

Innovation on Wheels in Emerging Economies: Lessons from Auto MNC's Experience

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Abstract

Emerging economies (EEs) are increasingly being considered as new sources of growth and innovation opportunities for global auto multinational companies. Many multinational companies from developed countries are eager to prosper in these economies. However, the crucial challenge that companies face today is to identify what precisely are the approaches required to serve mass market customers in EEs. In this research, the case study of a foreign auto multinational operating in India has been utilized. Focusing on the product innovation for the Indian masses with the creation of the most affordable car 'Figo' from the reputed auto multinational Ford, this analysis reveal the importance of engaging same set of suppliers in trust based, recurrent collaborative linkages to enhance the innovative performance. In addition, ensuring an effective value-for-money proposition is needed to achieve innovations with required affordability and acceptability criteria. Furthermore, experimenting with modules and resultant learning about markets are needed to enhance the innovative performance. With the suggested testable propositions, this study has significant theoretical contributions as well as implications for managers of aspiring companies intending to serve EEs.

Keywords: emerging economies, case study approach, mass market customers, trust based and recurrent collaborative linkages, value-for-money proposition, experimentation with modules, market learning

1. Introduction

How potential auto multinational companies (MNCs) can develop appropriate innovations for the mass market customers in emerging economies (EEs) is a vast strategically significant question in the auto industry today. In recent times, there has been a dramatic shift of the global economic power towards the less developed, low income and rapidly growing economies known as the EEs (Cavusgil et al., 2002, Hoskisson et al., 2000). Mass markets in EEs are considered to be the largest untapped markets with substantial of opportunities. However, much is still need to be explored in the academic literature about the opportunities and challenges that foreign multinational organizations face, which intend to engage with these markets. The few MNCs that have entered EEs with minor adaptations of their highly specified products have invariably overshoot the requirements of customers therein. In other cases, their simplistic pricing strategies of converting world prices into domestic currencies have ended up serving only the affluent few, with little consideration about the purchasing power prevailing among less affluent consumers or their precise technology needs (Arnold & Quelch, 1998; London & Hart, 2004).

In recent times, India has emerged as one of the world's fastest-growing passenger car markets in the global automotive industry and remains a preferred location for auto MNCs to develop frugally engineered products for the masses (Lee & Anderson, 2007; Mishra & Sahay, 2010). However, the existing literature, both theoretical and empirical, does not provide adequate insight as to what should be the approach by foreign auto multinationals for developing innovations to meet the unique price-performance criteria of mass market customers. Indeed, the extant literature has yet to map the intricate and empirical processes involved in creating suitable auto innovations for mass markets in EEs.

The aim of this study is to fill this gap in the literature. This article is inspired by the research question: *How potential auto multinationals can develop suitable auto innovations for emerging economies?* To this end, we undertake a case study and focus on the product innovations involving the creation of the most affordable

passenger car 'Figo' by Ford for India and other EEs. First-hand and long-term empirical evidence gathered in a fieldwork process has been utilized in this study. The findings make at least three contributions in this article. First, this study contributes to the academic literature by identifying the specific approaches required for EE innovation from a firm level perspective of a foreign auto multinational. Second, summarizing from the case analysis, this study proposes a conceptual framework of developing suitable auto innovations in EEs. Third, the propositions derived from the analysis of the auto MNC's case is useful in addressing an unexplored area in innovation literature. Through these contributions, the study is also valuable in offering practical guidelines to the prospective managers to develop innovations for mass markets.

The article starts with the theoretical background of the study. Following this, the methodology entailing the research study is outlined. In-depth case study of a foreign auto MNC operating in India is then presented. This is followed by an analysis and discussion along with propositions to advance research in this area. Finally, the article concludes with summarizing the major findings, contributions to the literature along with some limitations and directions for future research.

2. Literature Review

It is a well-established fact that the existing environmental and socio-economic characteristics in EEs make innovation challenging for firms (Khanna & Palepu 2006; Sharmelly & Ray, 2016a, b; Sharmelly, 2016). EE customers demand reasonable products with simpler specifications to meet their essential requirements (Dawar & Chattopadhyay, 2002; Prabhu & Krishnan, 2005; Prahalad & Lieberthal, 2003; Petrick, 2011). Such customers also demand products that are convenient to use, adequately robust and which can be repaired and maintained locally. Generally, mass customers from EEs favour durable products with long consumption cycles (Petrick, 2011; Prabhu & Krishnan, 2005).

Companies intending to design products and manage costs for the mass customers in EEs need to consider that income constraints are often the fundamental limitation that severely constrains the ability to pay and therefore create major challenges. Mass customers can be willing but not able to pay (Seelos & Mair, 2007). This is in contrast to developed markets, where companies are usually not concerned about the willingness of customers to pay for products and services. The general tendency for MNCs is to overestimate the purchasing power of the mass customers and set prices too high (Karnani, 2007) for products embodying superior features and specifications. Most customers are therefore poorly served by low-quality vendors or are actively exploited by intermediaries (London & Hart, 2008).

Moreover, top management of incumbent firms are reluctant to commit resources since their world view is largely shaped by their current business success and their entrenched value networks in existing technologies and product-markets. Leading firms measure their potential market size and growth rate only to understand their sophisticated customers better – ignoring possibilities for innovating simpler and more affordable technologies for mass markets in EEs (Christensen et al., 2001; Slater & Mohr, 2006). Existing conventions and routines of incumbents pose difficulties in analyzing and responding to opportunities existing in the EEs (Henderson, 2006). Therefore, firms find it extremely challenging to allocate resources to serve new customers at significantly lower profit margins (Henderson, 2006). How to meet the demand criteria of mass market customers in EEs therefore remains a daunting challenge to many companies from the developed world which are yet to realize the full benefits of these mega-markets (Christensen et al., 2001; Slater & Mohr, 2006).

Although researchers from diverse fields have studied innovation management in EEs, it is not explored how foreign auto MNCs can organize appropriate innovations in those countries for the mass customers. Over the last century, the motor car has shaped the global economy and has become an indispensable part of people's lives. In the auto industry, the 'economic center of gravity' and sources of profits have shifted from the developed world to EEs such as Brazil, Russia, India, China and South Korea (Lee & Anderson, 2007). These emerging markets are poised to significantly outpace growth in developed markets such as North America, Europe and Japan, with the share of global sales in EEs rising 65% in 2012. By the year 2020, it is predicted that emerging markets will account for approximately two-thirds of the total automotive profit (Lee & Anderson, 2007).

The Asian share of the global middle-class customer segment will double from 30% to 64% by 2030, whereas that of the US and Europe will decrease to 22%. At the time of writing, the contribution of Asia to global auto production had increased from 20% to 50% in one decade, with India predicted to soon become the second largest car producer in Asia, after China. Auto MNCs have been shifting their production bases from high-cost developed countries such as the US, Japan and Western Europe to low-cost emerging countries such as China and India, to minimize their costs and maximize their revenue (Brown et al., 2006; Lee & Anderson, 2007). Analysts estimate that producing cars in India today is 15–20% cheaper than in the US. There is also a clear shift

in global consumers' preference for smaller, compact and fuel-efficient vehicles. More than 60% of this market is located in EEs, where strong growth of up to 6% per year is estimated until 2020 (Brown et al., 2006; Lee & Anderson, 2007; Mishra & Sahay, 2010). However, little attention has been given to investigating how foreign autos MNCs develop innovations for the mass markets in EEs, especially from a micro perspective or at the firm level.

In general, studies in regard to innovation management suggest that a vast network of trust based partnerships enables the innovator firm to share costs and risks associated with the untested products and markets such as emerging markets (De Man & Duysters, 2005; Gulati, 1998; Hitt et al., 2000a; Quinn, 2000; Schilling & Steensma, 2001). When partner firms exchange information through a transparent and honest approach, trust is built within the alliance network (Faems et al., 2008). Trust intensifies with increased familiarity and interaction (Gulati, 1995). Trust-based relationships eventually reinforce cooperation and performance in the partner firms (Ring & Van de Ven, 1992) and this enables a focal firm to access proprietary knowledge from alliance partners. Firms have a significant tendency to form recurrent and long-term alliances with former partners, based on familiarity and trust, to reduce uncertainties in their relationships. Moreover, alliances based on trust, loyalty and reciprocity improve the transmission of knowledge and innovative performance (Dyer & Nobeoka, 2000; Phelps, 2010) and generate enhanced relational value (Schilling & Phelps, 2007).

Moreover, the capability to use modular architecture is important because of the presence of multi-tiered market segments in EEs with continuously evolving niches of customer preferences and income parameters (Sharmelly & Ray, 2013; Sharmelly et al., 2013). The capacity to utilize modular architecture allows the innovator to calibrate new offerings precisely corresponding to the demand profile of each market segment. It allows the flexibility to cater to both the low-performance requirements of mass markets and the more demanding upper-tier mainstream markets. This is an important determinant for mass market innovation. Further, building in standard interfaces through modularity enables future upgrading of product features and functionality and enhances its potential to disrupt established mainstream markets (Christensen, 1997; Christensen & Raynor, 2003; Christensen et al., 2002). From the perspectives of learning, the higher the technical complexity of a product, the more necessary it is for the module suppliers to become involved in the assembler/manufacture's engineering activities from the very beginning. This supplier-buyer interdependence leads to inter-firm learning as both parties rely on each other's expertise to ensure successful introduction of the innovation into the market (Mikkola, 2003).

In the context of EE innovation, a handful of recent studies have described the EE innovation strategies utilized by firms (Hang et al., 2010; Rao, 2013; Ray, 2010 & 2011; Wooldridge, 2010; Zeng & Williamson, 2007; Bound & Thornton, 2012; Chattopadhyay et al., 2012; Govindarajan & Trimble, 2012; Sehgal et al., 2010; Zeschky et al., 2011; Zeschky et al., 2014). Although these earlier studies focused on key aspects of design, technology and organizational choices that are likely to be critical for innovations, thus far little attention has been devoted to identifying the precise approaches required for suitable automobile innovation in EEs in the light of detailed empirical evidence.

2. Method

2.1 Research Design and Case Selection

A qualitative case study approach was adopted to explore how potential auto multinationals can develop suitable innovations for EEs. Using the case study research method was justified as this approach enabled to draw empirical evidences from the case of an auto MNC to gain deeper insights of the context along with rich data (Dyer & Wilkins, 1991; Yin, 1984). To address the central research question, the case study of Ford India was used for at least two reasons: First of all, India is emerging as one of the world's fastest growing passenger car markets in the global auto industry and will soon take the place of second largest car producer in Asia, after China. Moreover, Indian automotive industry is one of the strategic sectors of the Indian economy (Lee & Anderson, 2007; Mani, 2011). Hence, the auto industry provides a thought-provoking context to investigate the innovation management of a foreign multinational.

Second, Ford India was chosen as the sample firm since Ford India is the sixth largest player in the Indian automotive industry (SIAM, 2014). Therefore, this in-depth case study allowed to produce convincing empirical findings having the potential to be empirically tested in similar contexts. Table 1 below provides a brief overview of the firm.

Table 1. Key data on the sample firm

Firm	Founded	Industry	Ownership	Key Products	Markets Served	Revenue, 2014
Ford India Private Ltd	1995	Automotive	Private	Escort, Focus, Mondeo, Endeavour, Eco Sport, Fiesta, Figo	Asia, South-east Asia, Africa, Latin America, South America	USD 135.8 billion

Source: Interviews, Ford India Annual Report.

3.2 Data Collection and Triangulation

Visiting Ford India's headquarter and manufacturing plant in India in 2014, data was collected using semi-structured interviews which allowed flexibility for the managers to raise and discuss questions (Lincoln and Denzin, 2005). Interviews were conducted face-to-face with middle level, top level managers and with top management (Table 2).

Table 2. Interviewees from ford India private Ltd

Interviewee Designation	Ford India Department
President and Managing Director	Top Management
Executive Director	Top Management
Senior General Manager	Engineering
General Manager	Engineering
Deputy General Manager	Strategy
Manager	Strategy
Department Head	Innovation and Product Planning
Manager	Innovation and Product Planning

The interviews lasted between 45-60 minutes. For the sake of consistency, an interview schedule was developed. Several key persons were interviewed more than once which verified the previous transcripts for accuracy. All the interviews were tape-recorded. Internal validity of the data was confirmed by addressing observed discrepancies and clarifying them with respective interviewees. As suggested by (Berg et al., 2004), reliability was confirmed by disclosing the data collection methods in detail for replication. Collected interview data was analyzed using qualitative content analysis approach which is the most effective way to confirm extensiveness (Miles & Huberman, 1994).

For data triangulation, additional material such as company annual reports, internal documents and presentations received from the interview participants or which were publicly available were also analyzed. This triangulation of various types of data acted as a method to cross validate information obtained from interviews and increase the construct validity and reliability of the research (Denzin, 1978).

3.3 Data Analysis

After the data collection, all interviews were transcribed verbatim. In the first stage of analysis, the primary interview transcripts were reviewed, coded and triangulated with company documents and information from multiple sources. The codes were grounded in how the interview participants described innovation management approaches in the automotive vehicle development for India and other EEs. Consequently, a set of themes for framing the analysis was derived going through the individual transcripts iteratively and comparatively (Yin, 1993). From the interview data, the case study of the firm was developed. Adopting an iterative research approach, the researcher checked with informants that the information presented in the case studies is correct to support the validity of findings (Miles & Huberman, 1994).

4. Ford India Case

Ford India Private Limited, a wholly owned subsidiary of the American Ford Motor firm was established in 1995 and started production in 1996 (Madhavan, 2012; Sarkar, 2010). The firm's headquarter is located at Chennai, India. Presently Ford is the sixth largest automaker in the Indian market. Current models of Ford India consists

of the sedan and hatchback form of Ford Fiesta, Escort, Focus, Mondeo, the midsize SUV-Ford Endeavour, the SUV-Ford Eco sport and the small car Ford Figo with its variants Figo New and Figo Aspire. Due to the lack of value-for-money positioning, success in the Indian market came late for Ford India. Adopting a strategy of local engineering, higher level of localization, value engineering and ensuring low cost of ownership, Ford innovated its game-changer model Ford Figo. Targeting more than 65% of India's new vehicle buyers, Ford Figo helped drive growth in the Indian market (Sarkar, 2010). Former President and Managing Director of Ford India, in this regard commented:

"Ford Figo is targeting the middle class customers of India because middle class is growing due to increased level of GDP per-capita of US\$4,500-6,000. People are moving from a two-wheel vehicle to four-wheelers. This increased GDP per-capita level gave us confidence as the middle class customer segment will continue to grow. Not surprisingly, 65% of our Figo customers are first time car buyers moving from two-wheel vehicles, and who have never driven a four-wheeler before. Positioning Figo as value for money was a big factor for its success".

Together with its success in India, the Figo is being exported to over 37 international markets. With the Indian car market estimated to grow from 2.3 million vehicles in 2011 to 9 million by 2020, Ford expects India to become its third largest market after the US and China by then (Madhavan, 2012, Sarkar, 2010).

4.1 Supplier Engagement and Mutually Reinforced Trust

Ford sustained strong collaborative linkages by proactively developing both global and local supplier bases for automotive vehicle component design and manufacturing. According to a General Manager of Ford India, the suppliers were engaged from the very early stages, participating in the vehicle module manufacturing and trial productions. Innovative efforts of Ford were thus strengthened through recombining and thereby generating new knowledge more competently. These efforts helped Ford to achieve affordable mass market innovation. In his own words:

"We formed a number of linkages for mass market projects and we worked very closely with our suppliers to get high quality components at the appropriate cost level".

As an example, for developing the Ford Figo which is a small and affordable car for the Indian mass customers launched in 2010, the company formed a number of linkages with the component suppliers. Ford accumulated learning and partnering experience of working with mostly the same suppliers during the 2000s for the development of the Ford Endeavour, Fiesta Classic, and Fiesta. In this regard, one Deputy General Manager explained that, previously Ford used to import the power train of engines from the US. However, it was not an acceptable scenario to get the cost base attractive to the targeted Indian customer segment. Afterwards, Ford formed an alliance with Jai-Hind, which is an Indian automobile product manufacturer specializing in fabricating engine parts. Ford worked closely with Jai-Hind on the block and head casting of engines. Along with its Indian supplier, Ford also worked with global suppliers such as Visteon for air-conditioning systems, Bosch and Siemens for power train, and Johnson Controls for seating system. Thus, the learning experience from prior alliances influenced Ford greatly to engage in partnerships with the supplier base, capitalizing on their proven functional expertise and core competencies.

The collaborative linkages among Ford and the suppliers were based on trust, which eventually facilitated the transmission of specialized knowledge among the partners. Moreover, trust-based prior relationships from early projects influenced Ford to form recurrent linkages with the same suppliers for subsequent projects. In this connection, Executive Director of Ford India observed:

"Ford used common suppliers as much as possible across the entire product line. We work together with the best local and global suppliers who are known for their innovativeness and cost effectiveness".

The linkage relations not only assisted Ford to come up with mass market vehicles through capitalizing on a broad variety of critical skills, but also benefited suppliers and equipment manufacturers. One Manager in this regard said:

"Working closely with Ford gave a fantastic chance for partners such as Jai-Hind to grow their own business, as they could demonstrate their capacity. We have got a mix of local and global suppliers and it was very effective because of trust".

4.2 Ensuring Value-for-Money Positioning

For the Indian market, Ford used to bring the vehicles already designed, developed and manufactured for foreign markets, doing some small adaptations. As a result, Ford India could not come up with the vehicles meeting the required price-performance specification of the Indian mass customers. In this regard the former President and

Managing Director explained:

“Nearly 70% of all cars sold in India are small cars. We have been around for long time- learning, and weaving our experiences, on what India is all about. A few years back, we started working hard on our value-for-money positioning to ensure affordability. The strategy was to achieve higher level of localization, do local engineering and value engineering” (Sarkar, 2010).

For doing so, Ford engineers experimented with employing low cost and lightweight components wherever possible. In the own words of Ford India’s former president and Managing Director:

“Our innovation strategy also goes in terms of significant localization of the vehicle components, parts which is 85% local manufacturing in India to bring down the cost of ownership. In terms of value engineering, our engineers make sure that vehicles from Ford comply with the requirements of Indian mass customers. So, we design accordingly to create value for customers upfront rather than taking a high cost vehicle and trying to get the cost down. With localization, the parts are available much easily and at much lower costs. In addition, we benchmarked the parts replacement with the best-in-class and did value engineering, not just to address the price positioning but also to bring down the cost of ownership” (Sarkar, 2010).

Furthermore, Ford India undertook numerous experiments using lightweight and many discrete components in their vehicle design. In this way, Ford India ensured the affordability criteria for the Indian mass customers while significantly enhancing the performance and agility of its vehicles. In this connection, Head of the Product Planning explained:

“We have deployed lightweight components wherever possible in the vehicle design. For example, we have used all aluminium body panels. In terms of power train technology, engine and transmission technology, we have used aluminium cylinder head and block to make the vehicle lightweight, rigid and fuel economic. Using such lightweight material has reduced vehicle weight by roughly 15% and has made it possible to go further on a gallon of gasoline, boosting fuel economy”.

4.3 Modular Architecture in Vehicle Design and Experiments with Common Modules

Ford’s ability to acquire detailed architectural knowledge of the overall vehicle design well in advance ensured that the modules interacted with each other in the complete vehicle system and achieved the desired overall functionality. Ford engineers experimented with employing common components/modules for a range of different car models. Ford also re-engineered a common platform known as “One Ford global product development system” to design a range of base vehicles comprising identical components that were interchangeable for maximum flexibility in design, installation and repairs. Later on, various other add-ons were incorporated to design different vehicle derivatives. In the own words of Ford India’s former president and Managing Director:

“As part of our global platform strategy a range of Ford vehicles such as Fiesta, Fusion, and Figo are developed with the same base vehicle deploying common parts. We then produce different derivatives of the base vehicle by changing the top-head of the car- integrating accessories and adding a variety of features. In this way more choice in terms of technology and functions are available to the customers. Exploiting common vehicle components gives us the advantage of achieving economy of scale”.

Further, one Senior General Manager, speaking on modularity, observed:

“Indian customers are not only concerned of purchasing price but also immensely focus on vehicle ownership cost such as, fuel economy, service cost, warranty cost and reselling price across the entire product life cycle. So the ownership cost is equally important to purchasing cost. Understanding this customer requirement we implemented the ‘Child Part’ strategy. Traditionally, the whole air-conditioning system of our vehicle needed to be replaced if anything went wrong. With the Child Part strategy, we broke the air-conditioning into 15 different parts so that any single erroneous part can be replaced rather than replacing the whole system. So, this is exactly a modular architecture. We have adopted this modular architecture for 36 different critical systems of the car”.

Another Manager explained that in India lots of road accidents happen, damaging car exteriors. Since the doors of Ford vehicles were modular, it allowed any car owner being hit in the door to simply replace the skin of the door. That is the outer part of the door can come out and the inner part remains untouched. Thus, modularity in the car design contributed considerably to reducing the cost of vehicle ownership and service maintenance for the customers.

5. Discussion and Analysis

From the case of Ford India the motivation to engage with suppliers forming trust based collaborative linkages is evident. To economize on resources and reduce uncertainty relating to the development of new innovations for serving low-income mass customers, innovation for EE requires 'social embeddedness' (Seelos & Mair, 2007). This can be achieved by leveraging existing building blocks of local resources and capabilities through collaborative linkages (Gulati & Sytch, 2007; Hitt et al., 2000b; Schilling & Steensma, 2001). Partnerships facilitate innovation by lowering costs and uncertainties relating to the development of new products, sharing the risk of a particular venture and thus enhancing flexibility (De Man & Duysters, 2005; Gulati, 1998; Hitt et al., 2000a; Quinn, 2000; Schilling & Steensma, 2001). Often, ground-breaking sources of information and suggestions can be obtained from the collaborative partners of the focal firm, ultimately being transformed into the ideas of innovative products and services (Dyer & Nobeoka, 2000; Eisenhardt & Martin, 2000; Dyer & Singh, 1998).

As pointed out before, when partner firms exchange information in a transparent approach, trust is built within the alliance network (Faems et al., 2008). Trust facilitates cooperation, transmission of proprietary knowledge and strategic resources ((Dyer & Nobeoka, 2000, Phelps, 2010; Ring & Van de Ven, 1992). Furthermore, firms have a significant tendency to form recurrent and long-term alliances with former partners, based on familiarity and trust, to reduce uncertainties in their relationships (Dyer & Singh, 1998; Gulati, 1995; Gulati, 1999; Gulati & Wang, 2003).

Ford accrued the abilities to form collaborative linkages by partnering with the same set of auto suppliers for the development of a range of Ford cars such as Ford Endeavour, Fiesta, Fiesta Classic and Ford Figo since 1996. The auto maker relied on its intra-firm and global linkages to ensure strategic industry positioning, quality and differentiation of its various subsidiary products. Both local Indian and global suppliers were engaged from the very early stages of vehicle module manufacturing. This enabled Ford India to capitalize on the broad areas of vendor skills to innovate high quality product at the appropriate cost level. From the comments of the interview participants it is apparent that engaging in open, trust based collaborative linkages motivated Ford India to form recurring linkages with the same suppliers and leverage a number of strategic key resources, such as technology, market specific information and knowledge from the suppliers without which it was impossible for the company to manage the sturdy defies of innovation for the Indian mass customers.

Therefore, the following proposition is developed:

Proposition 1: *In the context of mass markets in EEs, foreign MNC's capacity to engage same set of suppliers in trust based, recurrent collaborative linkages is positively associated with its innovation performance.*

Generally, total ownership cost of a vehicle and product excellence reputé are the two significant factors in a customer's vehicle purchasing decision (Chattopadhyay et al., 2012). More specifically, in the context of EEs, millions of middle class mass customers wishing to upgrade from two-wheeler vehicles including motorbikes, scooters to all-weather safe four-wheeler car for the entire family prioritize the total ownership cost which includes purchasing cost, resale value and maintenance cost even more earnestly. Hence, auto MNCs aiming to innovate affordable cars for EE customers need to offer an economical and functional value proposition (Johnson et al., 2008). Principally, EE consumers favour robust vehicles with long consumption cycles to reduce the total ownership costs (Prabhu & Krishnan, 2005; Petrick, 2011).

In the case of Ford India, for developing a range of Ford cars such capacity is demonstrated by Ford India's approaches of high level localization of the Ford vehicle components, value engineering, local engineering of car modules and utilizing lightweight materials in vehicle design to ensure a value proposition that satisfies the distinctive price-performance conditions of the mass customers in EEs. Hence, the following is proposed:

Proposition 2: *In the context of mass markets in EEs, foreign MNC's capacity to ensure value-for-money proposition is positively associated with its innovation performance.*

The ability to exploit existing building blocks of knowledge in different ways becomes very useful when large parts of the underserved market segments require different product specifications. Modularity allows firms to configure new modules and introduce varied features and functionalities (Christensen et al., 2002). It allows engineers to create families of parts that share common characteristics, thereby reducing development costs for future generations of products, enabling substantial flexibility and promoting continuity (Baldwin and Clark, 2003). The goal of modularity is to create a design that can serve as the basis for a number of product variations with different performance and cost characteristics to serve different customer segments (Sanchez, 1995; Sanchez & Mahoney, 1996). Creating modular product architecture requires a high level of architectural

knowledge about how components function and interact in a product (Sanchez & Mahoney, 1996). And, creating a new modular product architecture involves learning by experimenting with new component designs and alternative arrangements of components (Baldwin & Clark, 1994). In this way, modular product design enables a firm to accelerate its learning (Sanchez & Sudharshan, 1993).

For the case of Ford India it is evident that a detailed architectural knowledge of the overall car design comprising relevant car modules and their interactions in the complete vehicle system, helped the firm to re-engineer its global platform system “One Ford global product development system”. Through re-engineering this global, common platform, a range of Ford vehicle variations such as Fiesta, Fusion and Figo were designed experimenting with employing common components/modules for a range of car varieties, applying cosmetic changes, changing external car accessories and a variety of features. The car modules were also interchangeable for maximum flexibility in design, installation and repairs. This allowed Ford India to improve its learning about EE markets and produce different derivatives of a base vehicle offering more varieties of technology and functionalities appropriately suited in the context of multi-tiered markets in EEs. This leads to the following proposition:

Proposition 3: *In the context of mass markets in EEs, foreign MNC's capacity to experiment with modules and resultant learning about markets is positively associated with its innovation performance.*

Summarizing from the case analysis and discussion, in Figure 1, we propose a conceptual framework of developing suitable automobile innovation in EEs.

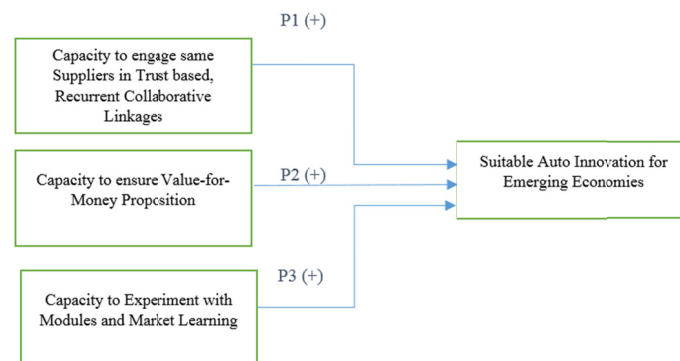


Figure 1. A conceptual framework of suitable auto innovations in emerging economies

6. Conclusion

To conclude, this article makes a number of contributions to the literature of innovation management in EEs. First, from an empirical micro perspective, the key approaches facilitating an MNC's affordable automotive innovation management for India and other EEs are outlined. Second, the proposed conceptual framework is useful in addressing an unexplored area in innovation literature for suitable automotive innovation in EEs. Third, this study formulates a set of testable positions on the innovation management methods by a foreign auto MNC to advance research in this subject and that also hold valuable suggestions for managers of aspiring firms intending to serve EEs.

Logically, like all other empirical research studies, this study also has limitation which suggests promising further research opportunities. As this research is based on a sole case study, the results of this study cannot be generalized beyond the formulation of testable propositions. Subsequently, larger sample comprising of more case studies would definitely advance our knowledge of how foreign MNCs facilitate suitable innovation in the EEs.

Second, being a single country study, the question is to what extent its findings can be generalized across other EEs. The institutional environment, policy framework and the role of government differ from country to country; hence it is not always possible to confirm whether what worked in the context of a specific country will work in another. These limitations imply directions for future research.

Further research could explore this issue investigating more firms from various industries in addition to the automotive industry focusing on other EEs. In this regard, examining automotive industry of other emerging economies such as China, Brazil, Russia and multiple other technology intensive industry studies involving more

EEs is required for a future comprehensive investigation. Another useful extension of this research would be to test the propositions across an industry population in order to statistically validate the qualitative findings obtained from this case study.

To conclude, this study has contributed to the emerging body of literature aiming to understand what specific approaches are required to create suitable auto innovations for mass markets in EEs. By examining the case of a reputed auto MNC innovating vehicles for India and other EEs, our study contributes towards the innovation literature which largely focus on how MNCs disseminate existing product innovations in EEs. The findings of this research study are also likely to be providing actionable knowledge for business practitioners.

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