

Organizational Capabilities for Mass Market Innovations in the Emerging Economies: Insights from an Automobile Firm in India

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Of late, there has been a dramatic shift of world economic power towards less-developed countries, in particular, emerging economies (EEs). The growing influence of EEs is shifting the global competitive landscape, as these new economies are a great source of opportunity, inspiration and innovation. However, companies face the challenge to identify what organizational capabilities are required to serve mass market customers to meet their unique demand and price-performance conditions. In depth empirical studies in this context are largely unexplored in the academic literature. Focusing on the product innovation for India and other EEs with the creation of passenger vehicles from the Indian multinational automaker- Mahindra & Mahindra, our analysis highlights that capabilities to recombine are required to achieve an altered price-performance package. Furthermore, linkage capabilities are required to economize on resources. Also, capability to modularize is required for product performance improvements to serve multiple tiered customers. Using case study design, our study aspires to contribute to the innovation literature on mass markets formulating a set of testable propositions to advance research in this subject.

1. Introduction

Rapidly growing emerging economies (EEs) such as China, India, Brazil hold immense opportunities for innovators (Prahalad, 2010, Prahalad and Hammond, 2002, Hart and Christensen, 2002). The past decade has seen an increase in the amount of research focused on and around EEs and their rising levels of competitiveness in the global marketplace. Furthermore, literature has been documenting a growing number of successful innovation stories that originate in EEs (Kumar et al., 2013).

Innovation opportunities in EEs are often overlooked by the established firms as they fail to foresee the prospects. Being persuaded by their most profitable and largest high end customers, established firms are 'held captive by their customers' (Christensen, 1997). Therefore, companies find it extremely challenging to allocate resources for taking endeavours to serve mass customers at significantly lower profit margins.

Existing literature suggests that firms should augment their organizational capabilities to develop innovations for the EEs (Ray and Ray, 2011, Slater and Mohr, 2006, Henderson, 2006). Moreover, the capabilities literature emphasizes the critical role of organizational capabilities for rapid product innovations (Amit and Schoemaker, 1993, Eisenhardt and Martin, 2000, Kogut and Zander, 1992, Leonard-Barton, 1992, Teece and Pisano, 1994, Teece et al., 1997, Dosi et al., 2000). However, the existing literature, both theoretical and empirical, has paid little attention to identify what precisely are the organizational capabilities that enable innovators to meet the unique price-performance criteria of the EE customers. More specifically, major gap is the lack of a structured framework vis-a-vis the empirical evidence presented by scholars, which suitably illustrates the capabilities to be honed for designing and developing innovations for the mass customers. Our study intends to fill this gap.

This paper is inspired by the research question ‘what precisely are the organizational capabilities required by firms to create affordable and functional innovations for EEs?’ Utilising first-hand and long-term empirical evidence gathered in a recursive fieldwork process, we utilized case study method to investigate the approach of how an Indian automaker Mahindra & Mahindra (M&M) developed affordable passenger vehicles for India and others EEs.

Our findings make at least two contributions in this paper: first, we contribute to existing literature by identifying the key organizational capabilities required for EE innovation from a micro perspective rather than providing anecdotal evidence and thereby respond to the call for more case-based insights in this young research area (Hang et al., 2010). Second, we develop propositions to observe the patterns of capability development for mass market innovations. The set of specified propositions represent elements of the proposed conceptual framework to observe the patterns of capability development for mass market innovations. The study is therefore useful in terms of providing actionable knowledge that may guide practitioners to nurture the required organizational capabilities.

The paper continues with a section on literature review to understand the demand criteria for innovation in mass markets. The research methodology is presented next. Following this, comprehensive case study of an emerging market firm (EMF) is presented. Next, the case analysis and discussion is continued. Finally, the paper delineates some significant propositions, managerial implications for the prospective innovating firms and closes with considerations for future research.

2. Literature Review

Product innovation for mass markets at the EEs presents many challenges due to the existing institutional, socio-economic, and environmental characteristics. Mass market customers want products with simpler specifications and functionalities. They are reluctant to pay for needless frills and features that add to additional costs (Dawar and Chattopadhyay, 2002, Prabhu and Krishnan, 2005, Prahalad and Lieberthal, 2003). Mass customers also demand products that are robust and look for affordable, functional and durable products with long consumption cycles that can be repaired at the local level (Prabhu and Krishnan, 2005).

Due to such challenges, only a handful of firms have embarked on innovation in EEs so far. A couple of recent studies have focused on strategies deployed by firms to create innovations for the mass

customers in EEs (Hang et al., 2010, Rao, 2013, Ray and Ray, 2010, Ray and Ray, 2011, Wooldridge, 2010, Zeng and Williamson, 2007). A key element of these strategies is a deliberate constraint on and the frugal use of resources (Bound and Thornton, 2012, Chattopadhyay et al., 2012, Govindarajan and 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 innovation for the EEs, little attention was devoted to identifying organizational capabilities necessary for pursuing such innovations.

In general, the concept of organizational capability refers an organization's ability to fill the gap between their intentions and outcome using organizational processes (Dosi et al., 2000). More specifically, organizational capability can be defined as the firm's capacity to deploy resources such as organizational knowledge and skills of its human capital to perform desired output activities, such as innovating new products and services (Dosi et al., 2000). Organizational capabilities have been categorized in various ways by a number of authors. For example, as 'capabilities' by (Amit and Schoemaker, 1993), 'combinative capabilities' by (Kogut and Zander, 1992), 'integrative capabilities' by (Lawrence and Lorsch, 1967) and 'architectural competence' by (Henderson and Cockburn, 1994).

Based on capabilities, firms differ in the way they coordinate their activities which ultimately have a significant impact on their innovative performance (Teece and Pisano, 1994, Teece et al., 1997, Dosi et al., 2000). Henderson and Clark (1990) for example, have shown that architectural innovations which require new ways to coordinate engineering tasks are often introduced by new entrants instead of the well-known MNEs. Likewise, failure to develop new technologies by the large MNEs often stems from the variance between their established routines and advancement of organizational capabilities to integrate resources in novel ways.

Although it is generally accepted that innovating firms possess capabilities that enable them to adapt, redeploy and incorporate technical, managerial and functional resources for a multiplicity of product innovations (Amit & Schoemaker, 1993; Kogut & Zander, 1992; Teece & Pisano, 1994; Teece et al., 1997), thus far little attention has been devoted to identifying the precise organizational capabilities required by firms for EE innovation. In an attempt to address this major gap in the academic literature, in the present study we draw upon the key aspects of design, technology and organizational choices identified as critical for EE innovation in the earlier studies (Ray & Ray, 2010; 2011) to propose a set of organizational capabilities that are likely to be important for mass market innovations in the EEs. We propose that three capabilities may be highly significant in the context of EEs namely, capabilities to recombine, linkage capabilities and capabilities to modularize. Admittedly, such a set of capabilities is not being proposed as one predetermined canonical or fixed set. Nor is it claimed that this set is absolutely complete. A particular list of capabilities is usually suitable for a specific purpose, while other capabilities may be useful for other purposes. Moreover, a list of capabilities can be prioritised according to the task at hand. For example, reverse engineering generic drugs for cost reduction requires process reengineering capabilities, which is quite different to the capabilities necessary for new drug discoveries which call for capabilities to innovate and overturn existing technological paradigms.

2.1 Capabilities to recombine

Innovations for mass markets often entail creating an altered performance package through changes in product architecture without a change in underlying technologies (Ray and Ray, 2010). Literature suggests that capabilities to recombine allow combining/ redeploying the existing component knowledge into new architectural knowledge leading to architectural innovations/new architecture creation for a firm (Kogut and Zander, 1992, Hitt et al., 2000b). Thus, product innovation for mass market often entail architectural innovation which essentially involves reconfiguration of an established system linking existing components in new ways e.g. resizing, changing design factors and material composition (Henderson and Clark, 1990). Firms intending to innovate for mass markets require component knowledge, that is, knowledge about each of the components and architectural knowledge-that is, knowledge on the ways components in a complete system are configured /integrated together (Henderson and Cockburn, 1994, Henderson and Clark, 1990).

Capabilities to recombine emerge from system, coordination and socialisation capabilities of a firm (De Boer et al., 1999). System capabilities facilitate establishment of formal procedures and routines for exchanging functional knowledge embedded in a group of engineers. Coordination capabilities integrate architectural knowledge through interaction, participation, training, job rotation and institutionalisation of relations among members of various groups (De Leeuw and Volberda, 1996). Finally, socialisation capabilities enable the integration of knowledge components through cultural institutions of a firm such as shared beliefs, values, norms and strongly agreed upon goals by all members to uphold the firm's mission (De Boer et al., 1999). Through all these processes the sharing and coordination of component/functional knowledge is facilitated leading to novel architectural knowledge creation.

2.2 Linkage capabilities

Innovation for mass markets in emerging economies requires social embeddedness, which can be achieved by leveraging existing building blocks of local resources and capabilities through collaborative linkages/partnerships (Seelos and Mair, 2007). Collaborative partnerships enable firms to access various functional and technological competences and resources that do not exist within their own boundaries (Gulati and Sytch, 2007, Hitt et al., 2000b, Schilling and Steensma, 2001). Often collaborative partners of the focal firm give ground-breaking sources of information that transform ideas into innovative products and services (Dyer and Nobeoka, 2000, Eisenhardt and Martin, 2000, Dyer and Singh, 1998). Partnerships facilitate innovation by lowering costs and uncertainties relating to the development of new technologies or new markets (De Man and Duysters, 2005, Gulati, 1998, Hitt et al., 2000a, Quinn, 2000, Schilling and Steensma, 2001).

Collaborative partnering experience enhances linkage capabilities of a firm as it enables firms to not only influence their existing alliances, but also to discover and participate in possible future alliances to gain functional expertise, knowledge, critical competencies, resources and reputation (Dyer and Singh, 1998, Gulati, 1995, Gulati, 1999, Gulati and Wang, 2003). Moreover, linkages based on trust, loyalty and reciprocity improve transmission of knowledge and innovative performance (Dyer and Nobeoka, 2000, Phelps, 2010).

2.3 Capabilities to modularize

In the context of EE innovation, incorporating features to provision for future improvements in performance package require product architectures to evolve towards modularity (Christensen et al., 2002). Modularity allows firms to integrate families of parts that share common characteristics and expand product varieties, reduce development costs and promote continuity (Baldwin and Clark, 1997). Increased modularity enables the parts of a system to be separated and combined with much greater flexibility (Baldwin and Clark, 1997). It also allows the introduction of varied features and functionality according to specific requirements of customer preferences. Interface standardization enables firm to carry out module design independently with the aim of speed in customization of features to meet evolving needs of customers, enhancing the firm's ability of firms to act in response to market dynamism (Baldwin and Clark, 1997, Sanchez, 1995).

For product modularity, the focal firm needs to have the capability to access a diverse range of modules designed independently in different firms and thereby accumulating the component developers' resources and capabilities (Sanchez, 1995, Sanchez, 1996, Sanchez and Mahoney, 1996).

Drawing from the literature, we thereby propose a conceptual framework of organizational capabilities required for mass market innovations in the EEs in Figure 1.

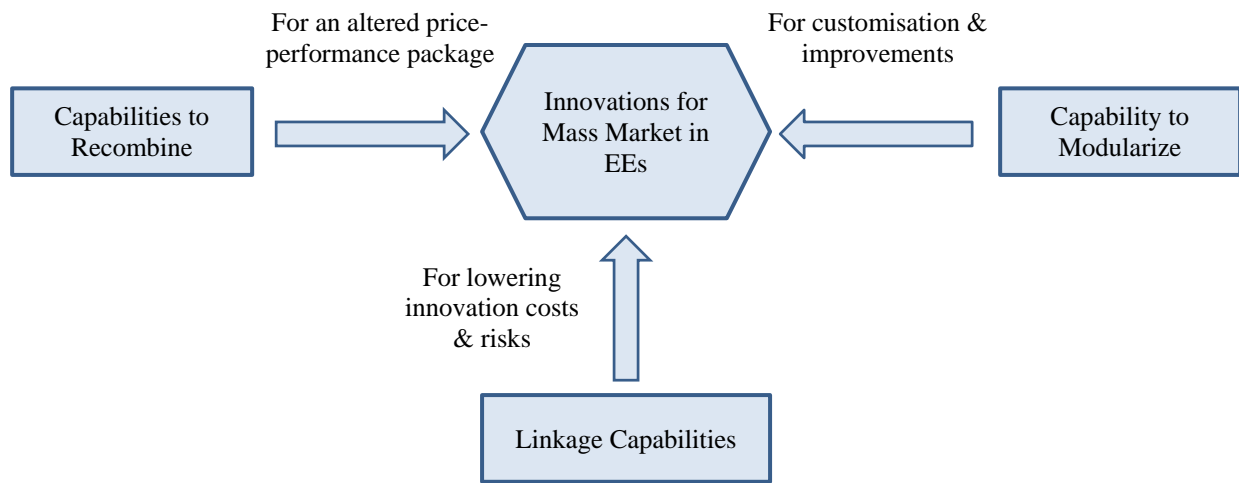


Figure 1. A conceptual framework of organizational capabilities for mass market innovations in the EEs

3. Research Methodology: Case study approach, data collection and analysis

In this study, case study design was used as the research methodology to gain in-depth insight of the context and also to obtain rich data (Dyer and Wilkins, 1991, Yin, 1984). The case study method enabled in-depth exploration of the complex real life activities/processes of the selected firm to probe the area of capability development. Studying the underlying processes deployed in performing a task by an emerging market firm is critical in identifying capabilities. As postulated by Hartley (2004), Eisenhardt (1989) and (Yin, 1993), the findings obtained from the case study method have the potential to be more rigorous, reliable and empirically valid. Moreover, case study approach provided a more convincing

demonstration of conceptual argument and causal forces (Siggelkow, 2007, Silverman, 2010). Furthermore, case study design also provided the potentiality to generate and new empirically testable theory due to creative insight arising from the concurrence of case evidence (Eisenhardt, 1989, Silverman, 2010). To address the central research question, the case study of Mahindra & Mahindra (M&M) was used to capture the capability development processes for innovation. We chose Mahindra and Mahindra (M&M) as the focal case in our study for two reasons:

First, sample firm for this research study were obtained from the Indian automotive industry, which has become one of the world's fastest growing passenger car markets, largest passenger car exporters in the world and is one of the key sectors for the economic development of India (Lee and Anderson, 2007, Mani, 2011). Given the significance of EEs, especially India, in the global automotive industry sector, the auto industry provides an interesting context in which the driving forces of innovation management of an EMF can be investigated.

Second, the choice of sample firm -Mahindra & Mahindra, and the unit of analysis was guided by how effectively the focal firm is addressing the challenges of innovation for mass markets highlighted by academic journals, books, trade journals and business press. M&M is the third largest player in the Indian automotive industry and is one of the largest vehicle manufacturers by production in India. Through this in-depth case study, we were able to create theoretical constructs that can be further tested in empirical studies in similar contexts. Table 1 below provides a brief overview of the firm.

Table 1 . Descriptive statistics on the case firm

Firm	Industry	Founded	Major Products	Major Markets Served	Revenue (USD Billion), 2012
Mahindra & Mahindra (M&M)	Automotive	1945	Scorpio, Bolero, Xylo, Thar, Mahindra-Renault Verito, Quanto	More than 100 countries across Asia, Africa, Latin America, Europe, South America	691

This study used qualitative semi-structured interviews to understand the process of capability development for mass market innovations. The interview participants were selected based on the individual judgments permitted on the grounds that participants possess deep knowledge and understanding of the capability development process and its importance for creating appropriate mass market innovations. Visiting Mahindra's Headquarter and manufacturing plants in India, a total of 10 Semi-structured face-to-face interviews were conducted between 2012 and again in 2013, with key informants assigned by the participating firm (Table 2).

Table 2. Key participants of the research study

Interviewee Designation	Mahindra & Mahindra Department
Executive Director	Mahindra & Mahindra Automotive
Head	Product Planning
Senior General Manager	Product Planning
Deputy General Manager	Product Planning
Manager	Product Planning
Senior General Manager	Strategy
Manager	Strategy
Manager	Strategy
Product Manager	Engineering
Senior Product Engineer	Engineering

For data triangulation referring to the employment of multiple sources of information for a better understanding (Gibbs et al., 2007), information was also mined from five other categories in addition to the primary data from interviews. These include academic journals, books, specialist automotive journals, engineering and technical trade journals and selected business press, including Business Week, The Economist, Business Today, Business World, Times of India – all reputed for quality of journalism. Data was also collected from internal documents of firms, including annual reports, firm announcements, organizational charts, consultants’ reports and supplier-related information. Such documentary evidence acted as a method to cross-validate information obtained from interviews and to triangulate evidence (Eisenhardt, 1989). In this way, the corroboration of multiple information sources increased the validity and reliability of this research study.

The cumulative evidence of: i) interviews on tape, ii) internal documents and annual reports, and iii) secondary data from selected print media, research and consulting organisations, and industry associations served as triangulation of evidence (Denzin, 1978). Congruence between primary and secondary data pre-empted any premature or spurious deductions.

Analysing data is the central feature of developing theory from case studies (Miles and Huberman, 1994). After transcribing the interviews, transcripts were reviewed, coded and triangulated with company documents and information. Consequently, a set of themes for framing the analysis was derived going through the individual transcripts iteratively and comparatively (Yin, 1994). Finally, case study report of the sample firm was written up describing the evidence of the innovation process. We also checked with informants that the information presented in the case studies is correct in a repetitive research process to support the validity of findings (Miles and Huberman, 1994).

To provide a more persuasive demonstration of conceptual argument, the preliminary analysis at this stage involved several iterations. The analysis went back and forth between the descriptive narratives of the case and data from interview transcripts to better understand the causal relations between the identified capabilities and how they were developed in the focal firm for creating mass market innovations. Following this, detailed case study report of the firm describing its processes of creating appropriate innovations for mass market customers in the Indian automobile industry was written up. In addition to the rich descriptions and contextual information, the detailed case study reports also included quotes from the interview participants to gain an in-depth insight on the innovation processes of the EMF.

Finally, to further enhance the internal validity, strengthen theoretical scope and sharpen the generalization of the research findings, the results of this research study were linked and compared to the existing literature. According to Ahrens and Chapman (2006), this process is particularly important for theory-building research as the research findings are often derived from a limited number of cases. Therefore, comparison with literature discussing similar findings in related context strengthens the confidence and enriches the conceptual level of a research study.

4. Mahindra & Mahindra case

4.1 Company background and visionary leadership

Mahindra & Mahindra Limited (M&M) - a subsidiary of Mahindra Group is an Indian multinational automaker. Based on consolidated revenue, it is one of the largest automobile manufacturers by production in India (Mathur, 2011). In the passenger automobile segment M&M is the market leader in the utility vehicle category, with market share of over 45%. Some of the notable passenger vehicles from M&M are Scorpio, Bolero, XUV 500, Thar, Xylo and Mahindra-Renault Verito. M&M also has a major stake in the Indian tractor business with market share of 40%. (Thomke and Luthra, 2009, Stewart and Raman, 2008).

The history of Mahindra and Mahindra began in 1945 with M&M becoming a manufacturing partner of the Willys Overland Corporation, US (Thomke and Luthra, 2009). Willys is best known for its design and production of military and civilian jeeps. With the initiative of two brothers K.C. Mahindra and J.C. Mahindra the jeeps were licensed to be manufactured in India as Mahindra brothers perceived the value of Willy jeeps suitable for India's emergent road infrastructure. Later on, M&M formed collaborative partnerships with a number of global automobile manufacturers such as Renault, Ford, Peugeot, Mitsubishi/Samcor, Ugin Kuhlmann and International Harvester Company (Thomke and Luthra, 2009). Keshub Mahindra joined the board of the firm in 1948 and was elected chairman in 1963. He was a role model for business leaders and a true Statesman (Thomke and Luthra, 2009). He built Mahindra as a firm that is known for its ethics and social responsibility and had shown how one remains steadfast in turbulence and navigates in crisis without sacrificing ethics and values.

Anand Mahindra (J.C. Mahindra's grandson) - a Harvard Business School graduate - joined M&M as an executive assistant in 1981. A person with the innate capability of out-of-the-box thinking, Anand Mahindra began by revolutionizing on four spheres: envisioning, creating a structure, enabling and energizing. Mahindra realized the significance of developing a vision for the future which will enable the

firm to turn around (Stewart and Raman, 2008). After taking the role of de facto Chairman and Managing Director of the US\$6.6 billion M&M group, Anand Mahindra set up aspirations and vision for the firm (Thomke and Luthra, 2009). He emphasized that innovation in all spheres of product development and process management would enable M&M to become the topmost player in the Indian automobile market. Anand Mahindra termed these aspirations as “mantras” (Sanskrit word referring to prayer) that are capable of creating transformation in the firm:

“We came up with five elements that would foster innovation in the Group. One, innovation has to start with insights about a customer. Without identifying a need, you can’t come up with new products or processes. Two, great products have great designs. Three, you have to encourage experimentation. You must hire people who don’t listen to you, which I always seem to do! You have to create a sandbox where people can play—and fail, often and early. The organization must celebrate failure. Four, unlike Xerox PARC’s inventions, innovation must add value to the firm’s bottom line. Five, you need to have a sales plan. No innovation sells itself; firms have to find ways of packaging and marketing it. So you need insight, design, experimentation, added value, and sales plans for innovation, and—I love acronyms—the first letters of those elements spell IDEAS. That captures the essence of what M&M will do to create a culture of innovation”. (Thomke and Luthra, 2009).

As an avid risk taker, ready to embrace tough challenge, Mahindra initiated the development of a new car concept despite financial constraints (Thomke and Luthra, 2009). The “Scorpio”, which is a world class sports utility vehicle (SUV) is India’s first indigenously developed affordable SUV, launched by M&M in 2002. Foreseeing the opportunity in the field of frugal engineering for emerging markets, Mahindra embarked on the mission to innovate a high quality SUV at very low cost in order to address the customers with low purchasing capacity. The mandate was “design to cost” and thereby the development cost of Scorpio was only US\$120 million which is only one fifth of other global automobile manufacturers’ expenditure. The challenge could have jeopardized Mahindra’s career. Instead, with Scorpio, M&M demonstrated excellence in affordable innovation for the emerging markets (Thakkar, 2012, Thomke and Luthra, 2009). Mahindra describes his achievement:

“As you know, M&M developed an SUV, the Scorpio, and customers love the vehicle. But we need to make more such products. If M&M is going to compete with the world’s best firms, it has to become an innovation factory—which is why I returned innovation to the top of our current priorities”. (Stewart and Raman, 2008)

Anand Mahindra also set an exemplary example creating an encouraging environment for an innovation culture and motivating employees to come up with breakthrough innovation ideas (Thomke and Luthra, 2009).

4.2 Advancing new architectural creation/innovation to satisfy unique price-performance criteria

For the price conscious Indian customers, M&M strove to innovate at an affordable cost while maximizing the value proposition. Head of Product Planning, described the situation thus:

“India is typically a value conscious market. So you have to focus on the value that a customer is getting from time of vehicle purchasing till selling that. So we try here at M&M to maximize the value for customers. Scorpio and XUV500 are ideal examples where we have maximized the value proposition in a price range which is more affordable than other automakers”.

The motto of M&M is to innovate and upgrade through cost optimization instead of cost cutting in order to capitalize on the value contributions. In this regard, the M&M product development team spent substantial time observing customers and gaining significant insights on customer requirements. Based on observation, it was found that in India, due to long hours waiting in traffic jams, fuel burns unnecessarily and results in extra cost for the customer. This was identified as a specific area where M&M could deliver greater value through cost savings. The “Start-Stop mechanism” is an example of using existing technologies and reconfiguring components in new ways. The firm realized that though customers would want to switch the engine off at signals, they often overlook actually doing it because they are apprehensive of being left behind when the signal changes. So, together with Pune-based Indian supplier named KPIT Cummins, M&M developed the “Revolvo Hydro Kit” that switched off the engine if it was idling for more than a set period of time (Krishna and Sarkar, 2012). This kit is a simple plug-in battery pack which is connected to the electric engine and makes sure that the motor and engine work concurrently. Based on regenerative braking, the kit is activated and the sensor helps to transit from fuel to electric automatically, saving fuel consumption. A press of the clutch automatically restarted the engine. Deputy General Manager of the M&M Product Planning described it as:

“This simple mechanism ensured that the consumer was not left behind in traffic and yet got better fuel economy”.

In addition, to satisfy the unique price-performance criteria, M&M engineers persistently experimented with new combinations of existing technologies, proceeded with re-engineering or reducing components and managed reconfiguration of vehicle parts interrelations that are characteristically linked with architectural innovations. Executive Director of the Mahindra Automotive Sector, affirmed:

“To bring down the overall cost of manufacturing, we have to make use of cost-effective alternative products while not compromising on quality and safety. Work on new, low cost substances which can be used to replace traditional materials for developing vehicles is carried on”.

For example, in order to trim down the cost of manufacturing vehicles, M&M exploited plastic fenders, replacing conventional steel (John, 2011). M&M also utilized aluminium, a much safer and stronger option than steel to reduce the weight of vehicles, leading to lower consumption of fuel. Studies on aluminium revealed that if a vehicle’s weight is compressed by 100 kg using aluminium parts substituting for traditional steel, the vehicle would save 2,000 litres of fuel in its life cycle. In addition, M&M makes vehicles more environment friendly, since with aluminium, the emission of greenhouse gases is reduced by 9 grams for every kilometre the vehicle runs (Mathur, 2011).

M&M engineers also conducted numerous experiments to come up with novel arrangements of existing components such as front seats. As a result, the front seat in the Mahindra Xylo can be turned into a flatbed, delivering a higher degree of comfort for people who spend a lot of time on the road.

Additionally, the Mahindra Xylo also comes with foldable trays that open up from the rear of the front seats, making a quick bite or drink “on the go” very convenient. One Manager explained:

“We thought of how to maximize what my customers can do with seats? You know we have a matrix called ‘rational, functional and emotional’. Rational benefit is to ensure that the customer can sit, functional benefit lies in the comfort of the seat. These benefits are almost the same as what every automaker provides. Emotional benefit is where we tried to maximize our offerings and then we came up with the idea of flatbed and foldable trays”.

Through a number of formal processes, coupled with strong relationships among team members, cross-functional teams at M&M shared their knowledge and expertise for project developments. As an example, for the Scorpio project, a team of 120 engineers with an average age of 27 was spread across 19 diverse functional teams (Thakkar, 2012). The goal for the Scorpio project was to develop an affordable SUV and at the same time equip the vehicle with all contemporary amenities. Consequently, Scorpio was provisioned with bigger space, state-of-the-art technology and a modern design. Without the communal effort of team members, the development of Scorpio with the required value proposition would not have been made possible. Affirming this integrative approach for any project, a Senior General Manager from Product Planning commented:

“We form cross-functional teams having people from R&D, engineering, manufacturing, marketing and sales to combine their knowledge and proficiency. We arrange regular meetings and development programs for the teams to enhance their competence level. We find it extremely important to evaluate teams based on their group effort to keep any project development on track. Understanding that our people are the main driving force of our firm, work performances are extensively associated with various award and recognition systems”.

4.3 Advancing linkages/partnerships with auto component suppliers

Starting from 1945, when M&M introduced the first utility vehicle in India, until today, Mahindra vehicles are produced as collaboration between the firm and a small set of strategic suppliers. In this regard, collaborative linkages were formed with both local and global partners who were engaged from the very early stage in the product design, trial productions, and manufacturing. Where any new automotive design/production technology was not available through a local Indian supplier, M&M tied up with global suppliers for the technology. For example, M&M formed linkages with Bosch and Lear. These international suppliers set up their manufacturing base in India to take the advantage of localization, which was a very important aspect for Mahindra for cost innovation. Moreover, on top of localization, supplier’s knowledge, experience and technology had also been adopted into a wide range of M&M vehicles. A Senior Manager from the Strategy department described it thus:

“For Mahindra, the main advantage of such linkage relations lies in the value creation. It is simply not possible for us to have expertise in all areas of vehicle manufacturing. For example, suppliers designing sitting systems, or air conditioning systems for the vehicle, are in the best position to carry out innovation in those specific areas because they have expertise and experience doing so. Therefore, rather than giving suppliers the

predefined specifications, we encourage them to innovate. This ultimately ensures M&M to get a better valued product for the customer”.

Learning and partnering experiences with the same supplier base enabled Mahindra to develop affordable, fuel-efficient and reliable SUVs like the Scorpio, Bolero and Xylo, in addition to cars, pickups and commercial vehicles. For example, Bosch manufactured fuel components of engine, injectors, hydraulic pumps, engine control units (ECU) for a range of Mahindra vehicles. Lear provided complete sitting system. The mobile platform of Scorpio was built by Delphi. Steering columns, and air-conditioning systems of the vehicles were obtained from Indian suppliers such as Motherson Sumi, Varroc Group, Rane.

Mahindra encouraged suppliers to come up with their own innovations through design changes, with value engineering keeping the cost pressure in focus. This provided the suppliers a great opportunity to learn. For example, an electronic braking system was developed by Wabco India to detect the distance between a car and the vehicle ahead, in real time, to reduce fuel utilization (Krishna and Sarkar, 2012). In this connection, one Senior General Manager from Mahindra Strategy described:

“So, it is a chain of innovation with our linkage relations. Innovation not only happening in Mahindra; Mahindra is also driving innovation for the suppliers to carry on”.

Trust was perceived as one of the very important elements of such collaborative partnership by M&M, because without trust the joint efforts would not be productive to the expected level. Therefore, such innovation for mass market projects involved trust-based relations with the same set of suppliers in a very collaborative environment facilitated by regular communications. Accentuating the importance of trust, one Manager from the Strategy department said:

“For example, if the suppliers have very innovative ideas on something which is at conceptual level, and they want us to implement through investment and engineering process, our door is always open for them to discuss that. If the idea is feasible, we take it to the engineering level. So this kind of collaboration and open communication we have.”

In this way, sustaining linkage relationships and accessing technological competencies across collaborative partners allowed Mahindra to embark on developing low cost and rugged automotive vehicles; it also encouraged the suppliers to undertake their own innovations.

4.4 Modularity in vehicle design

According to a Product Manager and Senior Product Engineer, for any low cost design of a mass market project, modularity was essential in achieving ultra-low cost levels while keeping the option to move to higher configurations. M&M thus had a modular architecture in vehicles due to its significant effect on minimizing time and development cost. In this regard, one Product Manager from the Engineering department explained:

“Modularity is one of the important factors for Mahindra vehicle design for two reasons. First, modularity saves us lot of time and cost because if the designs are modular then you don’t need to design the whole system all over again if anything goes wrong. Moreover, if you are breaking any system into a number of modules, then the total

development cost is getting distributed. For example, the door module; I can pick the same module and adopt it for next car model.”

M&M also maintained a network of a small but key group of module developers who were specialized in developing specific vehicle modules. As an example, Indian supplier Aditya designed power window modules; German supplier Bosch developed central locking, fuel injection, etc. It was easy to carry over these same modules into the next vehicle rather than developing again to reduce cost and make vehicles more cost-effective. These developed modules were utilized for multiple M&M vehicle models such as Bolero, Scorpio and Xylo. Furthermore, the reliability and quality of the modules also increased significantly, since the suppliers had the specialization and capability in doing so.

5. Case Analysis and discussion

Based on the evidence presented in the case study, it is now possible to identify what organizational capabilities are required by firms and how such capabilities may be developed during the process of innovation for the masses summarized in the table 3 below.

Table 3. Organizational capabilities demonstrated in the case

Capabilities	Rationale	Capabilities demonstrated in Mahindra & Mahindra
Capabilities to recombine	Meeting the unique price–performance criteria of mass markets in an EE	<p>Recombining and reconfiguring existing core technologies and components in new ways led to new architecture creation such as the “start-stop” mechanism of Mahindra Scorpio’s engine.</p> <p>Fostering an open environment and robust communication system to compile inputs of cross-functional team members.</p> <p>Formalized system of integrating architectural knowledge.</p> <p>Motivation of team efforts, shared sense of purpose and faith in engineers’ own in-house technical capability through charismatic leadership.</p>
Linkage capabilities	Sharing cost and risk while leveraging specialized knowledge	<p>Forging recurrent collaborative linkages to win the trust of a network of local component suppliers.</p> <p>Enabling transfer of specialized knowledge and best practices to improve quality and reduce costs – thereby increasing commitment among vendors.</p> <p>Driving innovation at component suppliers’ end through design changes and value engineering.</p>
Capability to modularize	Ensuring product upgrade and improvement over time to serve multiple tiered customers	<p>Anand Mahindra’s vision conceived of a high quality yet affordable SUV for mass markets that could be later upgraded to serve the more sophisticated mainstream markets.</p> <p>Open orientation innovation culture to involve module suppliers in the design phase of major car engineering systems.</p>

First and foremost, the case highlights the salience of capabilities to recombine that facilitate the creation of new architectural knowledge. For example, experimentation in new combinations of existing core technologies and a reconfiguration of components is a classic example of a firm deploying combinative capabilities to achieve a desired outcome, namely, altered price-performance package for the mass markets. Emphasizing frugal engineering, the “start-stop mechanism” of Mahindra Scorpio’s engine is a classic example of new architecture creation recombining existing components without changing the core technology and thereby, making the innovation more cost-effective. This innovation satisfied the unique price and performance requirements of the Indian mass customers in terms of providing better fuel economy.

What is more, in the case of Mahindra, the willingness to engage in aggressive experimentation with new combinations of existing core technologies, alternative/low-cost materials, resizing components, reducing part count, and reconfiguring the linkages between major components yielded substantial benefits in terms of reducing costs.

Capabilities to recombine enable firms to integrate architectural knowledge for new product development and they emerge from system, co-ordination and socialization capabilities of a firm (De Boer et al., 1999). For the case of M&M, socialization capabilities is evident from the strongly agreed upon goals, common values and a shared belief for recombining discrete knowledge of engineers about components and architectures to meet the needs of Indian mass markets. According to De Boer et al. (1999) and De Leeuw and Volberda (1996), system and coordination capabilities refer to the combination of individual knowledge units of an organization into a new set of architectural knowledge through formal policies and relations among group members. For developing Mahindra vehicles such as “Scorpio”, strong integration of and regular communication among various cross functional team members facilitated by formal project management policies epitomize the utilization of coordination and system capabilities.

Moreover, M&M case reveals the significance of linkage capabilities. Serving less-well-to-do customers calls for a strategy of collaborative alliances to economize on resources, reduces cost and uncertainty (Seelos and Mair, 2007). A network approach facilitates innovation by enabling sharing of costs and risks whilst leveraging specialised knowledge and other network resources (Dyer and Singh, 1998, Gulati and Wang, 2003, Gulati, 1999). M&M looked beyond the boundaries of the firm to combine its in-house body design expertise and capabilities with those of its innovative partners for re-engineering, redesigning and adapting technologies to create new architectural knowledge.

For M&M, linkage capability was developed from the learning and partnering experience gathered since 1945 when the firm introduced the first utility vehicle in India. M&M formed linkages with a set of strategic partners who were engaged from the very early stage of car component design, component manufacturing and trial productions. M&M not only collaborated with Indian suppliers, but also with a number of global suppliers who set up their manufacturing base in India. M&M also motivated the suppliers to come up with their own innovations through design changes and value engineering to control the cost of innovations and offer a better valued product; highly significant for mass market customers.

In addition, designers of the Mahindra vehicles strategically invested in amassing learning of a modular vehicle well in advance for upgrading the base model to more advanced versions in the later

phases. By having an open orientation to draw ideas from a pool of various autonomous module developers, M&M was able to access a diverse range of modules designed independently in different firms which is in line with the propositions found in the literature (Sanchez, 1995, Sanchez, 1996, Sanchez and Collins, 2001, Sanchez and Mahoney, 1996).

Being able to access and accumulate the module developers' specialization and capabilities, M&M was able to achieve low cost levels and keep the provision to move to higher configurations. With the visionary leadership of Anand Mahindra, M&M envisaged the prospect of catering to both Indian middle class customers and high-end customers of India and the global market. He shared this vision with the engineers, creating an environment for innovation culture. Therefore, based on an open architectural design, M&M was able to innovate a whole family of Mahindra Scorpio-starting from the base model Mahindra Scorpio LX for serving the lower performance requirements of mass markets, to more upgraded and premium versions, for example, Scorpio SLE, Scorpio VLX AT and Scorpio VLX 4WD for more demanding mainstream customers.

In essence, our analysis from the study of two cases thus exhibit that to deliver affordable, and functional innovations for the mass market consumers in EEs will require capabilities to recombine to achieve innovations with required affordability and acceptability criteria. Furthermore, Linkage capabilities are required to enhance the innovative performance through lowering cost and uncertainties. Finally, capability to modularize is vital for product modularity to meet evolving needs of the mass customers in EEs.

6. Propositions

This study examined the patterns of capability development for mass market innovations in the context of EEs. We observed that success in mass market innovations stems from a deliberate strategy to meet the unique demand criteria prevailing among its customers. Based on the case evidence and analysis discussed earlier in the paper, it is now possible to specify the following propositions:

Proposition 1: There is a positive relationship between capabilities to recombine and facilitating innovations for mass markets in EEs.

Proposition 2: There is a positive relationship between linkage capabilities and facilitating innovations for mass markets in EEs.

Proposition 3: There is a positive relationship between capability to modularize and facilitating innovations for mass markets in EEs.

7. Managerial implications

This study has significant implications for managers of aspiring firms intending to serve mass markets in EEs. Since this is a case study research, all the lessons may not be generalized. Nevertheless, the insights do provide lessons for firms doing business in India and other EEs. First, the low purchasing power of customers in EEs implies that firms attempting to serve mass markets need to be driven by a

frugal approach and a deliberate restraint on resources. From a traditional mindset, firms are used to tailoring new product development for the most demanding customers, developing resource-intensive routines and practices. Firms may need to unlearn the way they traditionally choose and allocate resources. Hence, the study proposes that potential firms should gain a meticulous understanding of demand criteria and innovation requirements of mass customers in EEs. By looking beyond their most profitable and demanding mainstream customers, companies from both developed and developing countries need to deliberately augment their organizational capabilities to serve mass markets in EEs.

Second, firms attempting to serve mass markets need to balance the need to meet the social objective of bringing affordable and functional products to the masses with the need to attain profitability in the long run. For this reason, the significance of capabilities to recombine is paramount to recombine existing core technologies frugally without being resource intensive. Hence, prospective firms should leverage existing blocks of resources and technologies to create new combinations of features to serve the mass customers in an affordable way.

Third, this research study exhibits the significance of linkage capabilities in developing innovations for mass markets sharing of costs and risks through linkage partnerships with a number of auto component suppliers. Potential firms should therefore invest in local R&D, through collaborations with local enterprises. This will significantly enhance the appropriateness of products for low-end segments of the market.

Fourth, firms aiming to serve mass markets in EEs should also develop strong capability to modularize. In the presence of multi-tiered market segments in EEs, with their continuously evolving niches of customer preferences and income parameters, such capability will provide flexibility for the innovators. Utilizing capability to modularize, firms will be able to customize products for the low performance requirements of least demanding customers. At the same time, provision for upgrading a product's basic model into a more sophisticated one for upper-tier mainstream markets can be retained.

8. Conclusion

Like most empirical research studies, our study also has certain limitations. One of the limitations of this study is that the focus has been on the product innovations of a multinational Indian company from the automotive sector of India. Being a single industry study, the evident question is to what extent its findings can be generalized across other industries.

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. 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 further comprehensive investigation. These limitations imply directions for future research.

While this study has a few limitations stated above, these limitations also provide opportunities for future research to deepen our understanding of the organizational capabilities required for innovations in EEs. One of the logical steps for future research should be to empirically test the propositions proffered in this paper to statistically validate the qualitative findings across an industry population.

Future studies on mass market innovation in EEs in response to the required organizational capabilities could be extended to focus on several other EEs, in addition to India. Future research could also investigate more case studies of various firms from industries other than automotive sector from India and other EEs. Studies on multiple EEs and several firms from diverse industries could refine and enrich our understanding on the specific capabilities required for innovation in EEs. Further research could also potentially rank the importance of capabilities through contrasting, characterizing and potentially grouping more EMFs in different industry sectors. Such taxonomy could be useful for comparing the capabilities required by firms to create affordable mass market innovations in different regions

While much work lie ahead, this study made an attempt to contribute to the emerging body of literature aiming to understand what organizational capabilities are required to create affordable innovations for mass markets. By focusing on the innovation aspects of an emerging country auto manufacturer, our study fills a critical gap in the innovation literature which dwells primarily on how MNEs disseminate existing product innovations in EEs.

In concluding the paper, we emphasize the three contributions that this study has made to the understanding of innovation management in EEs. First, from a micro perspective, we investigated how an EMF developed innovations for the mass markets by describing the organization of innovation and identifying key capabilities that shaped the EMF's affordable innovation management for India and other EEs. Second, at a theoretical level, scholars in innovation management have emphasized the requirement to add new theoretical insights or develop a conceptual framework that suitably illustrates the precise capabilities required for mass market innovations (Hang et al., 2010). This research study responds to this call for theory development. By focusing on the comprehensive case study of an Indian auto manufacturer, this study develops a conceptual framework of organizational capabilities for mass market innovations in EEs. Thus far, there has been no empirical investigation that has focused on this subject. It is believed that the conceptual framework developed in this study will help move work forward in this area. Third, the research study also attempts to formulate a set of testable propositions to observe the patterns of capability development for mass market innovations. The set of specified propositions developed represent elements of the proposed conceptual framework to observe the patterns of organizational capability development for mass market innovations.

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