is one of the criteria for them to decide their suppliers and OEMs are engaged in product differentiation at their end.

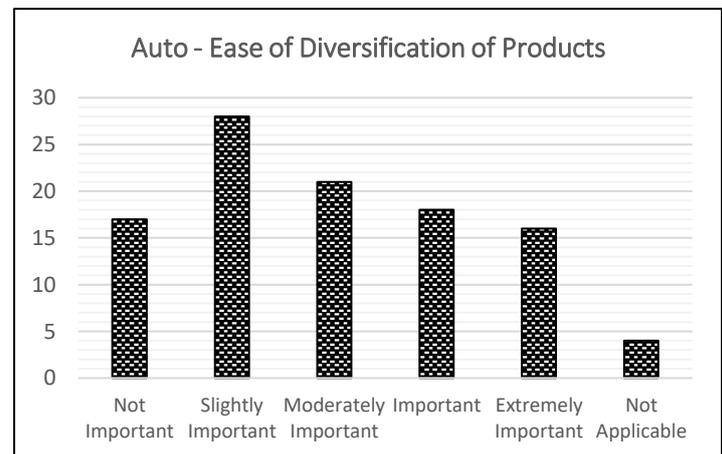


Figure 29: Importance of Ease of Diversification (Source: Based on Survey Findings)

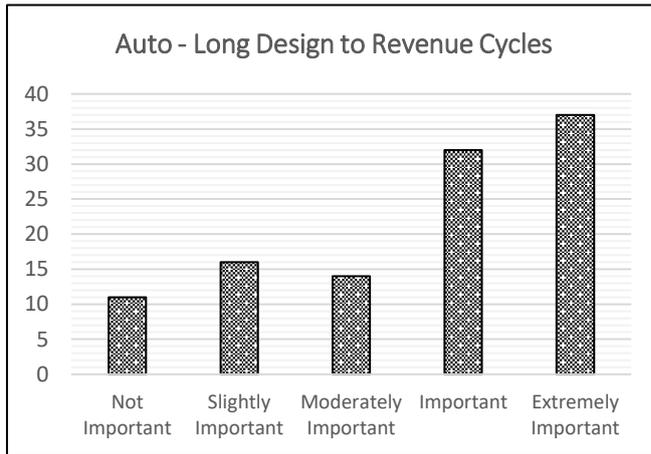


Figure 30: Importance of Design to Revenue Cycles (Source: Based on Survey Findings)

Long design to revenue cycles for auto products is an extremely important factor for participation according to an overwhelming majority of firms (62.7%) (Fig 21). This demands foresight about market expectations, ability to develop a desirable product and manage processes and costs effectively.

A1.4. TRADE RELATED FACTORS

Trade-related factors are related to the ease or difficulty of undertaking trade with foreign countries. Since participation in sectoral GVCs requires involvement in trade, most firms would have experience in trading and procedures involved thereof. Amongst the firms which were not active on the trade front (neither importing nor exporting), exploring the reasons for “why so” will reveal deeper insights into what factors deter trade participation.

9.4.1. Tariff Measures

These comprised of the basic trade measures that are applicable to imports and exports –import and export taxes in India, import tariffs of trading partner nations. As a follow up question, firms were asked to mention the basic rates of tariff that they experience for their products. This has been included under the taxes faced by firms.

As seen earlier, the import and export policies of India were not deemed as significant for participation by majority of the respondent firms. Tariffs (inbound and outbound) for the sector do not seem to affect it much. In fact, the Automotive sector is one of the most protected sectors for final products in India wherein completely built units face high import tariffs (Table 2). The emphasis is on domestic manufacturing and local sourcing. The import duty ranges from 40% to 125% for automobiles and roughly 10%-30% for components.

Criteria / Applicability	Import Duty in %
Used car import	125
Cars CBUs whose CIF value is more than \$ 40,000 or Petrol Engine > 3000 CC or Diesel engine > 2500 CC	100
Cars CBUs whose CIF value is less than \$ 40,000 and Petrol Engine < 3000 CC and Diesel engine < 2500 CC	60
Two-wheeler CBUs with engine capacity <800 cc	60
Two-wheeler CBUs with engine capacity >=800 cc	75
Commercial Vehicle CBUs (Trucks & Buses)	20
CKD containing engine or gearbox or transmission mechanism in pre-assembled form but not mounted on a chassis or a body assembly	30
CKD containing engine, gearbox and transmission mechanism not in a pre-assembled condition	10

Table 31: Import Duty on Automobiles (Source: SIAM)

Though import policies (Fig 4) of trading partner nations have not been deemed important by

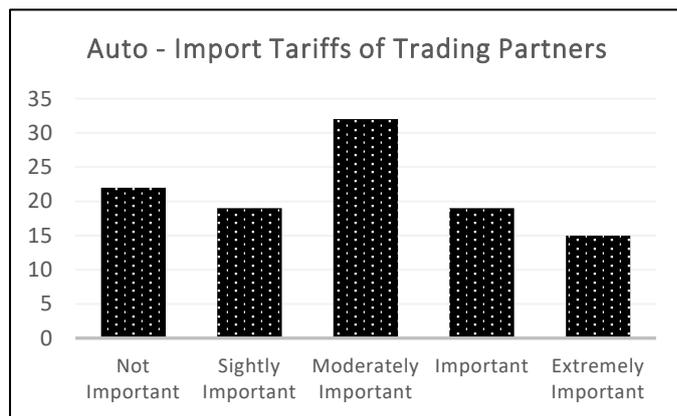


Figure 31: Importance of Import Tariffs of Trading Partners (Source: Based on Survey Findings)

the majority of firms, import tariffs of trading partners have been deemed as moderately to highly important for participation by the majority of firms (60%) (Fig 22). This is in tandem with the industry body SIAM's recommendations for scrutiny and amendment of national taxes, charges and fees on motor vehicles by member countries of WTO that deliberately or

inadvertently violate National Treatment by discriminating against the auto exports from India.

Additionally, most respondent firms (47.2%) are also in favour of more trade agreements with trading partners for increasing GVC participation (Fig 23). Tariff barriers are highly significant for participation in global value chains because of the very nature of transactions involved

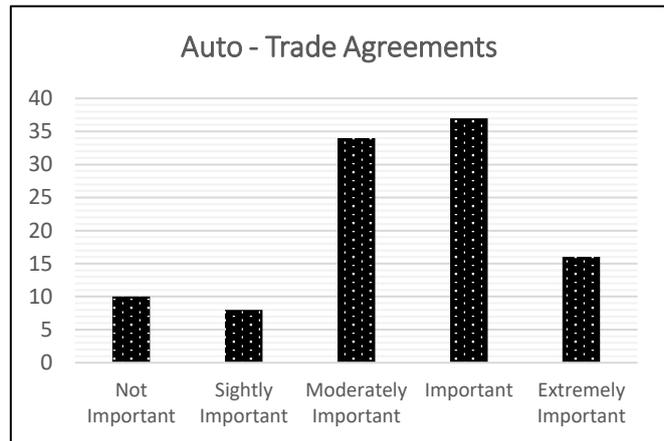


Figure 32: Importance of Trade Agreements (Source: Based on Survey Findings)

to make the value chain global. Cross

border flows of products are highly affected by tariff rates. Ease of trade can be improved through Bilateral or Multilateral Trade Agreements with trading partner nations, although SIAM has a proposed list of sensitive items to be put under negative list in such agreements.

9.4.2. Non-tariff Measures

Engaging in trade means following procedures, practices and documents as laid out by the Government to regulate trade. Procedural norms that majorly constitute the non-tariff barriers include documentation process (for clearances, Customs), licences (Import and Export Licenses), Certification and Standards of Trading Partner Nations, non-trade barriers (like Anti-Dumping Measures, Countervailing Duties) and import quotas or prohibition.

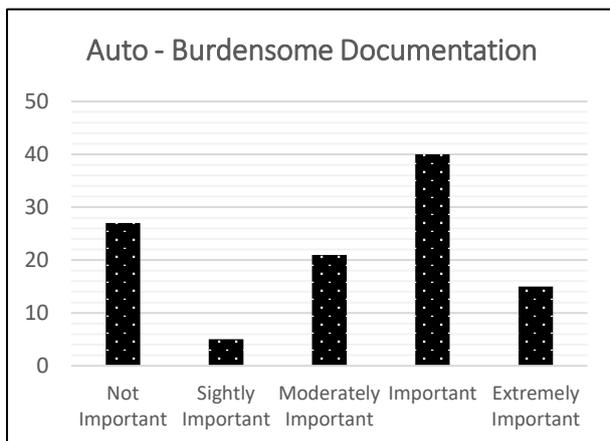


Figure 33: Importance of Customs Documentation (Based on Survey Findings)

Customs clearance formalities at ports requires a lot of documentation, which adds unnecessary complexities, time delays and high costs (agent fees, pick up fees, Bill of Lading fees, cargo filling charges). On an average, it takes roughly 6 days to clear imports from customs and 11 days to clear direct exports through customs at any Indian port for the Automotive Industry which is significantly higher than other comparable

nations. The time taken for same procedures in counterpart countries has been provided in the table below⁶⁵:

⁶⁵ World Bank Enterprise Survey (2014)

COUNTRY	DAYS TO CLEAR DIRECT EXPORTS THROUGH CUSTOMS	DAYS TO CLEAR IMPORTS FROM CUSTOMS
Malaysia	6.3	7.6
Thailand	1.9	6.2
China	7.6	9.4
Singapore	1.2	1.5
India	11	6

Table 32: Turnaround times at ports of entry/exit (Source: World Enterprise Survey 2014)

This has been considered a very important factor for participation by half of the respondent firms, indicating need for change. At present, the standard list of documents filed for customs clearance includes the following:

- (a) Bill of Entry: the legal document filed by the importer that declares the exact nature, quantity and value of the goods that are being imported or exported.
- (b) Commercial Invoice: assessable value of the imported or exported good is based on this invoice that states the market value of goods
- (c) Bill of Lading/Airway Bill: It is the detailed list of cargo carried by the ship/aircraft along with the terms of delivery that is issued by the carrier
- (d) Licenses: Import or export licences as provided by government guidelines. Automotive products are exempt from licences.
- (e) Insurance Certificate: Document for insurance of goods, also acts as a supporting document for the trader's claims.
- (f) Technical Write up: In case of complex goods, a statement on the function and design of the good is required.
- (g) Other documents, if applicable: These include documents when an importer/exporter intends to avail special provisions like duty exemption, import benefit etc. These include industrial license, schemes document (like DEEC/ECGC/Central Excise), Registration cum Membership Certificate etc

There are specific requirements for different commodities which make the process even more cumbersome. Firms desire easy and early clearance of customs dealings, preferably through a one-window approach and e-filing. The industry body SIAM has recommended the reorganization and automation of customs procedures and adoption of electronic reporting and periodic entry. It also wants accelerated clearance procedures (a maximum of 48 hours) for low-risk automotive importers (e.g., conditional clearance prior to arrival).

Other non-trade measures like Anti-Dumping Measures, Countervailing Duties can also create potential problems for participation. However these have been considered as not important by a majority of firms (46.4%), probably because they do not face barriers (Fig 25). Countervailing Duty in lieu of Excise Duty and 2% CESS on all imported automotive items are refunded as CENVAT credit. When the imported input is used for export production,

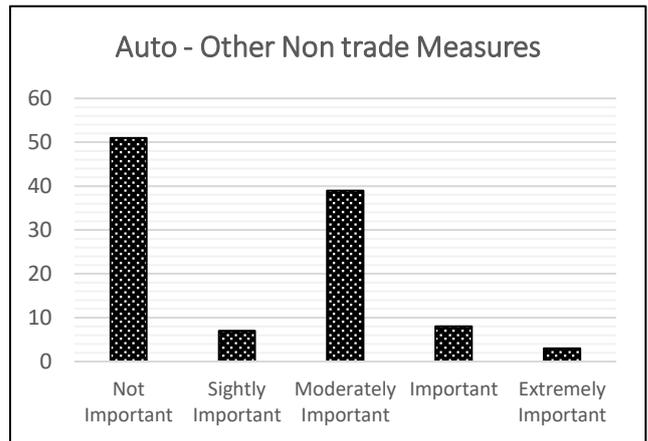


Figure 34: Importance of Non-Trade Measures (Based on Survey Findings)

basic customs duty (BCD) is also refunded as drawback.⁶⁶ However a third of the firms (35.6%) feel that non-trade measures are moderately important. Most of these firms especially feel that anti-dumping duty on basic inputs (raw materials and intermediates) to the industry such as duties on steel and iron products from countries like China, Japan, and South Korea are actually affecting their access to cheaper inputs. This in turn is affecting their input costs and further production.

Other possible non-tariff measures like import quotas and licenses do not seem to affect participation, according to most firms. Automotive trade, according to the Indian Government,

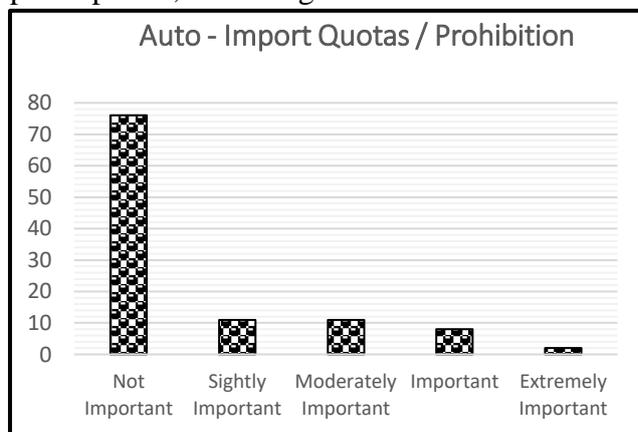


Figure 35: Importance of Import Quotas *Based on Survey Findings)

does not require any licenses and at present, no quantitative restrictions have been imposed. Hence most firms do not feel any impact of such non-tariff measures (Fig 26). SIAM has advocated the adoption of similar practices by trading partners where discriminatory quotas and licensing procedures still prevail. Under the WTO regulations for free trade, member countries should be able to access

relevant information regarding such regulations and practices of other member nations.

⁶⁶ SIAM Notes on Exim Policy (<http://www.siamindia.com/economic-affairs.aspx?mpgid=16&pgid1=26&pgidtrail=29>)

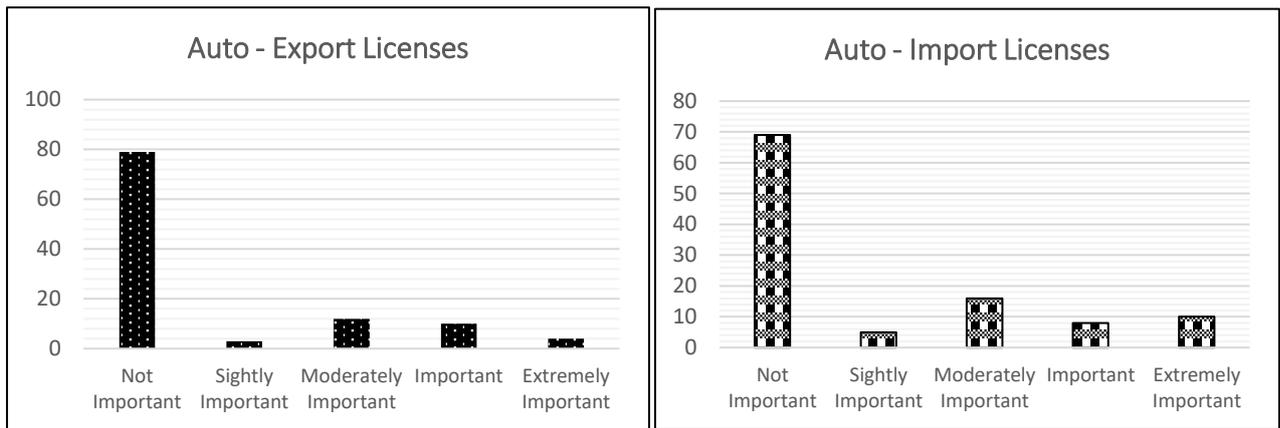


Figure 36: Importance of Licenses (Based on Survey Findings)

Since the automotive industry has strong preferences for standards, firms are expected to meet the standards set by trading partners and their industries. More than half of the firms consider this a very important factor for participation in Auto GVCs, which is in tandem with the prominence of standards in the sector.

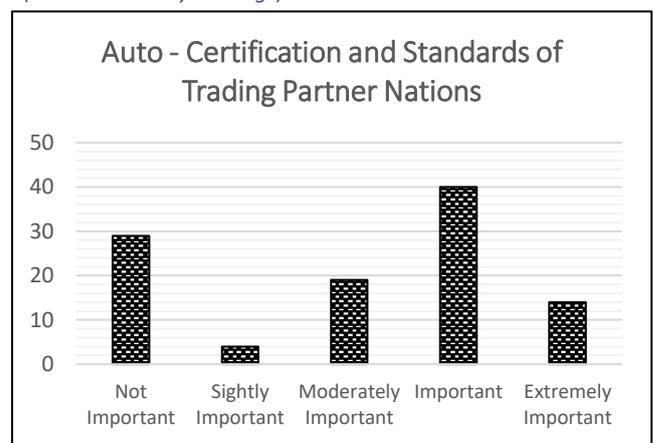


Figure 37: Importance of Standards of Trading Partners (Based on Survey Findings)

A1.5. FINANCIAL FACTORS

Financial Factors are related to various facets of financial resources and expenditures that are associated with conducting business. These include availability, ease of access, quality and quantity of finance for participating in GVCs, tax rates, access to foreign currency, exchange rates, and investment environment.

9.5.1. *Credit*

Credit (Loans) is an important input for business and ease of access to finance is the most important financial factor that affects participation in Automotive GVCs. Finance is available through formal channels of commercial banking as well as informal credit sources. The formal source of credit is usually more reliable and cheaper but requires extensive paperwork on information about the firm and collaterals, which many firms (mostly SMEs) find difficult to obtain/meet.

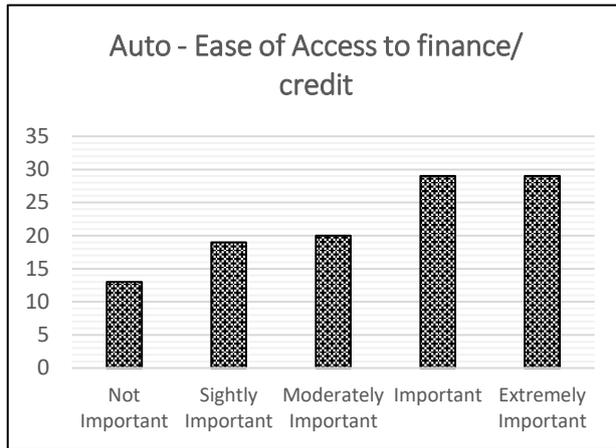


Figure 38: Importance of Ease of Access to Finance (Source: Based on Survey Findings)

The financial creditors are normally predisposed to lend to firms with good credit history and first time applicants usually find it harder to get higher corpus of loans at competitive rates. Hence the process of obtaining credit and the cost of credit has been deemed as a deterrent to participation by most firms (Fig 4). Smaller firms that do not have easy access to credit desire government intervention in the

matter, for instance through direct financial assistance, directives to public sector banks for priority lending to SMEs, allowing SME cohorts to apply for joint loans etc.

The general investment climate in an economy also affects participation as it defines the quality and quantity of capital accessible to businesses. The Auto sector in India is quite an open sector in terms of flow of foreign investments. 100% FDI is allowed under the automatic route (subject to applicable regulations and laws) and automatic approval for foreign equity investment up to 100% with no minimum investment criteria is present.

Government and domestic private investments are also important elements of the investment climate. Respondent firms are divided between not important (34.5%) and important (36.4%) with respect to the investment environment as a determinant of participation.

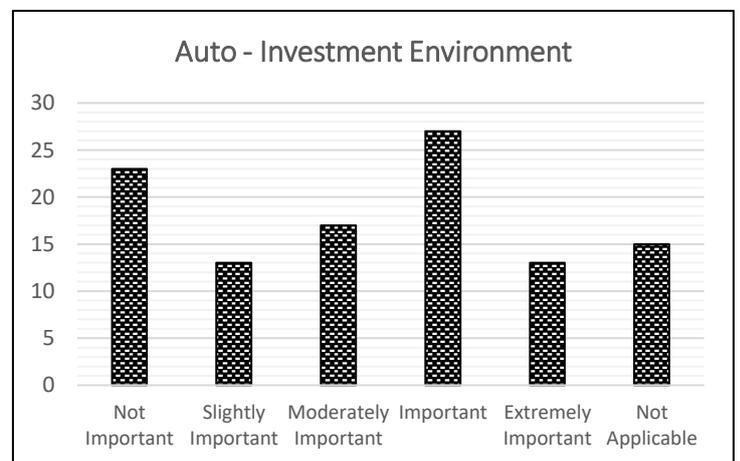


Figure 39: Importance of Investment Environment (Based on Survey Findings)

9.5.2. Costs

The cost of doing business refers to the operating costs involved in running the firms and participating in GVCs. This includes operational expenses (procurement, logistics, manufacturing costs), taxes, labour (salaries, compensation, skilling), R&D etc.

The high cost of doing business adversely affects participation in GVCs as firms tend to focus

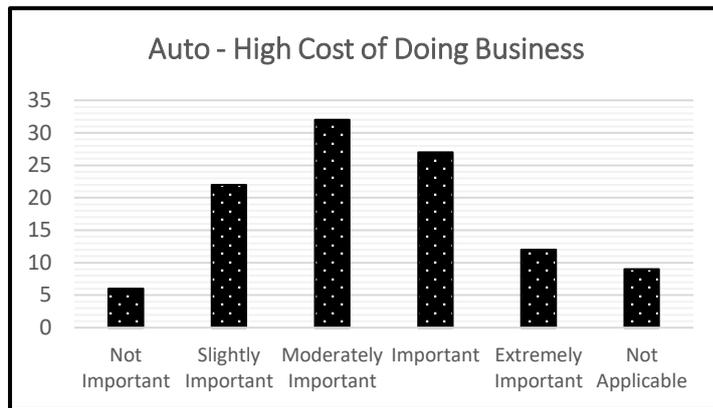


Figure 40: Importance of High Cost of Doing Business (Source: Based on Survey Findings)

on survival instead of adopting measures that enable them to integrate into GVCs. An alternate impact might be that firms learn to be cost-effective and operate at lower costs. A majority of firms (35.7%) felt this was important while another 30% felt this was moderately important. (Fig 31)

A follow-up question to gauge the degree of costs involved in doing business was posed. Since cost data is highly classified by firms, especially the unlisted ones, respondent firms were asked to indicate the range of costs under various operational cost heads as a percentage of their total operational costs. Information provided by the listed firms was crosschecked against information in the Prowess Database and company annual reports, wherever available. Since most of the respondent firms were un-listed, data on costs was not available in the public domain.

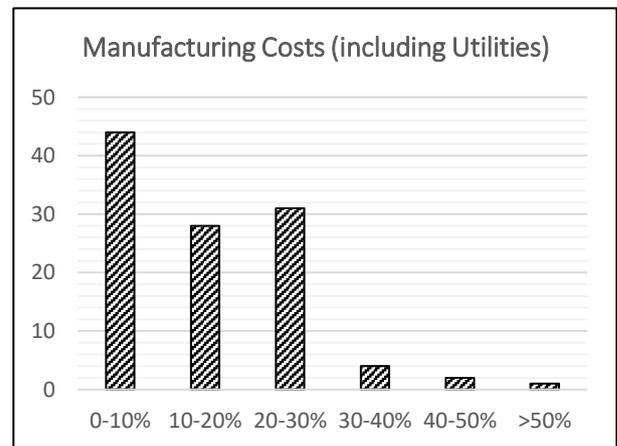
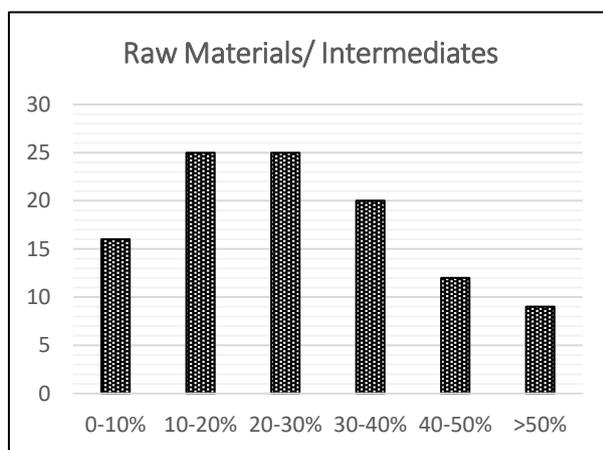


Figure 41: Various Operational Costs for Automotive Firms (Source: Based on Survey Findings)

The highest cost incurred by most firms was for raw materials or intermediates that were direct inputs for production. Usually the input costs were in the range of 10-30% but a few firms reported this cost as being more than 50% of the total operating costs. This cost is highly dependent on global commodity prices and exchange rates since a lot of firms depend on imports for their inputs. The past few years have witnessed high prices for raw materials, and subsequently for intermediates. The next significant cost is manufacturing costs which included

the costs associated with production like cost of spares consumed, utilities (power and fuel), and maintenance of plant and machinery. These ranged up to a third of the total operating costs for most firms.

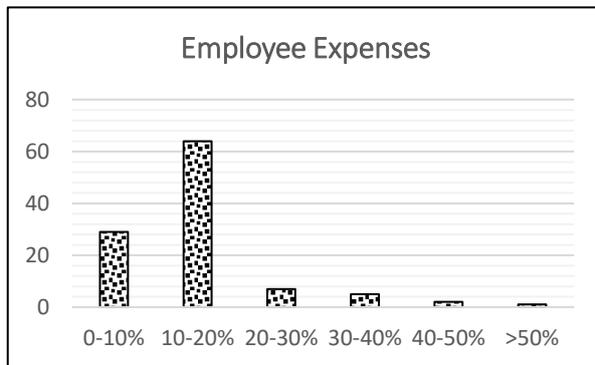


Figure 42: Employee Expenses (as % of Total Cost)(Source: Based on Survey Findings)

Employee expenses were the next most important cost item. This included the cost of hiring, salaries (wages), compensation, insurance and training & skilling. Firms typically spend around 10-20% of their total operating cost on employees. Although India still has cheap labour compared to other nations, employee expense is poised to rise in the near future

owing to the rise in minimum wages (in accordance with Minimum Wages Act), rising scarcity of skilled labour and need for more training and skilling.

Transport and Logistics accounted for upto 10% of the total operating costs for majority of firms. These included freights (road, rail, ocean, air) freights, distribution costs and investment in resource planning systems. Though transport costs might account for a low share of the total operating costs, there is still scope to further reduce it. Roads are considered to be the most expensive mode of transport in the country owing to rising fuel prices, poor conditions and relatively long distances of firms from the port of landing. But road transport is indispensable as it provides last mile connectivity and other forms of transport have very little coverage. Introducing dedicated freight corridors will reduce both time and cost of transport even further, thereby lowering overall costs.

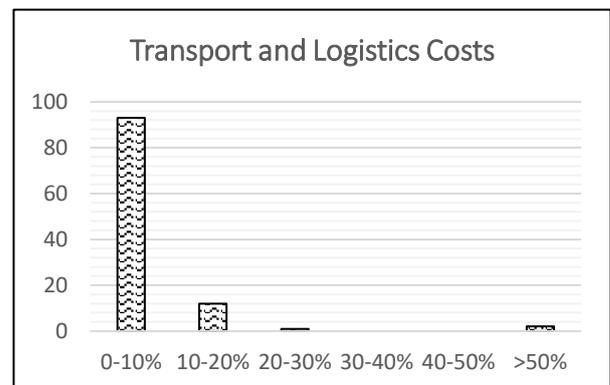


Figure 43: Transport and Logistics Cost (as % of Total Cost)(Source: Based on Survey Findings)

For instance, at present, a 40 feet fully loaded container (weighing around 25 tonnes) of automotive parts from Shanghai, China to Chennai, India costs approximately US\$ 720-795 (Rs 48,240 – 53,265), averaging roughly around Rs 2000 per tonne.⁶⁷ Truck charges per tonne

⁶⁷ Calculated from World Freight Rates Calculator (worldfreightrates.com/freight)

between Chennai and New Delhi roughly are around Rs 3,375 – 3500.⁶⁸ The railway freight per tonne is around Rs 950 (around Rs 1100 with busy season surcharge)⁶⁹ for the same distance between Chennai and New Delhi.

The most important expenditure for future investment is that on Research and Development (Fig 35). Firms need to invest in R&D to remain competitive in the market. OEMs most typically spend the highest amounts on R&D for innovation in products and processes. Majority of the firms had very little investment (0-5% of total operating

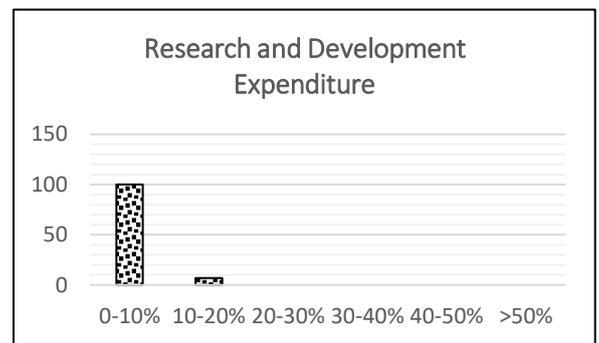


Figure 44: R&D Expenditure (as % of Total Costs) (Source: Based on Survey Findings)

costs) in research, which is an indicator of the need for more proactive action to encourage more investment in R&D. One possible way is to create mechanisms for joint research and sharing of costs. The Government has also introduced measures to promote R&D in form of tax deductions. For instance, tax deduction for expenditure (capital and revenue) towards scientific R&D has been granted. Similarly, weighted deduction of 150 % is approved to assessees for any amounts paid towards a scientific research program by a national laboratory, university or institute of technology. For firms engaged in in-house R&D, concessional excise and customs duty are available for certain products. Such moves can help reduce R&D costs and increase the returns on investment for R&D.

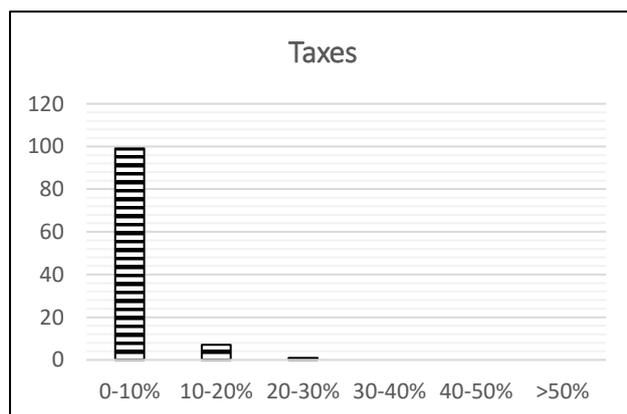


Figure 45: Taxes (as % of Total Costs) (Source: Based on Survey Findings)

Taxes also contribute to operational costs. There are various direct and indirect taxes that firms face including Customs Duty, Excise Duty, Value Added Tax (Central and State), Service Tax etc. These constitute about one-tenth of the total operating costs for almost all firms. A SIAM and ICRA study (2003) in Maharashtra and Tamil Nadu had assessed the amount of embedded tax in

manufacturing costs was around 12% and was making Indian automobile exports less

⁶⁸ From freightratesindia.com

⁶⁹ From Ministry of Railways, Government of India

competitive in international markets. Follow up questions on importance of tax rates and the incidence of various taxes faced by firms has been asked to gauge the impact of taxes in participation.

Tax rates were considered as slightly to moderately important by majority of firms (61%) (Fig 37), probably because (a) taxes are a relatively lower share of total expenses (b) location-wise incentives (like tax breaks or subsidised taxation by state governments) might be available to these firms.

The responses to the rates of various taxes faced by firms revealed the following picture (Fig 38):

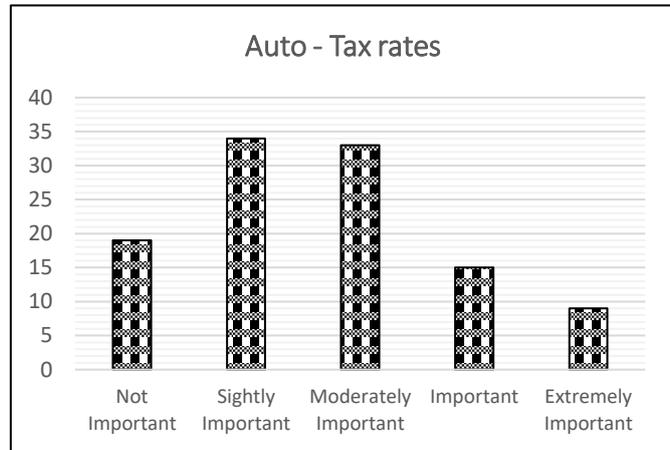


Figure 46: Importance of Tax Rates (Source: Based on Survey Findings)

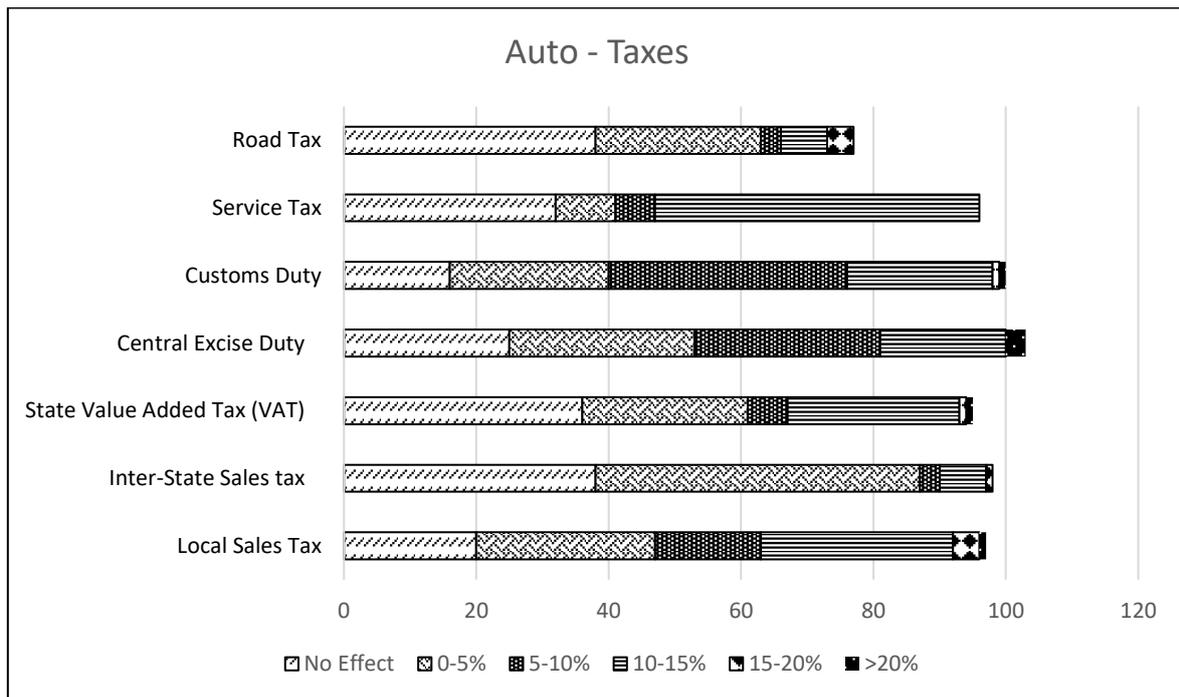


Figure 47: Incidence of Tax Rates for Automotive Firms (Source: Based on Survey Findings)

The highest tax incidence is for the Customs Duty (at 125%) but few firms are affected by this rate. For the majority of firms, the Customs Duty faced is between 5-10% as these are mostly auto components importers. The Central Excise Duty is yet another significant tax that has the maximum incidence between 5-10%.

Vehicle Category	Excise Duty
Small cars	12.50%
Length >4m but engine capacity less than 1500cc	24%
Length >4m and engine capacity more than 1500cc	27%
SUVs/MUVs (length >4m, engine capacity >1500cc and Ground clearance >170mm)	30%
Hybrid cars	12.50%
Specified components of Hybrid vehicles	6%
Electric cars, Buses, 2W & 3W	6%
Specified components of Electric vehicles	6%
Buses	12.50%
Trucks	12.50%
Three wheelers	12.50%
Two wheelers	12.50%

Table 33: Excise Duty on Automobiles (Source : SIAM)

Service Tax and Local Sales Tax have the highest incidence at 10-15% and are probably a major share of the tax burden on firms. Road tax and inter-state sales tax do not seem to have any major impact on most firms.

With the advent of the Goods and Services Tax (GST), the distortions due to different sales tax rates in different states and the complexity of inter-state sales tax will be done away with. According to SIAM and ACMA, there are concerns about GST tax rates, implementation details and input tax credit procedures. For instance, the auto industry would like to witness a uniform rate of tax for completely built units and components (inputs) against which input credit can be claimed. Similarly, a common base for Central and State GST would help avoid cascading of taxes, unlike the present system where states taxes (like sales tax) are levied on central taxes (like excise duty). Special incentives provided by states should also be secured under GST.

If novel approaches of reducing costs of operations like the input and manufacturing cost, transport costs and tax rates can be discovered and adopted, it will give a huge advantage to auto firms in India for being cost-competitive globally.

A1.6. TECHNOLOGICAL FACTORS

The Automotive industry is highly technology-intensive. *Technological Factors* are related to technological needs that include factors like Research and Development (R&D), access to existing latest technology and technology transfer restrictions.

The importance of Research and Development (R&D) as perceived by the respondent firms shows a bimodal response (Fig 39). A large proportion of firms (29.1%) do not feel that investment in R&D is an important factor for participation. Almost all of these firms are Tier-3 and Tier-2 component makers. They probably do not feel R&D is important because their products are highly standardized and do not require much innovation or adaptation. These products are made from drawings provided by Tier-1 suppliers and OEMs, are mass-produced and volumes are targeted for achieving economies of scale.

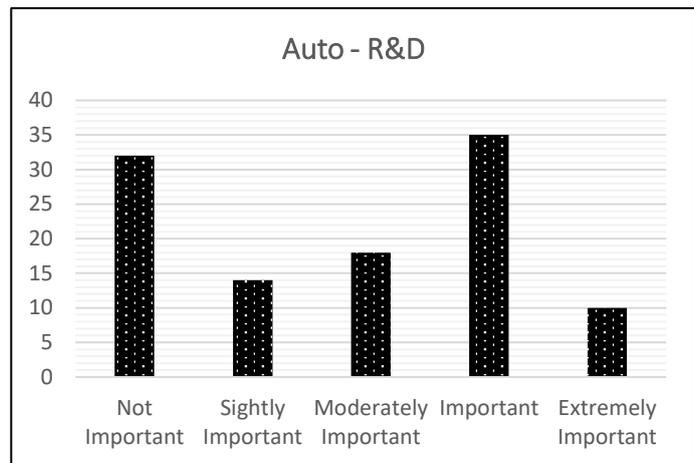


Figure 48: Importance of R&D (Source: Based on Survey Findings)

Tier-1 suppliers, however, have to work very closely with the OEMs in order to manufacture customized parts or sub-systems. Since these systems are often quite complex, these require quite a bit of innovation and adaptability to produce the best quality products at minimum possible cost and time. These suppliers either have access to OEMs' in-house R&D facilities or have to develop their own R&D setup in order to qualify as a supplier to any major OEM. Several major Tier-1 suppliers like Bosch and Cummins have their captive R&D centres while software companies like Caterpillar, Continental, Microsoft, AMD and Honeywell provide R&D services to the auto industry.

OEMs, on the other hand, always have to invest a lot in R&D for their products as there is pressure from the markets for rapid turnaround of products (product lives having been shortened to 4-5 years and new products have to be launched every 1-2 years) and high quality products. Being the brand owners, their entire supply chain is dependent on the OEMs as their designs and expectations decide the nature of products upstream. R & D also minimizes the future cost of production (Das, 2012)⁷⁰.

⁷⁰ Subhrabaran Das, Piya Das (2012), Asian-African Journal of Economics and Econometrics

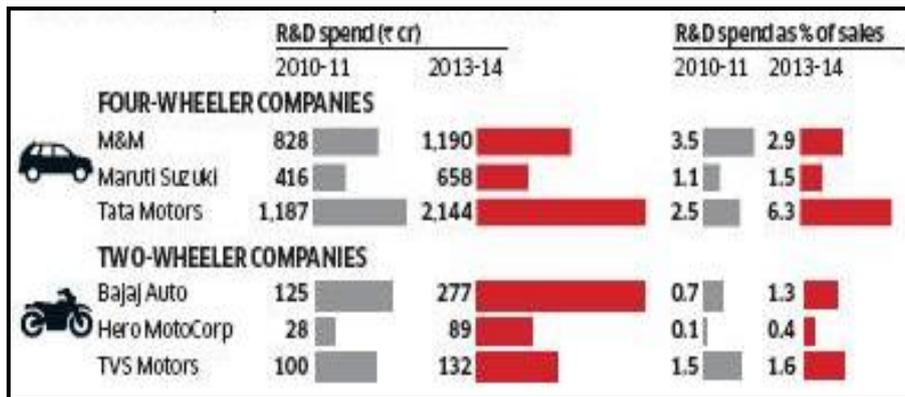


Figure 49: R&D Allocation for Domestic OEMs (Source: Economic Times)

Worldwide, automakers are the largest investors in R&D with figures of investment touching US\$102 billion annually in 2015. Most major global OEMs have their R&D Centres in India and the R&D allocations per annum are increasing every year. While most foreign OEMs have deeper pockets and excellent research bases back home, the domestic OEMs are not far behind in developing their home grown ecosystem for research.

R&D in the automotive sector is usually categorized into three kinds of activities: fundamental research; designing and engineering of a new vehicle model, and development (including

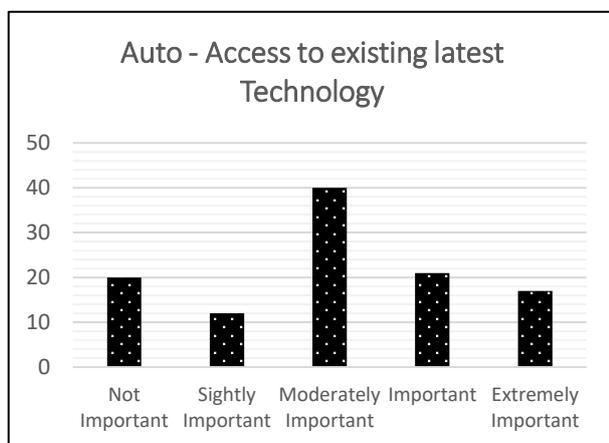


Figure 50: Importance of Access to Technology (Source: Based on Survey findings)

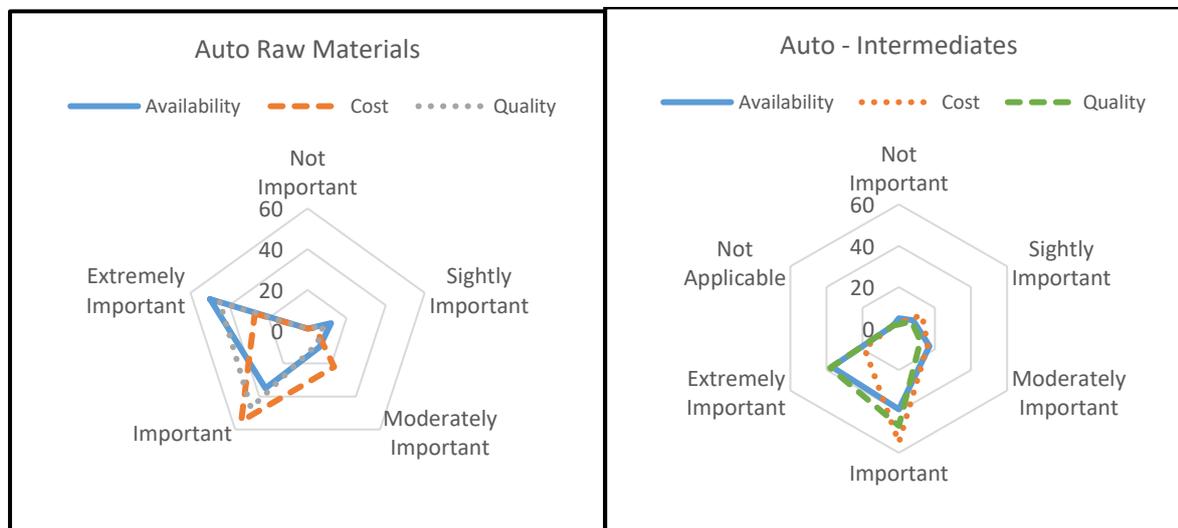
testing and data analysis). India is a preferred destination for the last type of activity, though designing and engineering is also gradually gathering momentum. There is huge scope for very high value addition to be performed in the R&D segment but that requires higher allocations, a co-research ecosystem involving lower tiers and a wholesome research-oriented environment in the country.

A1.7. INPUT RELATED FACTORS

Input related factors are concerned with the various inputs essential for making a firm efficient and competitive so that it performs or plans to perform well in a global value chain. These include inputs like labour, raw materials/intermediates, technology, basic infrastructure, etc. that might be affecting participation in GVCs. The Quality, Delivery and Cost (QDC) criteria

for inputs is a very well-known metric in supply chains. Firms were asked to rate the QDC aspect of major inputs for participation in GVCs.

9.7.1. Raw Materials/ Intermediates



The quality, cost and availability of raw materials/intermediates are of primary importance to manufacturing firms as they ensure the quality and cost of the output. This can be a major source of competitive advantage to firms that deliver high quality products at lowest possible cost. While all three aspects of the inputs are important, the availability of raw material and intermediates has been deemed extremely important by majority of firms. In case of quality concerns, firms are also affected by counterfeit parts in the market.

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Export	303	427	526	614	685	709
Growth rate(%)	60.3%	40.9%	23.2%	16.7%	11.4%	3.5%
Import	497	667	744	771	829	906
Growth rate(%)	38.1%	34.2%	11.5%	3.6%	7.5%	9.3%

Table 34: Imports and Exports in the Auto Components sector (Source: ACMA. Figures in INR '00 Crores)

A substantial portion of these inputs is still met by imports, which is a case of concern for value addition in the country (Table 30). The components imports have outstripped exports for several years now. There is huge scope in the components industry to increase value addition in the country by improving capacity utilization, quality standards and R&D competence.

9.7.2. Labour

Labour is one of the most important inputs to value addition and also the leading source of comparative advantage for India. Labour in India is abundant (owing to the demographic

dividend) and is considered cheap as compared to the rest of the world. But Automotives is a skill-intensive industry; hence the quality of labour is also an important criterion for firm performance. The firms rated the availability, quality and cost of skilled and semi-skilled labour as important factors for participation in Automotive GVC.

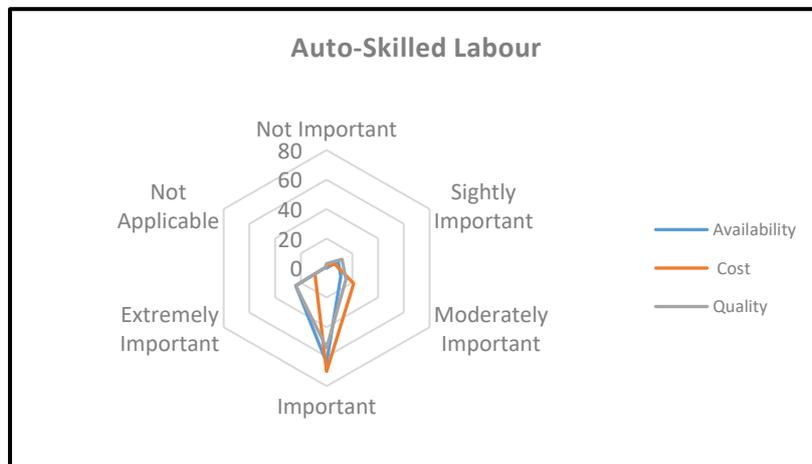


Figure 51: Importance of labour in Automotive GVC participation (Source: Based on Survey Findings)

On a scale of 0-7 (with 7 being most important, 1 being Least Important and 0 being No Impact), most of the firms ranked labour-cost, labour-availability and labour-quality a very high six for Labour Availability and Labour Quality while a five for Labour Cost. This

signifies that firms want more labour and of better quality even if the labour cost is negotiated.

As the Automotives sector is highly technical and skill-intensive, it requires a high volume of skilled workers who can handle the intricate processes. A report by the National Skill Development Corporation (NSDC)⁷¹ has cited the need for nearly 15 million (1.5 crore) directly employable people by 2022 in the automobile sector. According to this report, currently 19.1 million people are employed in the Indian automobile sector directly or indirectly. This includes manufacturing in OEM, auto components, raw material factories, automobile dealers, service centres and other enabling sectors. Although India boasts of a vast labour force, this demand for skilled labour is already exceeding the supply.

Ease of access to labour market and Labour Laws are the other important Labour-related factors that have affected participation in Automotive GVCs. Most firms prefer to locate themselves in regions or locations where they have easy access to the labour force of skilled and semi-skilled labour. This is one of the primary reasons for this industry to mostly operate out of clusters. Clusters provide positive externalities in the form of a common labour pool, which similar firms can dip into. Thus there are several advantages – (a) access to a large pool of specialized labour and varied skills which come handy since most firms do not know what

⁷¹ National Skill Development Corporation (NSDC) Report 2013-17, 2017-22 (<http://www.nsdcindia.org/sites/default/files/files/Auto-and-Auto-Components.pdf>)

kind of labour skills they need in the future, (b) knowledge spill-over occurs when workers from different firms interact informally and (c) there are considerable savings in terms of lower costs of recruitment, reduced training and low relocation costs (since workers already live nearby)

For India which considers itself labour-intensive and labour as a rich resource, the quality and availability of labour are also perhaps not at par with the expectations of the industry. If labour laws are proving to be a major deterrent to the participation of firms in India in Global Value Chains for both sectors, then a closer look at Labour and Skilling Policies is imperative.

9.7.3. Technology

Being technology-intensive sectors, the availability, cost and quality of technology is a major determinant of GVC participation of firms. The Automotive industry has constantly evolved in terms of both present as well as future technology. For instance, gearless vehicles have been around for quite some time now, typically in higher-end models. But adapting the technology (automated manual transmission) for mass segment vehicles (like hatchbacks) is an innovation in its own right. On the future front, electric & hybrid vehicles, smart cars, driverless cars, etc. are some of the most advanced R&D projects currently being pursued by all major vehicle manufacturers. Quality and Availability of Technology is deemed as extremely important criteria for automotive firms for participation in GVCs.

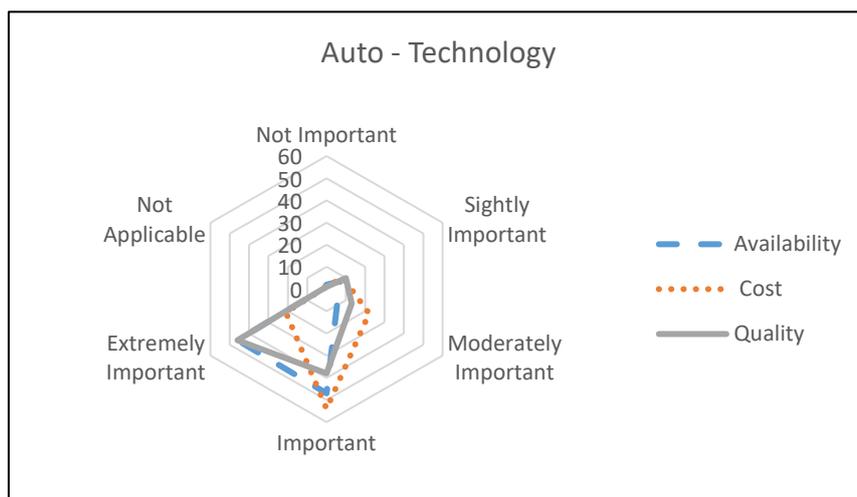


Figure 52: Importance of Technology for Participation (Based on Survey Findings)

Developing technological capabilities of firms is not dependent only on R&D spends or in-house facilities. It can also be achieved through technology transfers (by importing technology using foreign licences). Technology transfer enables access to latest technology that firms may not be able to develop first hand and can be a vital first step for building skills and internal capability for furthering R&D prospects in future. Most Automotive respondent firms feel that access to latest technology is moderately important for participation (Fig 46) while technology transfer restrictions are not important as the firms are either not involved in any major technology transfers or probably do not face any major restrictions, when they are involved.

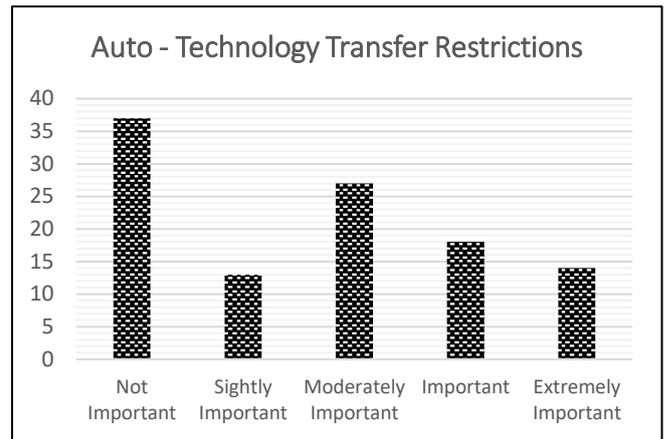


Figure 53: Importance of Technology Transfer restrictions (Based on Survey Findings)

9.7.4. Basic Infrastructure

Basic Infrastructure such as land, transportation and connectivity (roads, ports, and airports), utilities (electricity, water) and communication (telephones, internet) is the foundation pillar for establishing firms in any location. Providing healthy basic infrastructure ensures firms do not spend valuable resources in developing basic infrastructure unnecessarily; rather they utilize these resources for achieving greater productivity.

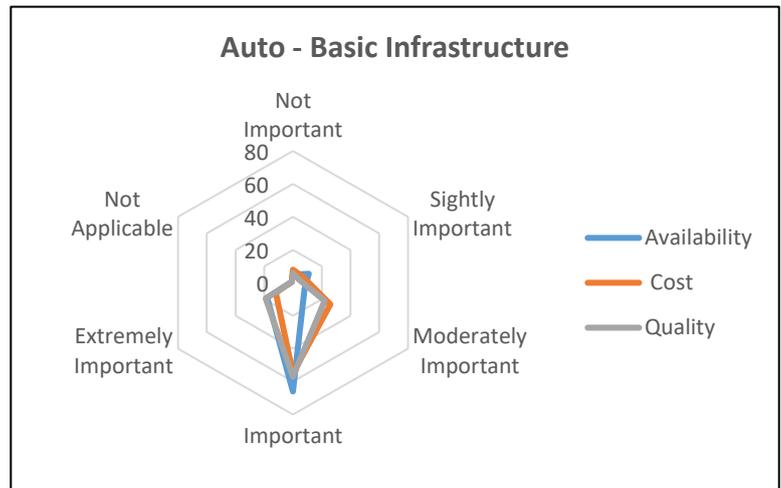


Figure 54: Importance of Basic Infrastructure for Participation (Source: Based on Survey Findings)

While majority of the firms rated all three aspects of basic infrastructure as important, most firms also feel that this has been a challenge in the country. The poor condition of roads, lack of adequate rail connectivity, long turnaround times at ports, challenges of 24x7 power and water are some of the important factors that have raised costs and affected the productivity of firms. The government has decided to improve the quality of basic infrastructure in the country.

For instance, the budgetary allocation for road infrastructure, schemes like Dedicated Freight Corridors and the Pradhan Mantri Gram Sadak Yojana, revitalization of the state power discoms through the UDAY scheme, and for developing waterways as an alternative mode of transport, has been increased.

9.7.5. Inventory Management

In the era of advanced inventory management systems like Just-in-Time (JIT), inventory is handled as a valuable resource.

Efficient inventory management, through optimization and communication, determines firms' ability to overcome supply-side shocks, meet customer expectations and operate profitably. Most firms have rated availability and quality of inventory management as extremely important while cost has been rated important. For quick turnaround times, reduced costs and proper handling of inputs, inventory management is of paramount importance.

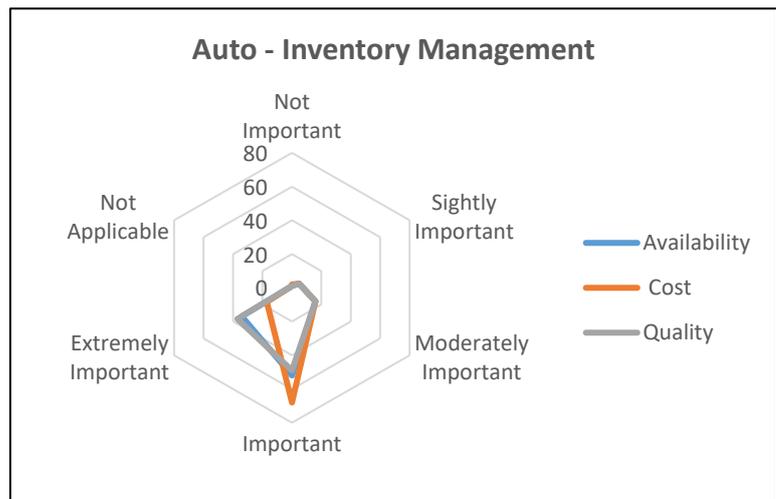


Figure 55: Importance of Inventory Management (Source: Based on Survey Findings)

ANNEXURE 2: FIRMS' PERCEPTION OF SIGNIFICANT FACTORS – DIRECT AND PARTIAL PARTICIPATION

In the main paper, PCLR provided insights into how broad factors (determined by PCA) affected participation in sectoral GVCs, giving a sense of the direction (positive or negative) and the relative impact on the odds of participation. Since the use of PCA abstracted away information regarding individual factors affecting participation in automotive GVCs that were contained within the survey questionnaire, this section has been included to provide insights into how firms responded to these individual factors that were ascertained as significant in the logistic regression.

Here the firms' responses to the individual factors that constituted the significant principal components in PCLR are outlined. These reactions of the respondent firms to the survey questionnaire have been categorized according to the status of the firm – Participant and Non-participant in GVCs. In the Participant category, both direct participants (firms that both import and export directly) and partial participants (firms that enter GVCs by exporting only) have been included. These include 42 firms importing inputs and manufacturing components in India for both domestic and international markets (direct participants) and 18 firms manufacturing components in India and exporting to foreign markets as well (partial participants).

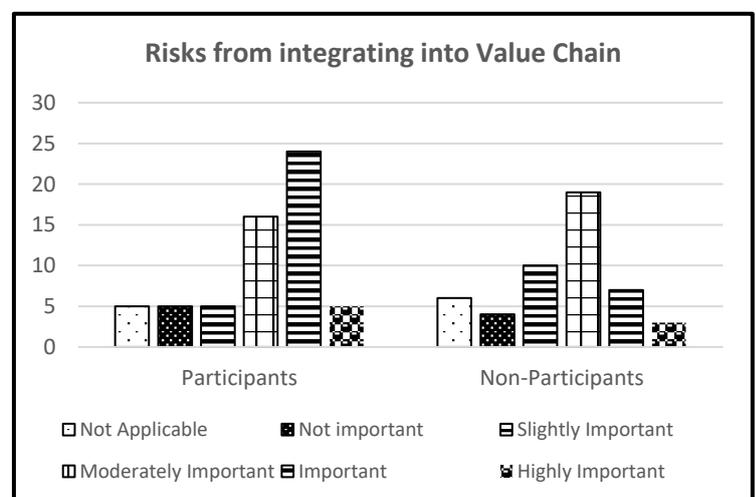
This is an extension of the original definition used in the paper (Section 5.3) in order to examine what factors affect partial participants as well and what possible remedies can be suggested to enhance such participation. In other words, this section provides insights into the firms' perceptions of their side of the story regarding the facilitation, challenges and opportunities that the firms face for participation in auto GVCs.

A2.1. INSTITUTIONAL FACTORS

1.1. RISKS FROM VALUE CHAIN

Global Value Chains operate internationally, so integration into GVCs means effectively participating in the international markets. This comes with a fair share of risks like increased vulnerability to vagaries of global markets and meeting global standards in

Fig 56: Importance of risks in GVCs for participation (Source Based on Survey Findings)



terms of quality, reliability, price and delivery

schedules. In addition, participating in GVCs might not automatically translate into better opportunities and scope for business expansion. The cost of participation might undermine the benefits thence derived. Different firms are affected differently according to their size and sectors.

Most participant automotive firms (40%) felt that these risks were important while about a third (38%) of non-participant firms felt this was moderately important (Fig 1). This could be because – (a) participant firms face these risks first-hand and are aware of the challenges that GVCs pose; and (b) firms higher up the value chain (OEMs and Tier-1) have higher risks (owing to higher degree of exposure in terms of value) while most firms in the lower value added tiers are not as exposed.

1.2. COMPETITION INTENSITY IN VALUE CHAINS

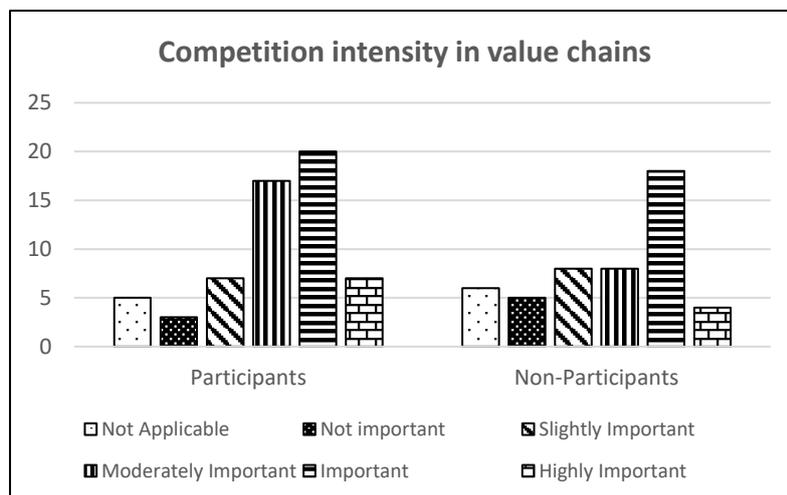


Figure 57: Importance of Competition Intensity of GVC (Source: Based on Survey Findings)

The Auto industry is highly competitive. Competition to join GVCs is as fierce as the competition to survive and flourish within the auto GVCs. Participant firms pose a major challenge to firms aspiring to become participants of auto GVCs.

Less value-addition segments operate on very thin margins and therefore firms have to stay economical in order to survive within the chain. Firms in higher value-addition segments need to stay technologically advanced, innovative and relevant in order to face their competitors. Any comparative advantage that can be garnered is a way of staying ahead in the race.

Firms face competition in upgrading along the chain as well, not only from aspiring co-upgraders but also from existing members in that segment. Often, intense competition is a deterrent for participation as firms may not be well equipped to handle such competition; a fact reflected in the responses of both participant (45%) and non-participant firms (37%) who felt that competition intensity of GVCs was a factor affecting participation. In global value chains,

the competition is not only from domestic firms but also from global counterparts. Hence a firm needs to be prepared to handle international standards that are less lenient.

1.3. STRUCTURE OF VALUE CHAINS

The equation between various players in the value chain is essential for determining the power structure and governance within a value chain. Decisions regarding what, how and how much to produce are often taken by the most influential player in the value chain and that determines the structure of the chain.

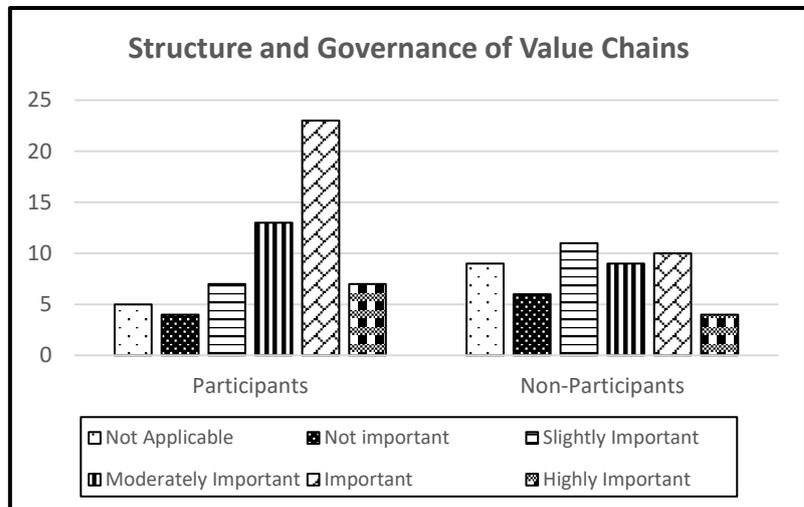


Figure 58: Importance of Structure of Value Chains for Participation (Source: Based on Survey Findings)

Most participant firms (50%) felt

the structure of the global value chain was important as it determined the context within which they had to operate (Fig 3). Usually OEMs (and sometimes Tier 1 suppliers) being the lead firms exert a lot of influence in determining the nature of their value chain; hence they felt this was important. For the non-participant firms (mostly smaller firms in lower tiers) that were eager to join or perform in global value chains, the importance of the structure of VCs was evenly distributed between slightly important to important.

1.4. INVESTMENT ENVIRONMENT

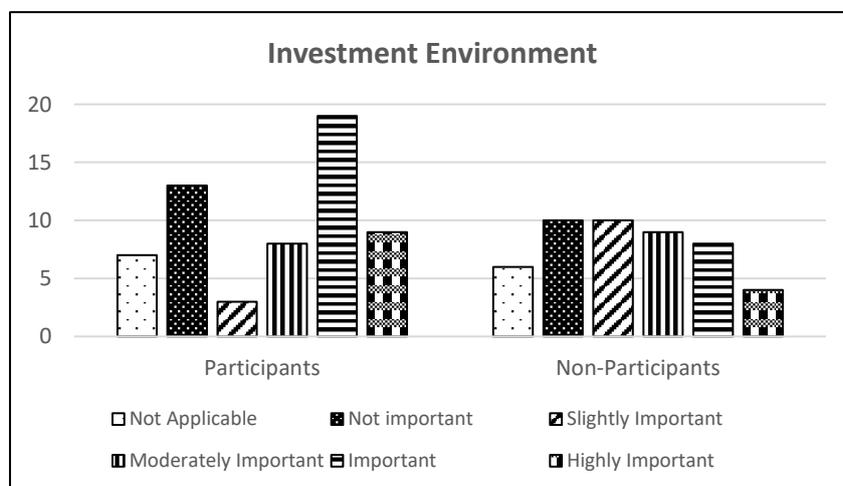


Figure 59: Importance of Investment Environment (Based on Survey Findings)

Government policies combined with industry performance and market conditions determine the general investment environment of an economy. It defines the quality and quantity of capital accessible to businesses.

The Auto sector in India is quite an open sector in terms of flow of foreign investments. 100% FDI is allowed under the automatic route (subject to applicable regulations and laws) and automatic approval for foreign equity investment up to 100% with no minimum investment criteria is present. While the majority of participant firms (46.6%) felt that investment environment was an important - extremely important factor, non-participant firms seemed to be divided in their opinion regarding the importance of this factor as a determinant of participation (Fig 4).

1.5. OWNERSHIP RESTRICTIONS

Ownership restrictions are often put in place by Governments to regulate the nature of flow of foreign investment and protect possession of national resources like companies and land. The Auto sector in India does not impose any such restrictions yet on FDI and wholly owned subsidiaries of MNCs are allowed.

This is reflected in the responses of the participant firms, majority of whom opined that this was not applicable or not important (40%). The non-participant firms, however, were divided in their opinion regarding the importance of this factor (Fig 5). Some of the non-participant firms went ahead and expressed the desire for such a restriction to be put in place as they felt firms with foreign ownership had an added advantage of easier access to foreign technology and markets that made entry into GVCs relatively easier.

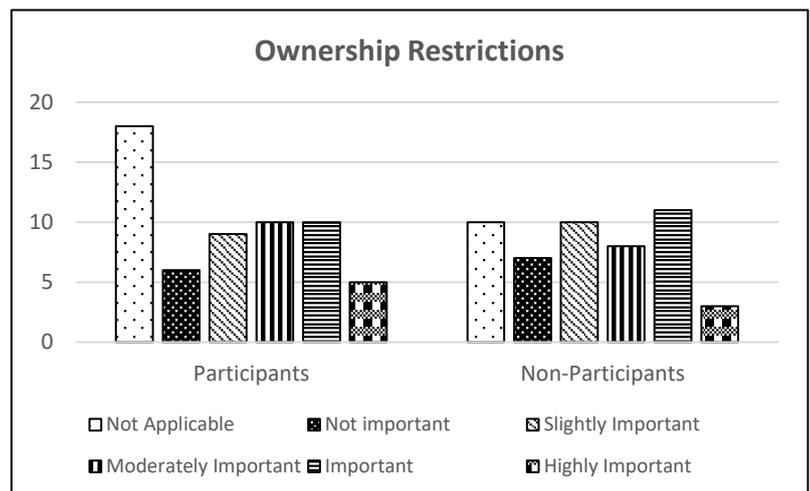


Figure 60: Importance of Ownership Restrictions (Source: Based on Survey Findings)

1.6. PUBLIC INSTITUTIONS

Firms have to interact with executive, legislative and judiciary institutions like bureaucracy and the courts in the course of their business. Efficacy and effectiveness of public institutions in an economy is an important determinant of the type of business climate in the nation. To gauge the how important these public authorities were affecting firms' participation, general questions on the efficiency and transparency of public institutions were posed to the respondents.

Transparency of a public institution refers to the openness, clarity and dependability with which public authorities function while efficiency refers to the speed, simplicity and accuracy with which these institutions deliver their avowed services. Since businesses operate within regulatory frameworks where the role of the public authorities can at

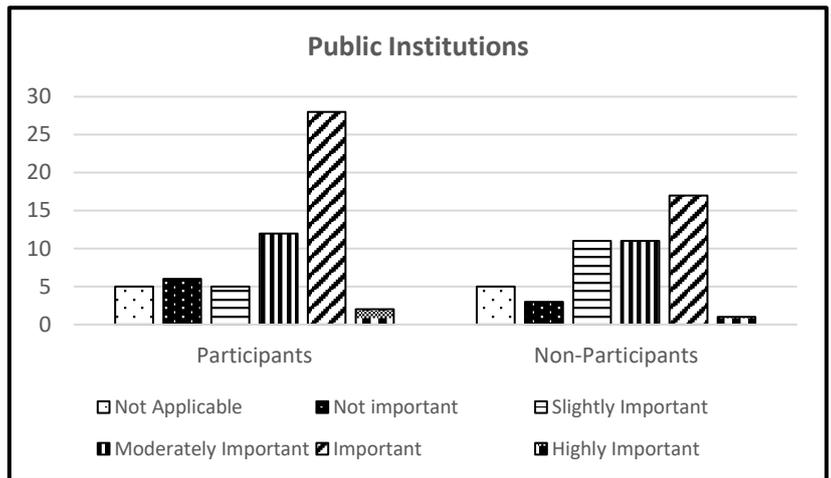


Figure 61: Importance of Transparency of Public Institutions (Source: Based on Survey Findings)

times assume very high significance, most participant firms (46.67%) felt that this was an important factor for participation (Fig 6). A majority of the non-participants (36%) also felt that public institutions had an important role in aiding or deterring GVC involvement. Public institutions need to be organized, predictable, open and accountable in dealings; only then can they incite confidence in them.

1.7. BUREAUCRATIC REDTAPE

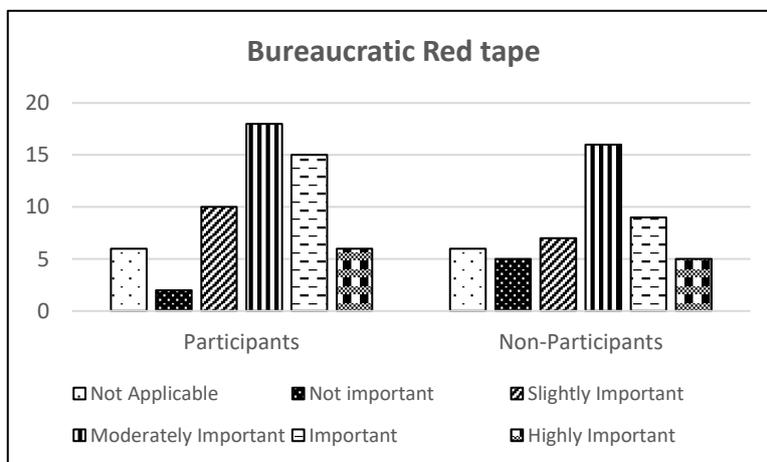


Figure 62: Importance of Bureaucracy for Participation in Automotive GVC (Source: Based on survey Findings)

Businesses in India have to comply with various bureaucratic procedures for set-up, operations, sale and trade. Policies of manufacturing, standards, trade etc are implemented through the bureaucracy, hence firms have to deal with the bureaucratic setup at several points in their lifetime.

As a result, this factor potentially could be a determinant of participation in GVCs. According to the responses (Fig 7), most of the respondent automotive firms (both participants and non-participants) felt that bureaucratic red-tapism was at best moderately important (nearly one-third each). Most firms felt that the government (especially the state governments) have proactively taken measures for speedy execution of approvals and clearances in order to encourage industrialization. Since a majority of these measures are being implemented online,

there has been a marked improvement in the speed and transparency of execution. Several procedures have been organized online (like e-filing, e-approvals) and dedicated cells for handling specific requests setup in order to facilitate businesses. For instance, the state governments where the auto clusters are located have e-Governance policies to facilitate not only Citizen-centric services but also Government to Business (G2B) services. The absence of the general sentiment that bureaucracy was indispensable for business is welcome news for participation as it indicates that the business environment in the country is not highly controlled by red tape or needless officialdom.

1.8. DISPUTE RESOLUTION MECHANISMS

Dispute resolution mechanisms assume high importance in the Automotive industry as a lot of business collaborations in the form of joint ventures, contracts, crossholdings etc. take place.

Additionally, a lot of innovation is demanded by the sector that gives rise to intellectual property rights. Sometimes there are tax-related issues (domestic and trade related) between firms and the governments as well. At the international level too, disputes between nations in WTO also arises. For instance, often countries employ legitimate actions against dumping (anti-dumping), subsidization (countervailing duties), and surges in imports (safeguard measures) which are contested by other nations.

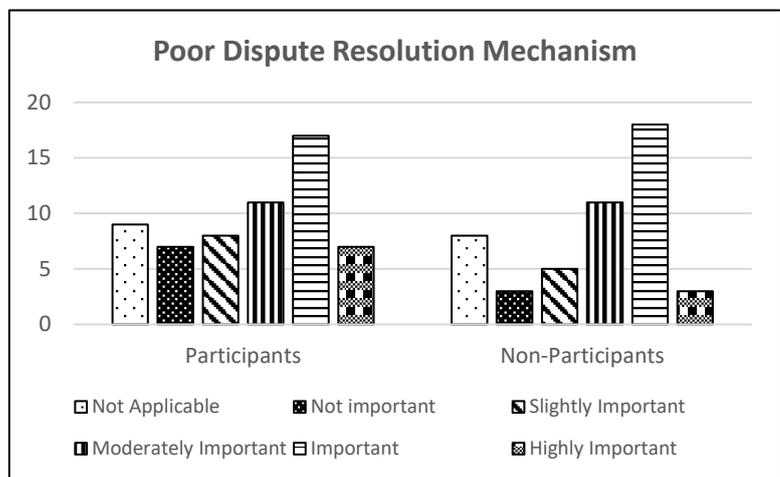


Figure 63: Importance of Dispute Resolution for Participation in Auto GVC (Source: Based on Survey Findings)

As court proceedings can be tedious, time consuming and expensive and can adversely affect all parties involved in the legal battle, firms typically are averse to the conventional dispute resolution route. As a result, alternative dispute resolution mechanisms like arbitration, mutual agreement procedures, advance pricing agreements, etc. are being explored for settling disputes confidentially and speedily. Majority of the participant (40%) and non-participant (42%) firms place high importance on dispute resolution mechanisms as a potential factor affecting participation (Fig 8).

1.9. DOMESTIC LAWS

Domestic laws and policies are vital for determining the general business and investment environment in an economy. Public institutions and firms operate, and by extension firms in

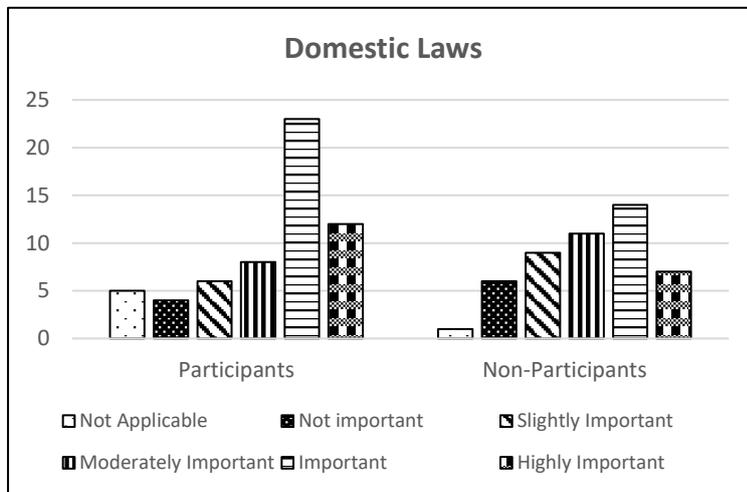


Figure 64: Significance of Domestic Laws in Participation in Auto GVCs
(Source: Based on Survey Findings)

GVCs, operate within the framework laid by laws. These not only affect the current operations but also future strategies by creating opportunities or challenges for businesses.

More than 50% of the participant and around 42% non-participant respondent firms considered the domestic laws as important or extremely important for

participation (Fig 9). Apart from the overall regulatory environment, specific laws pertaining to the Indian automotive sector were posed to these firms for a deeper understanding of the impact. The most important Automotive laws were shortlisted after extensive discussions and the pilot survey. Questions on the level and type of impact (positive or negative) of specific laws/policies (comprising of both State Government and Central Government policies) and the overall level of difficulty of domestic laws were posed to the firms to understand the degree of impact of these policies on their integration in value chains

The reaction of the respondent participant firms only to individual laws/policies has been shown below (Fig 10). The responses of the participant firms has been broadly categorized into three types of impact: -

(a) No Impact: Emission Norms, FDI Policy, Import Policy of India and Subsidies from Government seem to have no major impact on the majority of the participant firms.

(b) Negative Impact (High): Labour Laws and Foreign Exchange Rates have been cited as major deterrents by the majority of participant firms. Environmental laws have also been cited to have a negative impact on participation due to delays in clearances for proposed projects.

Delving a little deeper into these laws/policies with negative impact on participant firms, most respondents have alluded to the country's labour laws governing hiring, layoffs, wages and minimum operational environment as archaic and restrictive. They believe the present labour laws are not in tandem with the increasingly dynamic business environment. When integrated with the global markets, firms need greater tractability as employers to manage their labour force vis-a-vis the cost incurred and benefits derived. Almost all participant firms along with industry experts feel labour laws need to be improved in terms of flexibility to employers, better deal for employees and effective overall governance.

The Indian rupee's volatility has also adversely affected participant firms, especially the importers. With imports suffering and without adequate substitutability available in the domestic markets, exports too have suffered. Several firms have expressed the desire of Government to intervene to stabilizing the rupee or offer trade credit to the needy firms.

(c) Positive Impact (High): Investment and Tax incentives followed by the manufacturing policy (Automotive Mission Plan (2006-16, 2016-26)) and State laws seem to be the most positive enabling policies for the GVC participants.

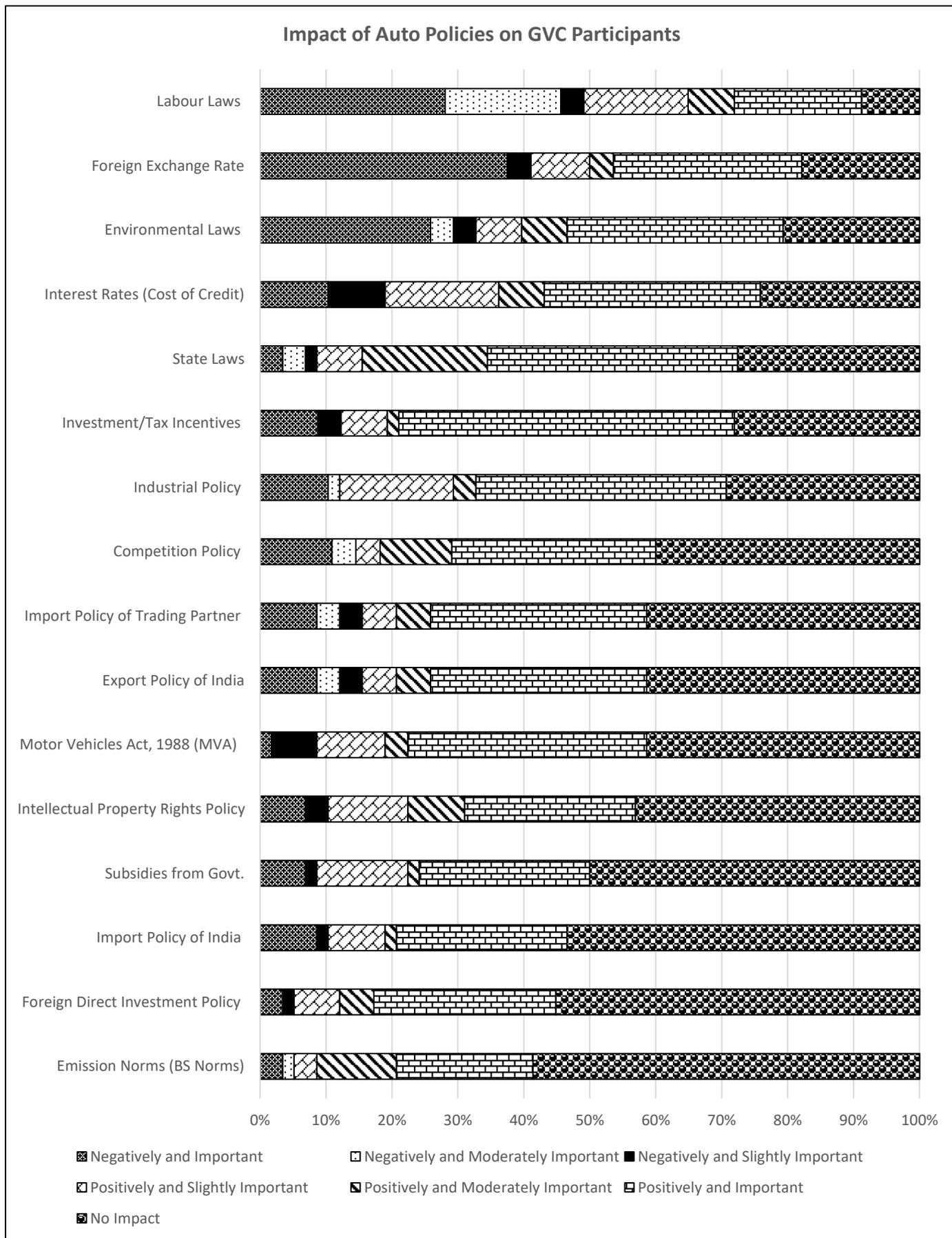


Figure 65: Impact of Policies on participation of Automotive GVCs (Source: Based on Survey Findings)

A2.2. TRADE RELATED FACTORS

2.1. LICENSES AND QUOTAS

As per the present Government regulations, the Indian auto industry does not require any licenses to import or export auto-related raw materials, components, or finished goods nor are there any quotas imposed on imports or exports. The Electronics industry, however, requires licenses for products broadly categorised under consumer goods, products related to safety and security, and certain electronics items. These licenses issued by the Director General of Foreign Trade (DGFT) are valid for 24 months for capital goods and for 18 months for raw materials, components, consumables and spares.

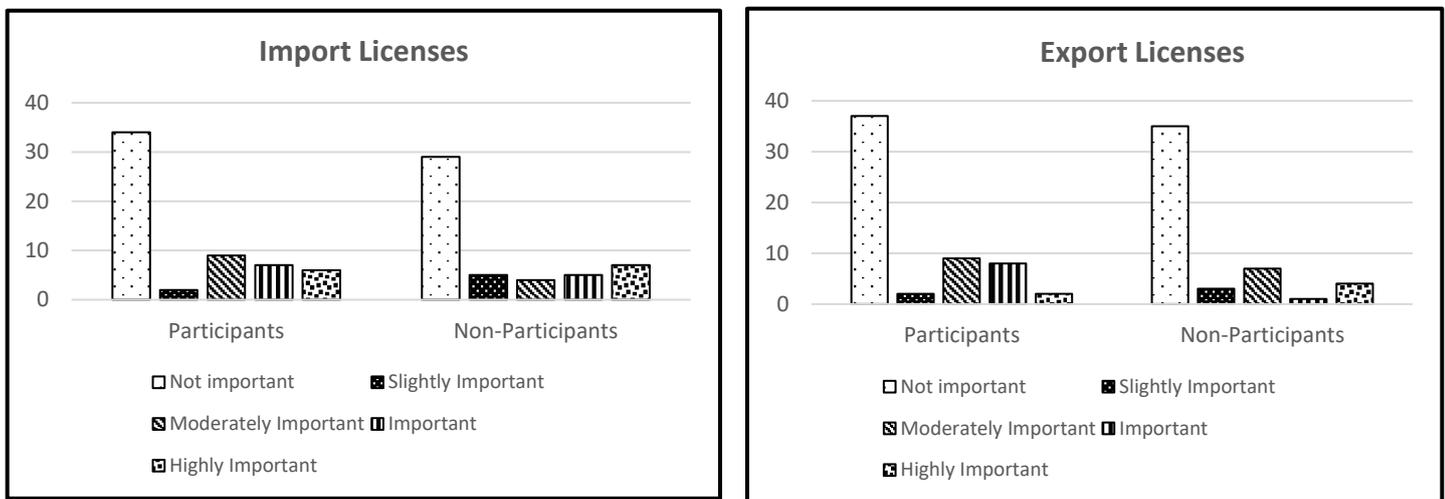


Figure 66: Importance of Licenses (Based on Survey Findings)

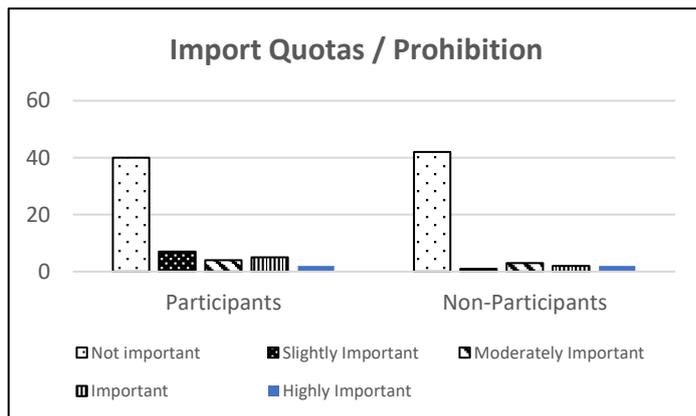


Figure 67: Importance of Import Quotas (Source: Based on Survey Findings)

The responses of the majority of both the participant and non-participant firms reflects the low importance of these factors in impacting participation in auto GVCs (Figs 11, 12)

2.2. NON TARIFF MEASURES

Apart from licenses and quotas, there are other procedural requirements and practices that constitute the non-tariff measures whereby trade between nations can be regulated. These include documentation process (for clearances, Customs) and non-trade barriers (like Anti-Dumping Measures, Countervailing Duties)

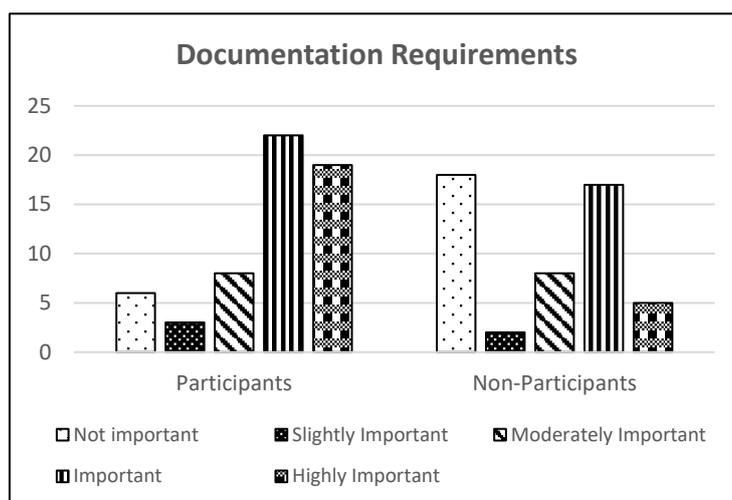


Figure 68: Importance of Customs Documentation (Based on Survey Findings)

Documentation requirements (for trade) include customs clearance formalities at ports of entry/exit. These add needless complexities, time delays and costs (agent fees, pick up fees, Bill of Lading fees, cargo filling charges). On an average, it takes roughly 6 days to clear imports from customs and 11 days to clear direct exports through customs at any Indian port for the Automotive Industry.⁷²

This factor has been considered a very important factor for participation by an overwhelming majority of participant firms (68.33%) The non-participant firms had mixed reaction to the importance of this factor with 44% citing it as important and 36% citing it as not important (because these firms engaged in very little or no trade) (Fig 13).

2.3. TRADING PARTNER NATIONS

Since participation in GVCs involves substantial amount of trade, the role of the trading partner nations becomes significant. Features like ease and cost of trade along with expectations of trading partners assume importance in determining the extent of GVC participation.

Since trade agreements play a major role in setting the tariff and non-tariff expectations between trading partners, this are an important instrument that affect participation of firms in GVCs. Ease of trade is aimed to be improved through Bilateral or Multilateral Trade Agreements with trading partner nations, although SIAM has a proposed list of sensitive items to be put under negative list under such agreements.

⁷² World Bank Enterprise Survey (2014)

Most participant firms (65%) highly favoured trade agreements with existing trading partners as well as new markets like the emerging economies (Fig 14). Several non-participant firms (about one-third) also believed trade agreements could lead to higher participation in GVCs while roughly half of these firms believed this to be a moderately important factor.

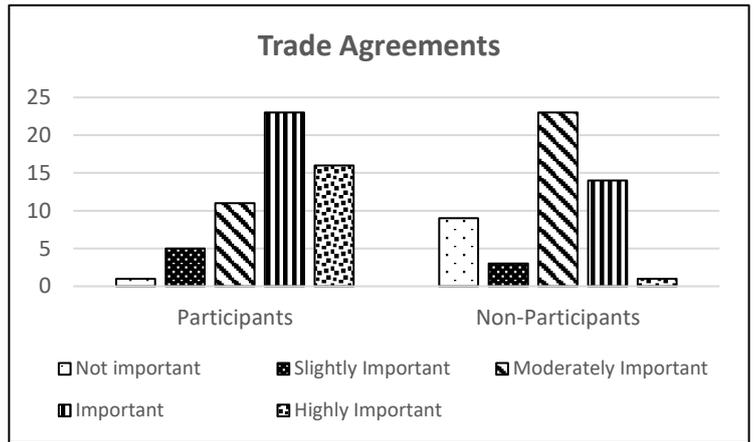


Figure 69: Importance of Trade Agreements (Source: Based on Survey Findings)

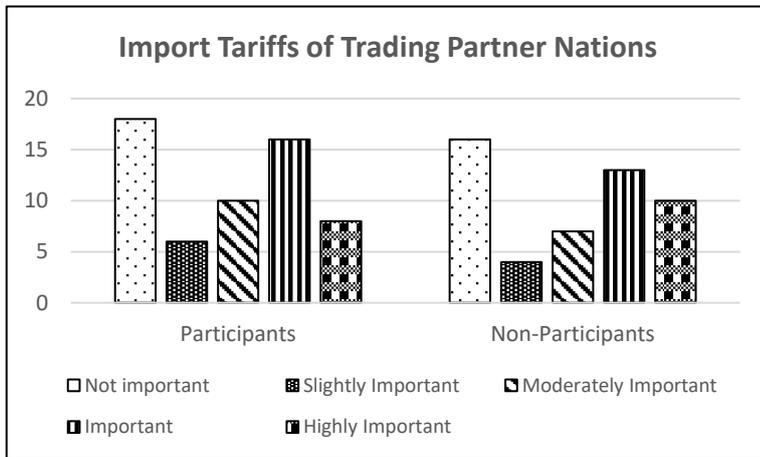


Figure 70: Importance of Import Tariffs of Trading Partners (Source: Based on Survey Findings)

both participant and non-participant firms.

The industry body SIAM has put forth several recommendations for scrutiny and amendment of national taxes, charges and fees on motor vehicles by member countries of WTO that deliberately or inadvertently violate National Treatment by discriminating against the auto exports from India.

Since the automotive industry has strong preferences for standards, firms are expected to meet the standards set

Cross border flows of products are highly affected by tariff rates. Import tariffs of trading partners control the magnitude of exports from firms in India. The importance of this factor was somewhat ambiguous in the responses of the auto firms (Fig 15). It has been rated from insignificant to highly important by

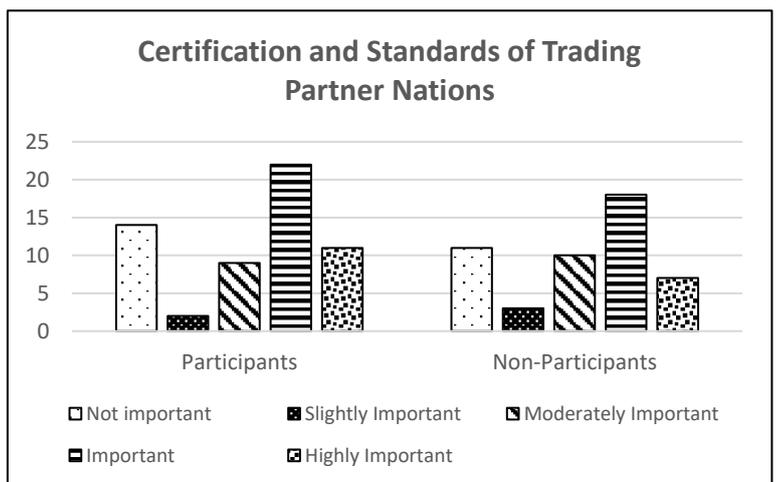


Figure 71: Importance of Standards of Trading Partners (Based on Survey Findings)

by trading partners and their industries. Roughly half of the participant firms (55%) and non-participant firms (50%) considered this a very important factor for participation in Auto GVCs, which is in tandem with the prominence of standards in the sector (Fig 16). Non-participant firms typically found this factor a major hindrance to their participation, although most industry standards across the globe are increasingly tending to converge.

A2.3. MARKET BARRIERS

The Automotives sector has high barriers to market entry (challenges faced by new entrants to penetrate the market). The biggest hindrance is in terms of scale of investments due to the very high capital costs for setup and subsequent significant operational costs (including skilling of labour and R&D).

3.1. HIGH CAPITAL COSTS

The Auto industry has high initial setup costs that include land, manufacturing plant, equipment, etc. With the advent of advanced and ever-changing technology, the basic capital costs for a firm wishing to make a global impact have only increased over the past decades.

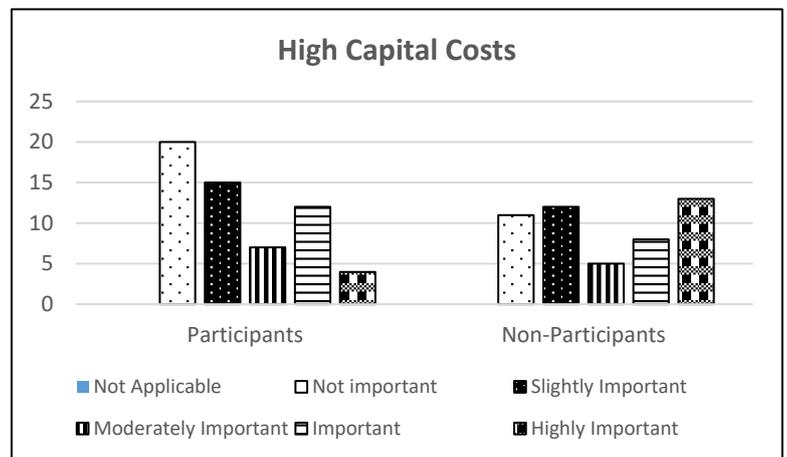


Figure 72: Importance of High Capital Cost for participation (Source: Based on Survey Findings)

Participant firms (58.33%) however felt this factor did not have a significant impact on participation while non-participant firms were divided in their opinion (Fig 17). This was most likely because respondent firms in GVCs need to incur the pre-requisite capital expenditure to remain competitive. Firms not in GVCs that responded ‘not important’ were mostly medium and small-sized firms; they probably felt so because of the relatively low degree of investment required (hence their size).

3.2. HIGH MARKET ENTRY COSTS

Market entry costs refer to the initial fixed costs of entry into supply chains that precede the setup stage. These include information collection regarding target markets, marketing, technology expenses, distribution channels and regulatory clearances. These costs are more pertinent for market entrants and entrants to new segments.

Nearly 44% of the participant firms felt that this was not important for participation (Fig 18).

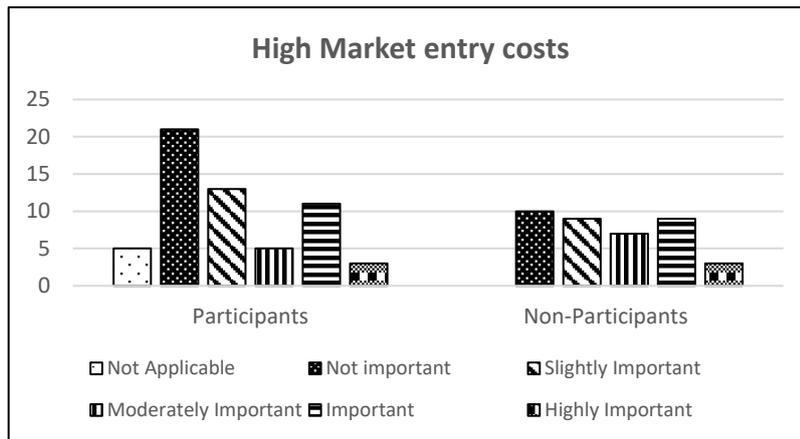


Figure 73: Importance of High Market Entry Costs for participation (Source: Based on Survey Findings)

The possible reason could be because these costs are no longer that high for the components segment. Amongst the firms that felt market entry cost was a significant determinant (21%) were quite a few OEMs. They face this cost more than other firms.

Amongst the non-participant firms, most firms keen on either exporting to markets abroad or upgrading along the value chain cited market entry costs as a major significant of participation in GVCs (24%) while 20% of firms felt this was not important.

3.3. LONG GESTATION TIME

Auto sector projects are typically long term and have lengthy turnaround times. Along with long setup times, the gestation time (time between initiation of the project and production) and time for skilling is also protracted.

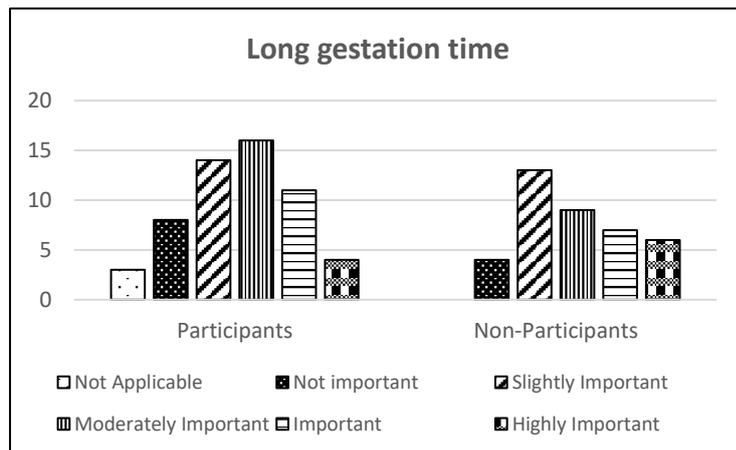


Figure 74: Importance of Gestation Time (Source: Based on Survey Findings)

Most participant firms (61.66%) feel that the long gestation time for projects is moderately - highly important (Fig 19). Incorporation of latest technology and diversified production lines actually pay off in the longer run in terms of making the operations more flexible, though the set up might become prolonged.

Non-participant firms (52%) however feel that this is not, or at best a moderately, important factor for participation. This is probably because most of this long gestation time is for the initial setup. Once the production process is in place and functional, there is an inherent flexibility built-in which ensures that the firm has some degree of tractability in meeting minor

changes in customer demand. For instance, the same assembly line can handle production of several variants of vehicle. The same goes for components manufacturing as well.

3.4. ADVANCE PLANNING STRATEGY

Executing projects in the auto sector requires vision and proper planning since the investments are high, products are dynamic and competition is intense. Hence there is high emphasis on advance planning strategy which is of vital importance when operating in an international arena.

Most participant firms (41.66%), however, felt that advance planning was as important a factor in Auto GVCs (Fig

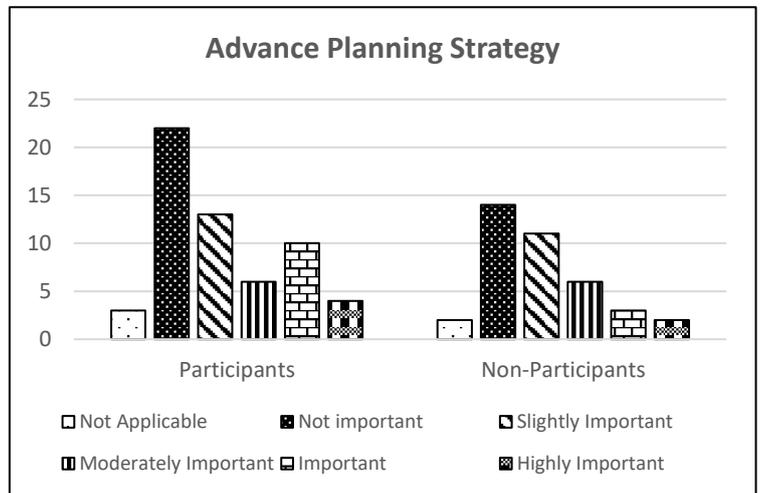


Figure 75: Importance of Advance Planning Strategy (Source: Based on Survey Findings)

20). A closer look at the type of firms revealed that most of these firms were in the Tier-2 and Tier-3 segments of the value chain; segments where product lines are relatively simpler and turnaround times are faster. The OEMs and several Tier-1 component manufacturers (23% of respondents), on the other hand, opined that this was a highly important factor in GVC participation. OEMs specially need to have strategies in place for short, medium and long term as they are the main drivers of products and innovation along the value chain.

Amongst the non-participant firms, nearly one-third (32%) felt that advance planning was not an important determinant for participation in Auto GVCs. This was an interesting insight because, for instance, when deciding suppliers, buyers tend to look at their plans of future in order to decide the sustainability of the relationship.

A2.4. **SECTORAL TRAITS**

Sectoral traits, as a broad factor, also have a significant impact in enabling or deterring firms in participating in auto GVCs.

4.1. CONSOLIDATION IN SECTOR

Consolidation within a sector or segment(s) is often the mark of the maturity of the sector or segment. For instance, the OEM segment of the auto value chain exhibits such a trend where

there is only a handful of players globally and very few domestic players, with hardly any new entrants in the last few decades. Higher consolidation, through exit of firms, mergers & acquisitions, etc., also presents tougher norms for participation as incumbent firms will tend to strengthen their positions in the segment, making it difficult for new players to enter.

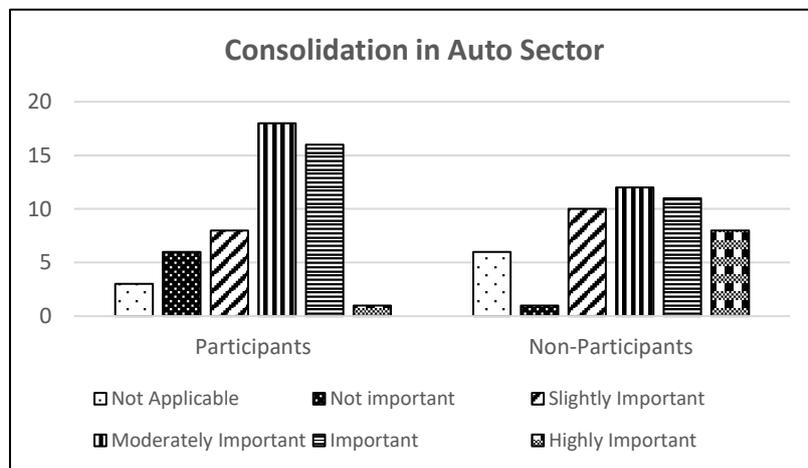


Figure 76: Importance of Consolidation in Auto Sector (Source: Based on Survey Findings)

Most participant auto firms (58.33%) felt that consolidation in the sector was an important determinant for participation in Auto GVCs (Fig 21). These mostly include the Tier-1 component manufacturers and the OEMs. Once established,

OEMs tend to solemnize their value chain with trusted suppliers. This leads to consolidation in value chains as well. This could spell bad news for aspiring entrants.

Amongst the non-participant firms, an overwhelming majority (62%) felt that this was an important factor as well. Several firms have cited that trends like fewer firms in the higher value-added segments and limited number of lead firms in a few sub-segments (based on products) have been adversely affecting them in participating in GVCs due to business preferences of these lead firms. But supplier related decisions by buyers are usually based on performance metrics of the supplier. So despite signs of consolidation, firms still stand a chance for participating in GVCs. The presence of fewer firms might just provide the opportunity for newer firms to try and enter the segment with upgraded capabilities.

4.2. BRAND DRIVEN SECTOR

The OEMs are typically the brand owners in the Automotive GVC. Branding helps in establishing familiarity, sets expectations of customers and differentiates a firm from its competitors. Customer perception is highly brand dependent, hence the auto sector is highly brand driven.

Participant firms were divided in their opinion regarding the importance of this factor – 45% felt this was slightly – moderately important while 32% felt this was an important factor. The non-participant firms (62%), however, responded undisputedly that this was a very important factor that affected participation in auto firms (Fig 22). High importance of branding

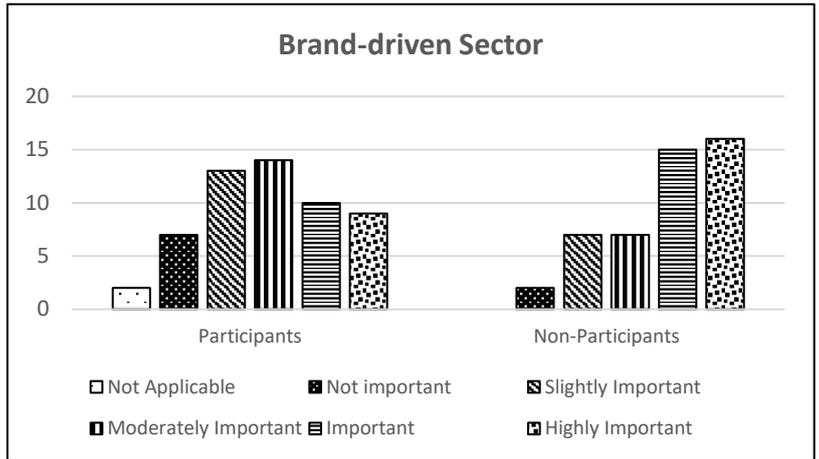


Figure 77: Importance of Brands in Auto Sector (Source: Based on Survey Findings)

gives the older players an edge over newer entrants (first mover advantage), which is why a lot of non-participant firms have opined that lack of brand image has adversely affected their chances of exporting or competing globally. Many small firms tend to neglect the significance of developing a brand image, which should not be the case when aspiring to work with international players. Brands inspire confidence, hence the demand of several firms for a collective brand like ‘Brand India’.