Chapter 2 - Literature Review

(This chapter consists of review of literature for the four broad objectives as mentioned in section 1.8)

2.1 – To understand the impact of road and infrastructural development on the growth of Multi Axle Trucks in India.

Road freight transportation is a significant contributor to the GDP of a country, in fact as pointed out by (Raghuram, 2015) as of 2012-13 the GDP share was 4.9% (in comparison Indian Railways’ contribution was 0.9%), also (Rambaskar, 2015) in their research paper mentions the importance of logistics sector and its contributions to the economic growth of India. The Indian transport industry consists of government policies, legal structure, economic situation, technology etc. (Dubey, 2015) discuss that the transport industry has substantial contribution over the economies of developed markets and developing economies as well, the transport industry has also been found to be benefited by improvement of economic activity, a study conducted by (Hossein Rashidi, 2012) had found a positive relationship between growth in transportation productivity and economic indicators in selected metropolitan statistical areas of USA. It is also noteworthy that as found by (Bloemhof, 2011) that from an economic performance perspective, when compared to inland waterways and rail networks, heavy trucks in long haulage applications have been found to be a better transportation mode choice, in terms of flexibility and speed. Under Indian scenario a report by (Deloitte Touche Tohmatsu, 2012) deals with containerization related issues like: policies and trends in containerization, container movement in India, way of transport and challenges etc. is found interesting. This report states that the advancement in overall trade environment and benefits in terms of modularization are happening due to adoption of containers for transport (hence popularizing the term “Trading in the Box”). Trade is being driven utilizing containers to transport goods between places through various modes of transportation, leading to the thriving of containerization. In this process, the primary players dealing with containers i.e. ports, railways, roads, warehouses, shipping & logistics companies are turning out to be the key contributors to the development of

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10 Containerization is the use of containers to unitize cargo for transportation, supply and storage.
container trade and infrastructure. Container logistics thus includes supply, transportation, packaging, storage and security; together with visibility of container and its contents into a distribution system from source to user.

Moving further into the Indian context it is suggested by the (Ministry Of Road Transport & Highways, 2011) that freight transportation trucks are important for the economy and it should be streamlined by minimizing various barriers and bring efficiency to road transport through various Acts, Taxation regimes, modernization drives, encouragement to multi-axle vehicles etc. According to this report, the Indian road transportation commands higher share vis-à-vis other transport modes primarily due to easy accessibility, flexibility of operations, door-to-door service and reliability. The share of road transport to the national GDP stood at 4.7% in comparison to 1.0% share of the railways\textsuperscript{11}. On the issue of barriers to road transport and smooth flow of cargo the sub-group found that the primary reason for such barriers are checks conducted by a myriad of governmental agencies and numerous levies/taxes. The checks conducted by respective agencies at separate check points result into more than one detention; these detention(s) lead to loss of time, lower average speed, high fuel consumption and idling of vehicles, which leads to underutilization of transport capacity and adversely affecting the operational viability of the freight transport vehicles. This also imposes cascading economy-wide costs which are difficult to assess. The sub-group points out in the report that exposing road transportation to checks at inter-state check post puts a significant inequity onto it compared to freight/cargo transported by railways, aviation and inland water transport, which do not face such rigorous en-route checking. The system in vogue hinders rather than facilitates smooth flow of freight and passenger movement across the country and has thwarted the formation of single common market. In addition to these numerous central and state levies/taxes\textsuperscript{12} lead to cost & price escalation and erode

\textsuperscript{11} As per the revised data on National Accounts released by the Central Statistical Organization (CSO) 2009-10

\textsuperscript{12} Taxes and non-tax charges on road transport sector can be broadly classified into the following categories: (i) taxes on the vehicle purchase, (ii) taxes on operation of motor vehicles, fuel taxes, motor parts, tyres and tubes, etc., (iii) Sales tax/VAT levied by the States, (iv) Registration and Transfer fees, licence/permit fees, (v) periodical vehicle tax (also called road tax), (vi) tolls, (vii) parking fees, (viii) Octroi, (ix) Entry tax , (x) Lease tax, and (xii) passenger and goods tax etc.
competitiveness. This report by the sub-group also states that to modernize the road transport system and lower its carbon footprint, (a) electronic toll collection systems should be introduced; (b) fuel efficiency should be improved through emission norms, (c) truck terminals outside cities, (d) fleet modernization, (e) encouraging use of multi-axle vehicles etc.

(Singru, 2007) Studies the Indian road and rail transport systems and observes attributes and shortcomings of both. It also provides vision on way forward and remedial measures for certain inefficiencies. The report points out that in 1990’s road transportation had an estimated demand of 80% and witnessed an annual growth of approximately 12% a year in freight demand whereas the demand of rail transport grew at only 1.4% a year. To improve the efficiency and productivity of the Indian road network the report suggests a model of concession agreement to be developed for build-operate-transfer projects, the institutional capacity of the National Highway’s Authority of India (NHAI) should be enhanced to establish a multidisciplinary professional body with high quality financial management and contract management. Also, road safety and traffic management should be put under focus and dedicated organizations should investigate this aspect.

The shortcomings of the road freight transport sector have been dealt with in the (Sectoral Innovation Council (Ministry Of Road Transport & Highways), 2010) reports which has put up a set of well-defined goals and recommendations to address the needs & challenges, opportunities, road infrastructure eco system requirements by Members from Govt., academia, Industry, civil society, executives from professional societies - experts from within the sector and allied sectors. The council found that there has been a tremendous growth in vehicle population which requires capacity augmentation which in addition to lack of enforcement of legal axle load limit and lane discipline which has adversely affected quality of delivery of service to the public across the national highway road network; scarcity of funds and diversity of geographical and resultant climatic conditions, ever growing difficulties in land acquisition, rehabilitation and resettlement make it even more challenging.

The goals set by the innovation council are to ensure: (a) fast and comfortable movement while ensuring economy; (b) Safety during construction and operation; (b) Facilities along Road for users including differently abled persons; (c) Mechanized/Automated data collection, management and dissemination; (d) Making green highways and
expressways; (e) Road should be taken as carriers of water, power, broadband and other services in addition to primary role of transportation of goods and people.

The (Working Group on Road Transport, 2011) assess the number of buses and trucks required in twelfth plan period indicating replacement and augmentation of capacity. Two methods have been adopted for projection of inter-regional tonne kilometres (TKMs) for the assessment for twelfth five-year plan; these methods are ‘Business as Usual’ scenario and using ‘Road Freight elasticity with respect to GDP’ in concurrence to GDP growth rate of 8.0, 8.5, 9.0 and 9.5 per cent, respectively. As per the ‘Business as Usual’ scenario by 2016-17 projected freight traffic would be 1,835 billion tonne kilometre (BTKM); as per the ‘Road Freight elasticity with respect to GDP’, with a growth rate of 8.0% by 2016-17 is 1,928 (BTKM), with a growth rate of 8.5% by 2016-17 is 1,993 (BTKM), with a growth rate of 9.0% by 2016-17 is 2,059 (BTKM) and with a growth rate of 9.5% by 2016-17 is 2,126 (BTKM). This report also categorically stresses that there is a pressing need for detailed study of the trucking industry by organizations like NSSO or some professional organization on a five-yearly interval basis in terms of vehicle acquisition cost, operational cost, cost of financing, vehicle technology, time and resource spent on detention of vehicles, turnaround time, distance travelled, etc. Such studies, the report states could make the task of evaluation of trucking operations and related policy formulation easier and appropriate.

Also, for the post GST era it is pertinent to know that (Frost & Sullivan, 2012) demonstrates how implementation of GST, favourable regulations, fuel efficient vehicles, and technological advancements could help integrate state economies and boost overall growth. The report mentions that India is catching up fast to global emission regulation trends and on the fiscal policy front is poised to implement goods and services tax (GST) soon; implementation of GST will pave the way for an efficient, single tax system for movement of goods across the country. It will eliminate multiple taxes and quotas at inter-state check points and will help to integrate state economies and boost overall growth. The entry of global commercial vehicle manufacturers will significantly raise the bar on technological innovations and push domestic manufacturers to refine their design and engineering. The studies by (Thukral, 2005) discuss the infrastructural, technological, legal, social issues in relation to the transport industry of India. The report also talks about the industry structure and the role of operators, intermediaries and clients.
in India and suggests improvement of regulatory norms and removing infrastructure bottlenecks to encourage usage of new and better built multi axle trucks. So that truck services can be operationally more efficient and service qualities can be significantly improved.

2.2 – To capture the inherent advantages of Multi Axle Trucks (over two axle vehicles) in long haulage applications

(Lumsden, 2004) In his research for European markets, promote the increasing load capacity of multi – axle heavy trucks by making trucks longer and heavier. They compare development of GDP and heavy, multi – axle truck sale along with the impact of increase in truck sizes. It is argued by the author that in European conditions, bigger and longer trucks would imply lesser number of trucks and safer roads. (Knight, 2010) In their ongoing study for The European Commission, are exploring socio-economic effects and technical details on adapting to the rules\(^{13}\) regarding weights and dimensions of multi – axle heavy trucks on the European markets. Under the economic aspect, it was found that exhaustive researches needed to be carried out to capture the shift to larger vehicles\(^{14}\) that is taking place in the European road transport (freight) sector. It may also be noted here that the study by (Jaržemskiene, 2007) has focused on researches made on the intermodal transport and the paper pays attention on classification of scientific issues regarding intermodality; the paper concludes that the domains of container terminals and railway scheduling areas are well covered in intermodal researches but intermodal transportation of trailers and swap bodies\(^{15}\) organized by SME companies, intermodal operators and forwarders lack in terms of scientific attention. (Holguin-Veras, 2005) Has also put up a comprehensive analysis of the trip chain behaviour of commercial vehicles (in the Denver, Colorado region). This was done on the basis of data collected from Denver

\(^{13}\) Directive 96/53/EC for EU member states (national as well as international transportation)

\(^{14}\) Euro Modular System

\(^{15}\) A Swap Body is a standard freight container for road and rail transport. Basic standardization is set with Euronorms EN 283, EN 284 and EN 452 for construction and design, as well as EN 13044 for marking and identification.
Regional Council of Governments. Trip chain\textsuperscript{16} behaviour was characterized by number of, length, conditional probability of trip purpose; whereas the trip purposes were grouped as freight transportation, transport of people, service calls etc. commercial vehicles were grouped as pickup vans, single-unit truck, combination truck etc. The conditional probabilities were analysed for number of stops made; although most vehicles were found to make one trip in a day, one in four commercial vehicles made more than one trip chains per day. The analyses also indicated that the average number of stops made per trip chain decreased with the number of trip chains. About 35\% of the trip chains involved two stops, although some trip chains had more than 12 stops. The main trip purpose for all commercial vehicles was freight transportation. This study apparently represented the first comprehensive attempt reported in the literature to analyse the observed patterns of commercial vehicle trip chain behaviour.

(Londoño-Kent, 2009) went on to compare issues and emerging trends in road – freight transport industries by describing market structures, effect of regulations and competitive nature of road freight transport. The paper also examines the good/bad practices of the transport industry; it was found that as industrialization increases trip lengths increase, medium rigid trucks (typical two axle trucks) lose out to larger trucks that could be the typical multi – axle trucks that carry freight in between large warehouses/hubs. As a result, the small delivery vans have also become very popular which redistribute from hubs to the smaller last mile nodes. This phenomenon is a common trend in numerous developing countries including India; the study also found that less than twenty percent of the average trips went empty.

(Grislis, 2010) explore the relationship between Heavy Commercial Vehicles (Longer Combination Vehicles) and road safety issues. Several transportation experts and community groups provide their views on road safety issues of Longer Combination Vehicles, several areas of benefits and problems of using these Longer Combination Vehicles are discussed and finally suggest some technical design improvement and highlight the importance of driver training. Also, (Mooren, 2014) review existing

\textsuperscript{16}"Linking of secondary activities to a primary activity through travel that is made from when an individual leaves home to when they return home. It is a schedule that individuals will follow (or create as they proceed through the day) from the moment they leave home to the moment they return home." (Transportation, January 2008, Volume 35, Issue 1, pp 60)
literature while discussing the safety issues involved and aspects to be paid attention to while dealing with heavy vehicle transportation. (Dingus, 2006) used a hybrid approach utilizing empirical and epidemiological methods to study driving safety. Several established safety determination techniques like: Hazard Analysis Technique, Instrumented Vehicle Studies, and fleet studies of driving safety interventions etc. have been used along with unique techniques like usage of sophisticated instrumented vehicles to collect over 400,000 km of commercial vehicle running data to address the long-haul trucking application in order to assess driving safety in terms of long-haul truck driver performance, road behaviour and fatigue experienced.

Moving on to the Indian perspective, (Mohan, 2009) analysed the traffic safety situation in India and identified countermeasures for areas in which the total harm caused by crashes can be substantially and readily reduced. The report focuses on comprehensive analysis of fatality rates on highways (and in urban areas) and identifies some key areas that can potentially reduce road fatalities. Some of these key areas are: Involvement of trucks and buses, night-time driving and wrong-way driving on divided highways. Also, the (AITD; CIRT, 2000) exhaustively studied various other issues relevant to the present study – like ownership pattern, fare & freight rate system, financing, technological upgradation, legal axle loads, overloading problems and aspects/benefits of promoting multi axle trucks. It was also found that although the MVI Act has empowered state governments to fix freight rates\textsuperscript{17} and the regional transport authority (RTA) has the right to grant public carrier permit and can also make provisions that goods be carried at specified rates\textsuperscript{18}, in reality this completely open to market. Since, the industry primarily consist of small truck operators (Study found that almost seventy-seven percent of fleet owners have a fleet size of less than ten trucks) and rates are not fixed by governmental bodies, freight booking agents and brokers play an important role in determining freight rates. On the financing aspects, NBFCs play a key role in truck financing (sixty four percent) as against banks (twenty three percent), it may also be noted here, that although the default rates are high in cases of banks; the NBFC’s record of execution in loan recovery is better. The NBFCs finance new trucks as well as old trucks and cover the cost of the truck chassis and the cost of truck body – building instead of financing the

\textsuperscript{17} Section 67 (1) of the Motor Vehicle Act, 1988

\textsuperscript{18} Section 79 (2) of the Motor Vehicle Act, 1988
new truck chassis only, as generally done by the banks. Under the safety aspects, it was found that accidents that involve trucks generally lead to high degrees of fatality. Thus, it is required that special focus is put on making trucks significantly safer. Another aspect that is dealt with in detail is the problem of overloading on trucks. It was observed that multi–axle trucks can effectively help to control this problem. The report actually suggests that GVW\textsuperscript{19} weight limit of forty tonnes should be raised to forty-nine tonnes for a six–axle truck that has one steering axle, one tandem axle and triple–axle configuration. (Velmathi & Ganesan, 2011) Point out the state of credit management in the Indian commercial vehicle industry, the objectives of this study were to understand the debtor’s position and credit policy of some selected commercial vehicle manufacturers. The study examines the efficiency of credit management of these selected manufacturers and tries to examine the efficiency of credit management and offer suggestions and recommendations for debtor management.

Study conducted by (RITES Ltd., 2014) on transportation solutions across various modes of transportations, cover the cost related aspects of all (rail, road, ship and air) modes of transport including road transport. Exhaustive data on operational, financial and economic costs of operations was collected from twenty regions covering a preselected group of commodities (commodity group I, II and III). The cost structure of two–axle, three–axle and four/five–axle trucks were listed under various road and terrain conditions

The working paper of (Kumar, 2014) suggests that in India, cost of transportation is relatively high and road transport (freight) accounts for the majority of freight flows. The primarily small fleet dominated trucking industry (more than 75% of trucking firms have less than five trucks) is prone to long driving hours, overloading, unauthorized modifications to illegally increase payload capacity, cost of detention at inter–sate check points. The cost of these various inefficiencies of the trucking industry is ultimately borne by society in the form of high rates of fatal accidents, damage to road infrastructure, high levels of pollution etc. The paper also supports the usage of multi–axle trucks as they bring down the cost of production significantly. The report also states that the efficiencies in trucking should be derived from minimization of empty backhauls and reducing search

\textsuperscript{19} Gross Vehicle Weight
cost for back hauls and enabling real-time information on freight availability to truckers and end-customers so that transparency ensures optimum freight rates.

(Marketing & Development Research Associates, 2007) throws light on the issue of corruption and highlight the impact of bribery at toll plazas, check points, state borders etc. on turnaround time of trucks. The report points out that around one crore people are associated with the truck operations business in India and the industry literally carries the economy of the country. However, it is not the most efficient by global standards. In India a truck plying with freight between states covers on an average approximately 280–340 km each day, these figures are much higher in developed countries; which translates into more days on road for the truck. A primary reason for delay is detention at interstate check points, which also are points where bribery is not uncommon. The bribe is mostly paid at check point, toll plazas, state borders or during en route stoppages by one or other agencies on pretext of checking documents. The study found out that truckers pay bribe at every stage of their operations which starts with getting registration and fitness certificates, and for issuance/renewal of interstate and national permits. However, due to the unorganized nature of the trucking operations industry (86% consist of small entrepreneurs), assessment of the extent of corruption is a complex and challenging task. It was found out that the primary reasons for paying bribe while on road were “plying overloaded trucks, traffic violations, parking at no-parking places or entering no-entry zone, and in the payment of toll and other taxes like octroi, sales tax etc. Lack of proper documents or alcohol abuse by truck drivers are the other reasons for paying bribe”. The most common reason for paying bribes while truck is in its journey are “plying overloaded trucks, traffic violations, parking at no-parking places or entering no-entry zone, and in the payment of toll and other taxes like octroi, sales tax etc. lack of proper documents or alcohol abuse by truck drivers”. Transparency International estimates that with almost thirty-six thousand trucks operating around the country, the bribe amount floating around in the trucking operations to the tune of Rs. 22,200 crore a year after adjusting for the inter and intra state operations. This study also claims that delays due to forced stoppages by authorities are costing the national economy to the extent of Rs. 1130.47 crore per year. If trucks are linked to an information system and operational aspects be automated, the trucking industry could be rationalized. To this effect, (Regan, 1995) has shown that betterment in terms of communications, automatic vehicle location and utilizing geographic information system technologies have benefited
commercial vehicle operations. The study shows that real time information can potentially save through simple route diversion strategies and highlights the need for such an approach for improved truck operations decisions.

(McKinsey & Company, 2010) points out that it is imperative for India to develop its logistics network efficiencies; it is shown that on considering the purchasing power parity (PPP) the road costs in India are thirty percent higher – which essentially hampers the economic growth of India. The report also suggests that poor logistics infrastructure costs the Indian economy almost 4.3 % of its GDP every year, alarmingly two – thirds of this figure is hidden (generally not regarded as logistics cost), this includes theft & damage, higher inventory holding costs, ‘facilitation and transaction’ costs etc. The report recommends ensuring setting up of common standards that help intermodal transferability and inter-operability, adopting a national level electronic tolling mechanism, setting dedicated coastal & rail freight corridors and improving the existing national expressways and add new expressways in high – traffic routes.

The study on competitive nature of the transport industry by (Sriraman S. V., 2006) in the Mumbai Metropolitan region through analysis and market surveys of freight rates, operating costs, industry structure. The paper also studies the effects of policy and regulatory regimes on competitiveness of the trucking industry in particular interstate routes involving multi – axle trucks. The paper states that although road goods transport industry is dominated by unorganized small operators it is notable that middle men play crucial role in price fixation as well as allocation of quantum of movement. The freight rates and operating costs had been analysed to understand that profitability of truck operations had been adversely hit due to increase in average operating cost (mostly fuel) and falling flat freight rates. Through various simulation exercises it was understood that the operations would be profitable at some much higher levels of movement; it turned out that only with a certain level of overloading, the operations turn profitable (it is important to note here that multi – axle trucks with higher payload capacity are particularly suited for such situations). The report says that since road goods transport industry dominates the economy it is important the truckers have similar rights (like railways) to travel interstate with minimum delay, legal and administrative reforms are required in this aspect for India to function as a single market.
2.3 – To quantify the impact brand image has on purchase decision of Multi Axle Trucks.

Brand and its powers have been a potent differentiator for any manufacturer (or service provider), branding is endowing of products and services with the power of a brand (Kotler, Keller, Koshy, & Jha, 2009). It has also been stated that the concept of brand is no less important in B2B setup as it is in B2C setup (Keller, 2001), but still although numerous studies have been conducted on business models of B2C branding, few comprehensive B2B models for branding exist. It has been also said that although very exhaustive, the Keller model has some limitations when applied to B2B scenarios (Kuhn, Alpert, & Pope, 2008).

As per available literature, the overland road logistics business which comes under the B2B segment also shows importance of brand related aspects. The exploratory study of (Marquardt, Golicic, & Davis, 2011) on the branding of B2B services - in the logistics industry and tries to understand the importance of differentiated value propositions associated with various brands in this industry. It is also noteworthy here that (Modin & Åkerstedt, 2009) found – once a traditional hauler grows on to build its own terminals and distribution systems (which Volvo AB found to be a growing trend through internal studies on its customer behaviour in Nordic Europe) their focus on truck as an asset for the organization reduces.

As truck manufacturers are concerned and focused on understanding the perceptions of their customer’s (transporters/haulers) perceptions of their brand and how could a truck manufacturer improve its operations and product quality in a competitive global environment. There exists in literature numerous studies which deal with these issues, (Krig & Stenström, 2001) studied the buying behaviour and supplier selection criterions to better understand the purchasing pattern of two Swedish heavy truck manufacturers. These upstream activities are important to a truck manufacturer, as quality and price of inbound inventory helps a particular manufacturer to produce products consistent with the ‘promised product quality’ and ‘expected price point’. A similar study was conducted on the business model and buying approach of an unnamed Swedish heavy truck manufacturer in India by (Bankvall, 2014) with a special emphasis on Industrial Marketing and Purchasing (IMP). They discussed and established the importance of a
Brand and its impact on image building and subsequent procurement of materials to build a product in convergence to the business model and marketing approach.

(O’Cass & Weerawaradena, 2006) Assert that when organizations operate in a competitive environment, they tend to improve their market focused learning qualities and end up marketing their products in a better way, which ultimately leads to a higher brand performance. It is also important for organizations to identify the ‘Key Performance Indicators’ while staying connected to their mission and vision statements, as found by (Yurtkulu & Rezanejad, 2012) this helps heavy truck manufacturers to drive up their brand values.

2.4 – To understand the differences in the Business models of various Multi Axle Truck Manufacturers in India.

In literature the term business model has often been used with varied implications and at times with diverse perspectives. It has been observed by (Zott, Raphael, & Massa, 2011) that in spite of enormously large academic activity on ‘business model’ there is hardly any consensus on a common and widely accepted definition on the aforementioned topic. But the authors still broadly identify a commonality on e-business models, business models as activity system and as cost/revenue architecture. Given this backdrop of hugely diverse take on business model, it was found by (Schafer, Smith, & Linder, 2005) that although there is hardly any commonality among the plethora of ‘business model’, at least twelve definitions for the term ‘business model’ coined between 1998 to 2002, but none of these definitions seem to have been fully acknowledged by the business community completely. However, the authors concluded that broad areas like: strategic choices, creating value, capturing value and value network to be relevant and significant in terms of previous and contemporary researches in this regard.

Besides, the consideration for business model various researchers like (Casadesus-Masanell & Ricart, 2010) also lay down a relationship between strategy and business models, they claim that the process of designing business models is more of an art and it is necessary that an integrated framework separates the domains of strategy, business models and tactics.
Two important perspectives have been discussed by (Kortmann & Piller, 2016) as they study business models of various manufacturing companies. Besides vertically integrating the entire product life cycle, traditionally separated tasks are being reallocated horizontal stakeholders, as due to ease of information sharing integration with external partner entities in new product development has become a norm. Organizations now pay increasing attention to not just value creation but also on value capture. While discussing impact of business model on PLM (Ogewell, 2015) mentions the conflict in degree of customization that is preventing a seamless integration and acceptance of a common product design platform for all truck brand of the Volkswagen Group.

The study conducted by (Hedman & Kalling, 2003) concludes that an effective information system has a positive effect on business model development in an e business environment. The authors also stress upon the relevance of quantitative study and recognition of key variables in this regard.

Also, (Malone, et al., 2006) while discussing business model by ‘creators’ or manufacturers have resolved that while classifying financial performance of a business model ‘market value and growth’, ‘profitability’ and ‘operating efficiency’ should be focused upon.

(Lang & Dauner, 2012) points out that the Indian market is dominated by local manufacturers while foreign manufacturers are investing heavily and localizing their products to take advantage of a great potential in terms of growth in volume terms and segment upshift over the next decade. For companies to taste success, it would be essential that they are aware that the price sensitive Indian mid-market is suited for low cost products, where ideally production needs to be fully localized and manufacturers need to have a dense local sales-and-service network. The end product offering also needs to be topped with good value for money local financing options (a flexible, locally adaptable credit-scoring model will be the key).

(Vahlne, Ivarsson, & Johanson, 2011) Study the globalization process of Volvo’s heavy truck business through management of complexities and uncertainties. The authors adapt the Uppsala Internationalization model (17 and 18) to explain the globalization process. The Uppsala model is a theory that explains how firms gradually intensify their activities in foreign markets. The key features of the models is that the firms first gain experience
from the domestic market before they move to foreign markets; initially the firms start their foreign operations from culturally and/or geographically close countries and move gradually to culturally and geographically more distant countries; firms start their foreign operations by using traditional exports and gradually move to using more intensive and demanding operation modes (sales subsidiaries etc.) both at the company and target country level. The authors state that since globalization, like the internationalization process, is also characterized by the management of various complexities and uncertainties, a globalization process variant of the Uppsala Internationalization model (17 and 18) is suitable to be adapted to “test” explain the globalization of Volvo’s heavy truck business and the inherent economic and managerial intricacies involved in this process.

(Curtis, 2006) Discuss how through service innovation, companies can achieve significant benefits to provide improved end user experience. Service innovation comprises of: Service model innovation – which is establishment of the service strategy and service business model of the firm concerned; Service operational innovation – which is about bringing in efficiency through innovative approaches in existing service operations that helps to dramatically lower the costs; Service growth innovation – which is about managing the creation, development and delivery of new services using the same discipline and rigor as used in new product development.

The report also suggests three main considerations to make service led growth. They are: Creation of a service growth strategy that recognizes and accounts for different growth models; identification and addressing of process and capability gaps; Management of service development and delivery differently than product development.

(Becker & Diez, 2011) Say that although emerging markets like Russia, India and China are all growing, there are key differences among them. They provide an overview in terms of competitive environment, market characteristics and market development of the BRIC countries. The market characteristics in terms of customer requirements would be shaped by stricter emission norms which will lead to increase in technological sophistication; in spite of traditionally being a low-cost market, total cost of ownership is also a growing area of focus among a large chunk of customers. The report also points out that poor road conditions are still prevalent which necessitates robust trucks (which may be technically unsophisticated) to be offered to the market. The Indian market is
turning increasingly attractive for the global manufacturers due to constantly declining regulation but on the other hand globalization activities of the Indian manufacturers have not been their strength which to a large extent is because of the fast-growing local markets.

(Chaklader, 2010) Highlight the growing degree of interest in the business fraternity to improve the sustainability of operations; which often turns out to be a balance between short term goals (of turnover and profits) with long term goals in social and environmental performance. The authors try to use the 'balanced score card' (BSC) - Kaplan and Norton, (1996) which is a strategy-centred performance measurement tool that enables firms to align their operations to business strategy. Though the conventional balance focuses on the financial, customer, internal process and learning & innovation; it excludes two important long-term aspects: environmental and social. The authors try to address this lacuna by covering the environmental and social aspects to evolve a relevant strategy at Tata Motors Ltd. through a case study.

(Rishi, 2009) Look into some decisive actions taken by manufacturers in the areas of: globalization, brand development, technology integration, partnerships and workforce transformation. So that organizations stay relevant to ever changing client requirements. The analysis found that the dilemma regarding globalization that numerous manufacturers face could be resolved by decisively charting a path toward global integration or regional specialization. Another challenge of brand redefinition requires substantial moves to realize and respond to the needs of the future. Changeover of a brand towards services and solutions through technological innovation and a strong ecosystem of partners may create short term organizational discomfort but it should be a priority to ensure long term success. Amid massive industry wide changes only strong leadership would ensure a transformation in culture and workforce through all levels of a progressive truck enterprise by 2020.

(Dressler, 2009) Aimed to examine erstwhile current changes in the truck industry landscape and explored the factors influencing them and tries to determine where the industry would be in 2020. The study found that local sourcing with global coordination, multi-regional platform within one segment, strong cross OEM cooperation are very important for globalization in long term perspective.
The study found that OEMs which look forward to globalization can essentially choose between three strategies: (a) enter the emerging market in the higher budget (or lower premium) segment, adapting premium products to the local market requirements; (b) enter the emerging market in the low-cost (or lower budget) segment by means of partnering with local OEMs for engineering, sourcing, and production or sales; (c) enter the emerging market in the low-cost (or lower budget) segment, meeting current market requirements only and following it up by exporting the low-cost truck or a second brand to other emerging markets.

This study also points out the most powerful tools to facilitate the truck OEMs globalization efforts as: (a) platform architectures – a one truck concept valid for numerous markets with minor changes, part sharing & platform sharing; (b) networks – decentralized/local purchasing for less critical low value parts from regional suppliers, critical or strategic parts delivered by suppliers with worldwide reach to ensure strong global coordination for exploitation of all market benefits; (c) organization – collaboration between OEMs, integrating engineering, purchasing and other key functions should be fully integrated across the world.

(Dangayach, 2001) Discuss the findings of their extensive survey of selected Indian automotive companies. Although the companies were diverse in terms of their sales volume, product range and geographic location, they also shared some common traits like use of advanced manufacturing technologies and other improvement aspects. The manufacturing strategy processes were analysed, and it was found that their competitive strength was sustained through quality, innovation and delivery. The process of strategy formulation varied among the companies in terms of participants, complexity and degree of formalization; so effectively the approach practiced by each company was different. But it was found that the process of manufacturing strategy was in line with corporate strategy. Using cluster analysis, the companies were classified in four strategic groups, wherein they were termed as reactive enterprise, neutral enterprise, active enterprise and proactive enterprises in terms of their manufacturing strategy. After extensive and rigorous discussions with managers, the study also determines the competitive priorities, order winners and critical success factors. Based on some strategic manufacturing issues, a manufacturing competence index was worked out and a framework for manufacturing strategy was proposed.
(Narayanan, 1998) Published a discussion paper series at the UN University (Institute for New Technologies); #9703; he tries to analyse the effect of the policy of deregulation in India during mid-1980s on various aspects like technology acquisition and competitiveness in the automobile industry of India during 1980s. The various econometric analyses have shown that even under constraints like capacity licensing, the development of competitive skills crucially depended upon the ability to build specific technological competitive advantages. It was found that when new firms depend on intra-firm transfer of technology and promote in-house R&D efforts, it was also found that under a liberal scenario capability of vertical integration drives competitiveness of organizations.

(Thompson P. W., 1995) State that – “New paradigms of work organization espousing a radical break in production systems assert a natural identity between advanced manufacturing and utilization of skilled labor.” The authors of this study entered into a comparative project on the commercial vehicle industry in Sweden, Austria and the UK. The authors try to identify common tendencies in advanced manufacturing (growth in cognitive and extra-functional abilities in context to a team. The study focuses on various routes to the creation of skilled labor with an emphasis on skill formation; things done by firms in labor processes and things done by the state in education and training.

2.5 Summary of Research Gaps

Gaps for 2.1:

The review of the literatures as provided in section 2.1 demonstrates that there are gaps in the discussed studies as they do not cover the relationship between the sale volumes of multi-axle trucks in India and India’s industrial and infrastructural development. To the best of our knowledge the business growth of the transporters has in context of the governmental policies and the transporter’s attitude has not been studied before.

Gaps for 2.2:

The review of the literatures as provided in section 2.2 demonstrates that there are gaps in the discussed studies as they do not cover all the aspects (operational efficiency, financial advantage) of inherent efficiency of multi-axle trucks over the two-axle trucks in the Indian transport industry. Especially financial operational cost benefits across
various types of road and terrain, freight types etc. has not been compared (across various GVW or truck varieties in terms of number of axles) alongside the attitude of the drivers towards safety in the reviewed literature.

Gaps for 2.3:

The review of the literatures as provided in section 2.3 demonstrates that there are gaps in the discussed studies as they do not cover the specific aspects of branding of multi-axle trucks in India. The brand related literature even if it focuses on automotive sector, concentrates on B2C markets, although (Kuhn, Alpert, & Pope, 2008) had refined the Keller’s CBBE\(^{20}\) model, but a CBBE model specifically developed for the trucking industry has not been found.

Gaps for 2.4:

The review of the literatures as provided in section 2.4 demonstrates that there are gaps in the discussed studies as they do not cover the aspects of business model from the supply side as well as from the demand side of the concept of business models. It would be curious to understand the value expectations of the demand side and the general value delivery approach of the supply side.

Justification for the Research Gaps to be addressed:

As discussed in the introduction chapter, the potential of multi – axle trucks to bring down operating costs from Rs. 0.99/tonne km (in case of 2 – axle trucks) to Rs. 0.60/tonne km (in case of 6 – axle trucks) provide a strong motivation to pursue research in resolving the gap areas.

For such a product (multi – axle trucks), in a developing country like India it is important to explore Gap 2.1 aspects as these could help regulators to focus on industrial productivity and connectivity. While manufacturers could benefit from the focus on transporter attitude in terms of product development considerations.

\(^{20}\) Customer Based Brand Equity Model
Addressing Gap 2.2 is important as objective efficiency measurement (in terms of economic vehicle operating cost) across different freight types and terrain types may help respective stakeholders in making a faster transition from 2 axle to multi – axle trucks.

Exploring Gap 2.3 is important as understanding the perceptual difference of brands and its various underlying factors in the consumer psyche may help to formulate better brand strategies. Also, since business is primarily value driven, it is important to understand Gap 2.4 and conceptualize the aspects value expectations in terms of value perceived (by multi – axle truck purchaser) and value provided (by multi – axle truck manufacturer) in an industry catered to and competed upon by several successful Indian corporations and multi – national brands.

2.6 Hypotheses

2.6.1 Literature Review Conclusion – Hypotheses Framing:

Throughout the review it was found that the four areas of interest as put up in section 2, has numerous academic researches, professional researches and governmental studies. But, the same research documents/reports also have research gaps as put up in the ‘observations’ sub – section of sections 2.1, 2.2, 2.3 and 2.4. These research gaps could be further deliberated upon and researched in greater detail to establish the following research null hypotheses:

2.6.1.1 - H1 0: Growth of Multi Axle Trucks in long distance haulage is not related to road and infrastructural development (Derived from research objective: To quantify the impact of road and infrastructural development on the growth of Multi Axle Trucks in India (Section 2.1))

   a. H₁A 0: Growth of Multi Axle Truck is not significantly related to road infrastructure and industrial development.

   b. H₁B 0: Business performance of Multi Axle Truck owners are not positively correlated by government policies and personal perceptions.

2.6.1.2 - H2 0: Multi Axle Trucks do not have inherent advantages (over two axle vehicles) in long haulage routes (Derived from research objective: To capture the
inherent advantages of Multi Axle Trucks (over two axle vehicles) in long haulage applications

a. H2A:0 Multi Axle Truck’s cost of operations is not significantly lower than non-multi-axle trucks.
b. H2B:0 Speed of Multi Axle Truck is not significantly higher than non-multi-axle trucks.
c. H2C:0 Cabin comfort of Multi Axle Trucks with factory made cabin does not result in significantly higher productivity and safety than those of cabins not made up to OEM specifications.

2.6.1.3 - H3:0 Brand image has no impact on purchase decision (Derived from research objective: To quantify the impact brand image has on purchase decision of Multi Axle Trucks.)

a. H3A:0 There is no significant positive correlation between Brand image and customer perception.
b. H3B:0 There is no significant difference between key buying factors related to the brands Tata and Ashok Leyland.

2.6.1.4 - H4:0 Business models of the top three Multi Axle Truck Manufacturers in India are not different from each other (Derived from research objective: To understand the differences in the Business models of various Multi Axle Truck Manufacturers in India.)

a. H4A:0 Customer value perceptions are not significantly different across the major truck brands of India.
b. H4B:0 Business Models of the top three Multi Axle Truck Manufacturers in India are not different from each other.

2.6.2 Hypotheses Elaboration:

The Hypotheses mentioned in 2.6.1.1 to 2.6.1.4 have been put forward after due literature review and these hypotheses also have their theoretical justification as well.
The null hypothesis, $H_1$: ‘Growth of Multi Axle Trucks in long distance haulage is not related to road and infrastructural development’ – was put forward after reviewing the academic work of (Hossein Rashidi, 2012), (Bloemhof, 2011) and (Thukral, 2005). The researchers were also motivated by the suggestions and deliberations by (Ministry Of Road Transport & Highways, 2011), (Sectoral Innovation Council (Ministry Of Road Transport & Highways), 2010) and (Working Group on Road Transport, 2011). It has been noted in established economic literature that economic infrastructure has positively affected the GDP of an economy, it is also seen that GDP positively affects the heavy truck production of a country. So, this null hypothesis is considered for further deliberation to ascertain the truck production aspects as well as attitudinal/behavioural aspects of operators.

The null hypothesis, $H_2$: ‘Multi Axle Trucks do not have inherent advantages (over two axle vehicles) in long haulage routes’ – was put up after reviewing the academic work of (Lumsden, 2004), (Londoño-Kent, 2009), (Knight, 2010), (Grislis, 2010) and (Kumar, 2014). The exhaustive institutional studies conducted by (AITD; CIRT, 2000) and (RITES Ltd., 2014) also greatly motivated to develop this hypothesis. In fact, the datasets used by (RITES Ltd., 2014) also proved to be a source of secondary data for the required consequent data analysis. Since, the multi – axle trucks are a livelihood product for a transporter who needs it to be safe, economical, reliable. As a B2B product the need of the customer (transporter) is to have a product that can provide him better returns through lower cost of operations and higher tonnage capacity in comparison to a non – multi – axle truck. So, this null hypothesis is considered to determine whether multi – axle trucks do indeed have meaningful advantage in terms of relevant parameters.

The null hypothesis, $H_3$: Brand image has no impact on purchase decision – was put up after reviewing the academic work of (Keller, 2001), (Kuhn, Alpert, & Pope, 2008), (Marquardt, Golicic, & Davis, 2011) and (Krig & Stenström, 2001). As discussed in the previous chapters the multi – axle trucks are a B2B product, but Brand has been observed to be an important aspect even for B2B products. This was an inspiration to incorporate a brand related null hypothesis and work towards determining the different factors that drive the buying decision of the transporter.

The null hypothesis, $H_4$: Business models of the top three Multi Axle Truck Manufacturers in India are not different from each other – was put forward after
reviewing the academic work of (Zott, Raphael, & Massa, 2011), (Schafer, Smith, & Linder, 2005), (Bradley & Wood, 1994), (Monroe, 1979) and (Ziethmal, 1988). Across
the plethora of diverse approaches towards Business Models, the perspective of value in
terms of Quality and Price was found to be interesting and so this hypothesis was deemed
meaningful to be further worked upon to understand the perception of value and price
among transporters and the product portfolio offered by manufacturers.