Chapter 11
Industrial R&D Centers in Emerging Markets: Motivations, Barriers, and Success Factors

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Abstract Due to their strong economic growth as well as increasing local know-how, emerging markets (EMs) have turned into attractive locations for research and development (R&D) activities of Western multinational companies (MNCs) in the last two decades. Especially, full-fledged R&D laboratories focusing on core products of MNCs are mushrooming regardless of industry. On the basis of a recent research study of German and US MNCs, we identify the main motivations and barriers related to establishing R&D sites in EMs as well as demonstrate how these barriers can be overcome in order to reach the aims encapsulated in the internationalization motives. We find that of particular importance for a successful R&D center in EMs are presence of a global R&D strategy, top management support, personality of the R&D site managing director, "ownership" of development tasks, global innovation culture, accurate R&D HR policy, and external as well as internal networking. Finally, we demonstrate that local R&D laboratories increasingly develop products for worldwide markets.

Keywords Emerging markets · Captive R&D center · MNC · Internationalization · Motivations · Barriers · Success factor

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11.1 Introduction

In the last decade, emerging markets (EMs) have gained in importance for Western multinational companies (MNCs) as both attractive sales markets and sources of distinct technological know-how. Although so prominent, the labeling EMs is not explicit. A number of different country groups are called EMs. A very common synonym is "BRIC" (Brazil, Russia, India, and China) (Goldman Sachs 2009). This group has further been extended by the so-called Next-11 economies (Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, the Philippines, South Korea, Turkey, and Vietnam) (Goldman Sachs 2009). Apparently, EMs are far from being a homogenous group of countries in terms of geography, culture, or political systems. Nevertheless, they do have some common characteristics like relatively big and fast-growing domestic markets, a promising human capital, and technological potential as well as basic political stability (Goldman Sachs 2009). Because of this, more and more Western MNCs decide to open local research and development (R&D) facilities. Many of them go beyond outsourcing simple R&D-related back-office operations like IT support, documentation, or testing. A good example is General Electric (GE) that opened a multidisciplinary, full-fledged R&D laboratory in Bangalore as early as in 2000 (Dubiel 2009; Wille 2009). This facility employing about 4,200 researchers and engineers (co)developed such a wide product range like a portable electrocardiogram device, turbines for the new Boeing "Dreamliner," or pedestrian safe car bumpers. Clearly, EMs are changing their image from cost-effective mass production bases to powerhouses in the field of new product development. Albeit all these positive news, there still remain some challenges associated with building R&D sites in EMs. For instance, many companies fear the loss of intellectual property (IP), lack experience with local markets, or have to deal with high local employee turnover rates. Thus, it is always up to the top management to decide whether for a particular MNC, the anticipated benefits will eventually outweigh the associated risks.

Our motivation behind the research project leading to this chapter was providing some evidence on how Western MNCs—both multibillion euro corporations and mid-size businesses—successfully establish captive R&D sites in EMs focusing on the development of innovative products for local and global markets. Our understanding of R&D in this context is very broad ranging from basic research to applied product-oriented development. Based on extensive case analysis in four industries complemented by literature review, we intended to identify the main motivations and barriers related to establishing R&D sites in EMs as well as show how these barriers can be overcome in order to reach the aims encapsulated in the internationalization motives.

The resulting chapter is organized along these contributions preceded by an outline of the general development path of R&D activities in EMs. We conclude with a brief summary of our most important findings for the practice of R&D management in EMs. Although the geographic focus of our research has been on India and China as they attract the lion's share of the Western R&D investment,

most of our observations can be applied to other EMs as well. Thus, in the remainder of the chapter, we will use the term EM with regard to the aforementioned group of countries as a whole.

11.2 R&D Capacities in Emerging Markets

We start with introducing a few basic facts about foreign R&D centers in the two biggest EMs, that is, India and China. Then, we will briefly outline the typical development paths of foreign R&D facilities in EMs.

11.2.1 Some Basic Facts

R&D investment by foreign MNCs in EMs is rapidly increasing. For example, a recent survey result shows that by 2015, about 19 % of Western European and 23 % of North American firms will invest more than a quarter of their R&D budgets in EMs in contrast to 7 and 11 %, respectively, doing it currently (Ernst and Young 2010). With regard to the main beneficiaries China and India, this translates into an impressive amount of local R&D affiliates of foreign MNCs. Estimations with regard to China show that the number of R&D facilities belonging to international companies amounts to 1,200 representing a 9.3 billion euro investment (Moody 2011). Most of them are located in Beijing and Shanghai and are concentrated in technology-intensive fields such as electronic communications, biopharmaceuticals, automobiles, chemicals, and software (Fujitsu Research Institute 2010). US companies are the biggest investor followed by Japan and Europe. Concerning India, different sources reckon from 639 to 871 foreign R&D laboratories[1] in 2010 (Basant and Mani 2012). During 2005–2010,[2] alone foreign FDI in R&D summed up to more than 470 million euro (Basant and Mani 2012). United States is the largest investor followed by Germany and Korea, France, and Japan (TIFAC 2006). In terms of industry, most of these R&D facilities can be identified in high-technology sectors such as telecommunications equipment, IT, pharmaceuticals, and biotech industries (Basant and Mani 2012). The highest density of foreign R&D laboratories can be found in Bangalore and New Delhi (Basant and Mani 2012; TIFAC 2006).

[1] It is not always clear how a foreign R&D laboratory is defined. It seems that a laboratory is counted as foreign on the basis of foreign equity holding in the center, that is, if it exceeds 10 % or more, it is regarded as foreign.

[2] Please note that there are no numbers for 2009 available.

11.2.2 The Evolutionary Perspective

As demonstrated above, the strategic importance of R&D sites in EMs is steadily increasing. However, establishing R&D capacities in such countries is more challenging than opening production or sales subsidiaries with which many firms already have experience. This complexity is first and foremost due to the strategic long-term characteristic of such decisions which cannot be readily revised without high costs. Moreover, the success of an R&D facility is visible only after several years. Also, the already mentioned obstacles like limited IP protection in some host countries pose additional challenges. Thus, a simple transfer of lessons learnt with local production and sales should be carefully deliberated. The main reason is that such subsidiaries have totally different goals like cost reduction in manufacturing or the implementation of local marketing measures.

Most MNCs possess at first, a central R&D department at or near their headquarters (HQ) (left lower quadrant in Fig. 11.1). The extension of the R&D activities can occur along two dimensions.

The first dimension (Y-axis) touches the geographic distribution of R&D activities. On this, in fact, continuous scale, two general categories "central R&D at home" and "decentral R&D abroad" can be identified. The more different overseas R&D locations a firm has and the more independent from HQ they are, the higher its internationalization degree. According to that MNCs like GE, Siemens or SAP with their strong R&D presence in EMs—which will be described

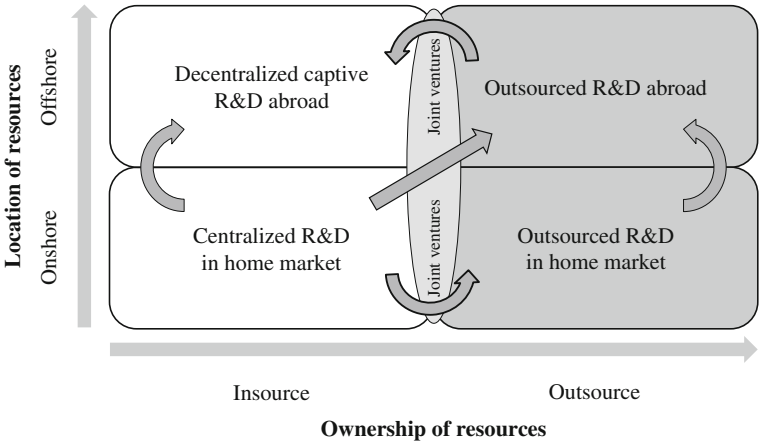


Fig. 11.1 Forms of industrial R&D activities and trend toward decentralized captive R&D abroad (adapted from Eppinger and Chitkara 2006, p. 27). (This figure is reproduced with kind permission of MIT Sloan Management Review/Massachusetts Institute of Technology. All rights reserved. Distributed by Tribune Media Services © September 4, 2012)

in more detail in the following subchapters—exhibit high degrees of R&D internationalization.

The second dimension (X-axis) relates to the question if a given activity—in our case R&D—should be performed within the boundaries of the firm or with the help of third parties. R&D is a very sensitive firm activity directly touching the firm's core competencies. Thus, each company should carefully decide which activities are indispensable for retaining its innovativeness and future competitiveness. We cannot provide a general answer to this question. However, most of the firms we examined in our research project have at least middle term opted for own R&D facilities in EMs (left upper quadrant in Fig. 11.1). These findings are supported by further studies showing a trend toward decentralized, captive R&D laboratories (Boutellier et al. 2008; Eppinger and Chitkara 2006; Ernst and Young 2010). In many cases like GE or SAP, such EMs' R&D sites play an equal role among other worldwide R&D locations. However, there is a long way to go, before a full-fledged R&D center can be established in an EM. On their way, many firms fall back on third parties (both right quadrants in Fig. 11.1) and enter, for instance, joint ventures with local partners like the German agricultural machinery manufacturer CLAAS in India.

Thus, often a captive R&D site in an EM (upper left quadrant in Fig. 11.1) is the most advanced level of a local business engagement. In most cases, Western MNCs start their local activities in EMs with sales offices. They are followed by a gradual establishment of local manufacturing capacities—often due to local governmental regulations. At the latest, at this stage, most MNCs realize that it might be worth to adjust their products to a higher extent to local market needs and start some application development often with external partners (joint ventures or upper right quadrant in Fig. 11.1). These first development activities can be gradually expanded into a captive R&D center, the latter being the main focus of our chapter.

11.3 Research Methodology

In our explorative research, we wanted to uncover the main motivations and barriers behind R&D internationalization into EMs from the perspective of Western MNCs. Moreover, we wanted to study and learn how successful MNCs manage their local R&D, that is, how they overcome the many barriers in order to reach their R&D internationalization aims mirrored by their internationalization motives. We have limited our research to India and China as they are the main beneficiaries of Western R&D-related FDI. Similarly, the United States and Germany are among the leading R&D investors in these countries. We focused on four broad industries, namely machinery, automotive, electronics/IT, and chemistry as they are the backbone of both the US and German economies and very export-oriented. We purposefully selected MNCs of different sizes spanning from

160 million to 124 billion euro revenues (in 2008). Altogether we have studied 14 technology-intensive MNCs and their affiliates[3] and conducted 40 interviews with experienced R&D managers most of whom were personally involved in the establishment of local R&D sites over a longer period of time.

Our research project lasted from 2008 to 2010 and consisted of two parallel research efforts. First, we asked knowledgeable R&D executives from the above-mentioned firms to prepare in-depth case studies of their respective R&D facilities in China and/or India. Each case study was based on specific guidelines to enhance comparison. It described in detail the given R&D site, how it was build up and managed, what role it played in the worldwide R&D network as well as what were the main drivers and barriers behind its establishment. Second, in addition to these case studies, we conducted further semi-structured interviews on the same topics with selected R&D executives—many of them on-site in India. Both the case studies and the interviews were complemented by a wide range of (internal) company materials like presentations and memos. The findings of the case studies and of our interviews were discussed in great detail with the respective company representatives during two workshops held at the WHU—Otto Beisheim School of Management in Vallendar, Germany, in spring 2008 and in autumn 2010. This prevented us from driving erroneous conclusions and interpretations out of the data.

Based on both the company data and a literature review, we identified four motivations and four barriers of Western MNC R&D internationalization into EMs as well as seven key success factors helping to overcome the exiting barriers.

11.4 Motivations and Barriers of R&D Activities in Emerging Markets

In the following, we present the main motivations and barriers of R&D internationalization into EMs from the perspective of Western MNCs (see Fig. 11.2). In the two sub-chapters, we limit ourselves to motivations and barriers internal to the company.

11.4.1 Motivations

There are several reasons why western MNCs start R&D operations in EMs. The most prevailing are proximity to local sales markets, a large pool of skilled

[3] These companies were Bosch, CLAAS, Continental, Dell, Evonik Degussa, GE, MAN Diesel, Nokia Siemens Networks, SAP, Sartorius, SCHOTT, Siemens, SUSPA, and Tyco Electronics. Not all of them have been involved in all parallel research efforts described in this sub-chapter.

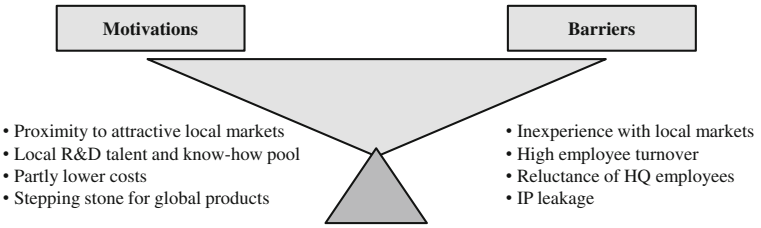
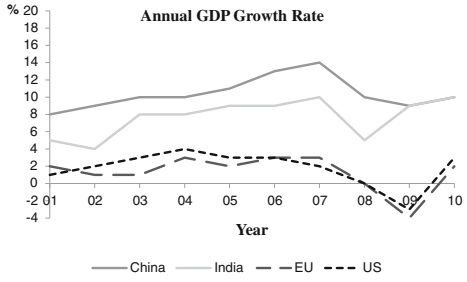


Fig. 11.2 Motivations and barriers of Western MNCs pursuing R&D in EMs. This figure is reproduced with kind permission of Springer-Verlag GmbH © July 27, 2012)

personnel, to some extent lower costs, and the potential to profit from products developed locally also in other markets.

First, local sales markets become increasingly attractive. These developments urge MNCs headquartered in developed countries to respond quickly in order to maintain their competitive positions both in domestic and in international markets. On the country level, many EMs have experienced extraordinary growth of their economies in the last years. For instance, China's average annual GDP increase over the last decade amounts to 10 %, whereas India's is still 7.7 % (see Fig. 11.3). In comparison, the European Union and United States have not surpassed on average the 2 % threshold during this time and even experienced a decline of their economies. Such statistics indicate that many EMs have started to close the gap on more developed countries like Germany or the United States at a fast pace (see Fig. 11.3).

On the individual level apart from the often declining premium market segment traditionally dominated by western MNCs, particularly the fast-growing middle



China and India Move Up USD-demoninated GDP Rankings

	2007	2008	2009	2010	2011*	2012*
1	US	US	US	US	US	US
2	JP	JP	JP	CN	CN	CN
3	CN	CN	CN	JP	JP	JP
4	DE	DE	DE	DE	DE	DE
5	UK	FR	FR	FR	FR	FR
6	FR	UK	UK	UK	UK	UK
7	IT	IT	IT	BR	BR	BR
8	ES	RUS	BR	IT	IT	IT
9	CA	ES	ES	IN	IN	IN
10	BR	BR	IN	CAN	RUS	RUS
11	RUS	CA	CA	RUS	CA	CA
12	IN	IN	RUS	ES	ES	ES

* Forecasts.

Fig. 11.3 Growth of selected EMs in relation to more industrialized countries (*Source* Goldman Sachs 2011, p. 2; World Bank 2011). The right hand part of this figure is reproduced with kind permission of Goldman Sachs AG © August 23, 2012)

market segment deserves special attention (Gadiesh et al. 2007). The World Bank estimates that the global middle class—defined as earners making USD10–20 a day—is likely to grow from 430 million in 2,000 to 1,2 billion in 2030 (Bussolo et al. 2008). These increasingly solvent and technology-savvy new customers ask for tailor-made products that have both a low price and meet their particular needs. Such "good-enough" products—as experience shows—can be best developed on-site by local R&D staff. Firms' central R&D departments located in more developed markets and used to high end, and sometimes even over-engineered products are less successful. In this segment, Western MNCs still have a realistic chance to counter cost-driven local competitors. Moreover, if they refuse entering this segment, they run the risk of being preempted by local rivals in their home markets, too. Local R&D also reduces delivery time—another essential requirement for the presence in dynamic markets. A good example here is Bosch, the leading German automotive parts supplier, who developed components for the low-cost car "Tata Nano" in its Bangalore-based R&D facility.

Second, MNCs can profit from the huge local talent pool of researchers and engineers as local governments increasingly invest in science and technology (S&T) as well as higher education institutions. For instance, China plans to increase its R&D spending from 1.5 % of GDP in 2007 to 2.5 % in 2020 (Deutsche Bank Research 2011), whereas India plans to achieve the target of 21 million students by 2012, compared to 14.8 million in 2007 (UNESCO 2010). Although one has to keep in mind that EMs have started from a relatively low level of S&T development, they gradually make up ground on more developed markets in terms of R&D output-like patents filed or scientific journal publications (World Bank 2011).Without a local R&D laboratory, it would be difficult to attract local top talent and leverage its potential worldwide. Such a human resources (HR) strategy may even help to counteract the stagnating number of graduates in engineering and natural sciences in many of the MNCs' home markets. Additionally, local R&D centers allow direct access to specific local knowledge clusters. A prime example of such a "pocket of innovation" is Bangalore known for its IT expertise. MNCs like GE or Siemens establish their R&D laboratories in this region. For GE, local talent was the main motivation to come to India (Dubiel 2009; Wille 2009), and Siemens explicitly looks for employees with strong "technopreneurial" skills (Monster India 2007).

Third, some MNCs report lower R&D costs, especially lower labor costs, as a driver of local R&D facilities. How far this really holds for a given company should be carefully calculated case by case including a broad range of "hidden" costs like the necessity to spend more time on tasks than R&D teams at home would spend or home-country overhead time for sharing expertise and setting standards. Most of the MNCs we interviewed like, for instance GE, however, underscored that this was not their main long-term reason for a local R&D presence.

Last but not least, pioneering MNCs demonstrate that products primarily developed in EMs for local use can well be exported to other EMs or even—after some adjustments—to more developed markets. Such a "reverse innovation"

strategy of designing basic product platforms in EMs and upgrading them later on for worldwide sales may prove successful in the future (Immelt et al. 2009). CLAAS—an agriculture machinery manufacturer—for example, sells harvesters developed in India in other Asian and African countries (Forkert 2009). Siemens on the other hand successfully launched a computed tomography device developed for the Chinese middle market in its R&D center in Shanghai also in Germany and the United States.

11.4.2 Barriers

Notwithstanding the many benefits MNCs derive from their R&D sites in EMs, there are also some roadblocks they have to circumvent in order to succeed (see again Fig. 11.2). First and foremost, for many firms, EMs are relatively new additions to their business landscapes. This is exacerbated by the fact that many EMs differ to a high extent from the MNCs' home markets (Sheth 2011). In general, they are highly volatile with local competitors used to react quickly to changing buyer preferences as well as have distinct customer patterns. Lacking experience with local specificities makes it particularly difficult to establish R&D sites as they push into the very core of the firm's value chain, involve high investments, and are dependent to a high extent on local scientific and industry ties which are likely to be poorly developed at the beginning.

Second, many companies we studied pointed to the relatively high employee turnover, particularly in the early stages of the R&D center establishment. This was mostly due to the fierce competition among numerous Western MNCs opening R&D sites in attractive locations of EMs like Shanghai or Bangalore. Often, even small remuneration differences motivated employees to switch jobs from one day to another.

Next, in many cases, HQ employees were skeptical regarding the new R&D operations. Many feared losing their jobs to low-wage countries and thus were reluctant to cooperate with the new sites. In case of our interviewed MNCs, the development of R&D capacities in EMs was not conducted at the expense of domestic operations. What is more, EM R&D laboratories were seen as an extension of domestic operations helping to achieve faster innovation cycles and faster time-to-market and enhancing the existing R&D network with new skills like lean product development.

Finally, many MNCs we studied, like the specialty chemicals manufacturer Evonik Degussa or the laboratory and process technology provider Sartorius, pointed to the threat of IP leakage making the establishment of full-fledged local R&D a challenging task. Some of them like Sartorius spread the responsibility for product components over its worldwide global engineering network in order to minimize plagiarism. IP leakage is connected to both the relatively high employee turnover and differences in national culture as well as a relatively weak IP law

enforcement in some EMs. The good news, however, is that IP protection is improving steadily as local firms start fearing imitation themselves.

11.5 Successful Management of R&D in Emerging Markets

Apart from listing motivations and barriers faced by MNCs establishing R&D in EMs, a second goal of our research project was to sketch best practices helping to overcome the mentioned barriers and succeed with local R&D laboratories. In this context, it is however important to notice that successful local R&D depends on a mix of factors. There is no one dominant best practice. Our studied MNCs demonstrate that a bunch of measures attuned to the new R&D site and to the firm's overall strategy should be adopted. Several internal firm stakeholders like HQ and foreign subsidiary employees are responsible for implementing these measures. With regard to R&D laboratory success, the studied MNCs name, for instance, an above-average number of successful R&D projects, an increasing number of patents and scientific publications, and an above-average assessment of the new R&D site in internal employee reviews as well as a low staff turnover rate.

In the following, we introduce the seven key success factors of establishing R&D in EMs and illustrate them with examples. Further, we show how these factors can help to overcome the mentioned R&D internationalization barriers.

11.5.1 Overview of Success Factors

For most MNCs, building up R&D facilities in EMs is very challenging. The following seven factors representing strategic, cultural, and organizational aspects unveiled by successful MNCs participating in our research project might be a helpful guideline (see Table 11.1).

11.5.1.1 The Presence of a Global R&D Strategy

Generally, the establishment of a new R&D site in an EM should follow a long-term global R&D strategy. This implies the existence of such a strategy. It should clearly define how a company aims to internationalize its R&D and who (which unit) is developing what (which product or component), where (which location), and for whom (which market or customer segment). The allocation decision for R&D tasks should be taken from the perspective of the whole company and according to the competencies of each local laboratory. Often, R&D internationalization decisions, especially to low-wage countries, are perceived as a threat by

Table 11.1 Key success factors

Success factor	What matters?
Strategy	
1. Presence of a global R&D strategy	International orientation; assigning clear roles and responsibilities to all R&D laboratories in the company's international network; long-term horizon; convincing company-wide communication
2. Top management support	Support of the new R&D site with adequate resources and management attention; careful selection of the local managing director
3. Personality of the R&D site managing director	Professional, social, and intercultural competence; excellent network within and outside of the company; international experience; host country experience
4. "Ownership" of development tasks	Assigning interesting tasks to local R&D teams; empowering the local R&D site
Culture	
5. Global innovation culture	Company-wide strengthening of the "belonging to one company attitude"; openness toward other national cultures; knowledge exchange between company sites
Organization	
6. Accurate R&D HR policy	Balancing local expectations and global manageability; company-wide reward systems; intercultural training; transparent communication of the company's core values; time-restricted relocation of R&D employees between R&D sites
7. External and internal networking	Personal relations; local-language-speaking R&D employees; careful selection of potential research partners; internships for students; support for doctoral students; deployment of international R&D teams

HQ employees. However, the MNCs in our research project reported even positive employment effects for domestic facilities. Assigning such tasks just by the way, as a result of decision making on lower hierarchy levels and in an uncoordinated manner to maximize short-term goals, is anything but successful. A volatile relocation of single R&D activities from country to country quickly takes revenge on the firm. The experience of the studied MNCs shows that it can take up to 10 years before a new R&D site in an EM unfolds its full potential. Such a long-term project implicating far-reaching changes within the MNC should be carefully planned.

Siemens coordinates its worldwide R&D activities in so-called Global Technology Fields (GTFs) devoted to technologies of strategic importance to several of its business units. Through the GTFs, Siemens can leverage the potential of its worldwide R&D network. Its researchers work on pioneering technologies in innovation clusters worldwide where customer needs and future markets have been identified (Achatz et al. 2009). The R&D sites also serve as regional centers of competence. Special emphasis in EMs is placed on the development of so-called S.M.A.R.T. products (simple, maintenance friendly, affordable, reliable, and

timely to market) which are designed to compete in price-sensitive local markets. For instance, the Shanghai R&D facility of Siemens Medical Solutions bears the global responsibility for middle and low-end medical equipment (Siemens 2010).

11.5.1.2 Top Management Support

After the long-term global R&D strategy has been decided on, it should be communicated within the company and backed by both material and immaterial resources. Especially a clear, permanent, and visible support of the new R&D center in an EM by the firm's top management is necessary. This motivates local R&D employees on the one hand and enhances the acceptance of the new R&D location within the existing company network on the other. Consequently, potential concerns of employees can be reduced, the so-called not-invented-here syndrome minimized and thus prerequisites for a fruitful cooperation created.

GE's R&D center in Bangalore illustrates the pivotal role played by the company's CEO for the site's development. Without Jack F. Welch—the former CEO—the center would hardly exist in its present form. In fact, the center is named after him—the only R&D facility within GE's network named after a person, not its geographic location. His confidence regarding India's scientific potential is mirrored by his words visibly placed at the R&D center's entrance that "India is a developing country however, with developed minds." Equally convincing was his firm-internal communication that the investment in Bangalore is long term. His clear commitments like "We want to make it big here" or "We are here for the long run" are still present in the laboratory's employees' minds. The present CEO as well as other board members also supports the site through personal visits (Dubiel 2009; Wille 2009).

11.5.1.3 Personality of the R&D Site Managing Director

The personality of the R&D laboratory's managing director plays a central role particularly in the early phases of the center's foundation. When staffing this important position, not only the professional but also the social and intercultural competencies of the candidate should be taken into account. The successful manager should be a respectable, internationally experienced person with numerous contacts within and outside of the organization who is used to work on the interface between different locations and functions and with a direct reporting line to top management. Such managers are often known as "boundary spanners" (Schotter and Beamish 2011). Especially, during the build-up phase, the personal network of the managing director at the firm's HQ is decisive.

Exactly such a personality is Dr. Wille, managing director of GE's Bangalore site between 2001 and 2010. Particularly in the first years of the center's existence, he could heavily build on his wide internal company network. Thus, he was able to overcome several obstacles and to acquire a number of important projects for his

R&D laboratory. Due to his broad international experience in general and Indian experience in particular, he could successfully manage company-wide expectations (Dubiel 2009). His successor is an internationally experienced Indian backing the trend that new R&D centers are planned to be led by medium-term local executives (GE 2011).

11.5.1.4 "Ownership" of Development Tasks

With the proceeding setup of the new R&D site, a gradual transfer of more responsibilities for own, innovative R&D tasks should take place. This contributes highly to the esteem of the local R&D personnel. If the MNC truly plans to build up an innovative R&D facility developing products for local and international markets as well as to attract and motivate the best people, it has to cede some decision-making power to locals. An "extended workbench" approach will not work in the long run. Such a HQ policy manifests itself in a remote control of local decision-making processes possibly even ignoring local specificities as well as the delegation of simple, repetitive activities like testing, documentation, and maintenance to local employees. This has a very discouraging impact on them and can well increase the labor turnover rate with all its negative implications. Only with an on-site responsibility for own R&D projects, the full innovative potential of the R&D site can be leveraged.

Such a local "ownership" of innovative projects can be observed at SAP—the German B2B software giant—where the firm's R&D site in Bangalore is responsible for the development and maintenance of product lines for certain industries (Neumann 2009). Not only software industry assigns interesting R&D projects to Indian subsidiaries. Also, the biggest German agricultural machinery manufacturer CLAAS develops rice harvesters for the Asian market out of its Indian facilities (Forkert 2009).

11.5.1.5 Global Innovation Culture

Of great importance to enhance cooperation between R&D facilities located in different countries is a global innovation culture. Such a culture can be defined as openness to world markets, diverse customer needs, and different national cultures. It asks for the ability to recognize and leverage specific skills, resources, and ideas within the company that are often geographically dispersed (Kleinschmidt et al. 2007). This factor also exemplifies the long-term nature of the R&D site's buildup as company cultures do not evolve within a few months but take years to develop and mature. The firms we studied employ several measures to enhance an organization-wide innovation culture. Most of them are indirect in nature. They impart internal value systems, behavioral rules, and the sense of belonging to one organization. Hence, they support a certain behavior of employees who become more open toward individuals coming from different national cultures, regard the whole

company independently of its geographic locations as one entity, and act in concert with their international colleagues.

SAP places great importance on supporting a global innovation culture by offering intercultural training for new employees, mainly middle management and project leaders (Neumann 2009). New associates in India are, for instance, offered training on "how to work with Germans" as well as German language classes (working language at SAP is however English). Further, a number of exchange programs between the international R&D facilities are in place to foster personal relations. Finally, in day-to-day product development operations, SAP deploys international teams and encourages all employees to make contributions as equals, regardless of geographic location.

11.5.1.6 Accurate R&D HR Policy

The experience of our studied MNCs repeatedly points to the need of a well-developed HR policy to successfully operate state-of-the art R&D facilities in EMs. Its key issues are recruiting and retaining excellent local R&D employees. However, there seems to be no single HR factor that on its own guarantees success. Clearly, it is a mix of many expected and more outstanding measures. The "overall HR package" must be convincing for potential employees as the competition for the very best people, especially in innovation clusters like Bangalore or Shanghai, is quite fierce. Beyond an attractive remuneration, also the firm's image, its product orientation, internationalization degree as well as the job content are important. Likewise, retention of the employed and on-the-job trained individuals should be enhanced. Offering benefits like air-conditioned bus transport or health insurance for family members does not make the difference any more. The assignment of challenging and innovative tasks as well as the definition of personal growth paths is a better incentive. Employee retention might also prove an effective strategy to reduce IP leakage in countries with weak IP protection. Beside local employees, also expatriates from the firm's HQ are relocated to the new R&D site to help build up local operations and enhance ties between central R&D and its foreign subsidiaries. It is crucial to carefully choose these managers both in terms of professional and in terms of social skills as well as intra-firm networks.

Effective R&D HR policy is not a matter of firm size as SUSPA, a German 160 million euro turnover manufacturer of gas springs, dampers and adjustment systems, demonstrates. In its Chinese R&D site, the classic example of a German Mittelstand firm offers attractive monetary and non-monetary remuneration packages for employees. Beside regular salary adjustments, the firm also assesses its employees' performance, creates an attractive work environment, and gradually but continuously promotes its best R&D personnel. To reduce the turnover rate, SUSPA agrees on contract penalties with employees who drop out of the firm shortly after extensive training, pays loyalty allowances, and grants leave days depending on job tenure. Finally, it also employs German expatriates (Erat 2009).

11.5.1.7 External and Internal Networking

Building up R&D facilities in EMs usually goes well beyond the degree of internationalization experienced by most companies in the past. And it exceeds by far the relatively "closed" circuit flow of a foreign production site. The success of the new local R&D laboratory is therefore considerably tied to its integration into the local scientific and industrial community. And to accomplish this, the R&D site has to be regarded in the host country as a local player. This is by far not a straightforward task rather the development of local networks is a long-term investment. While enhancing local ties between the new R&D site and its hosts, the facility should not turn into an isolated island within the MNC's organization. Thus, it should also be integrated in the existing firm network consisting of both other R&D centers and business units.

For a good example of an efficient internal networking, just recall Siemens' GTFs. Their directors have a global responsibility for their technology fields, regardless of geographic location. This minimizes inefficiencies and redundancies often occurring in dispersed R&D organizations. Furthermore, heads of new R&D sites are experienced managers who already have a broad personal intra-firm network. Siemens also fosters its external ties. In order to link itself more closely to scientific institutions, it has established Centers for Knowledge Interchange at selected higher education institutions for instance, in Shanghai and Beijing. It also maintains a Technology-to-Business center in Shanghai which works with local universities, start-up companies, and individual entrepreneurs to transform their innovations into successful businesses (Achatz et al. 2009).

11.5.2 Application of Success Factors

Within the studied MNCs, we identified a mix of factors crucial for a successful establishment of R&D centers in EMs. Implementing these measures allows overcoming certain barriers widespread in EMs and allows MNCs to reap the expected benefits of R&D internationalization into EMs. In the following, we would like to exemplarily demonstrate how the four barriers we identified in our study can be successfully overcome (see Table 11.2).

Inexperience with local markets inhibits MNCs' access to them and limits potential profits from their well-educated labor pool. Without a deep anchoring in local markets, it is very challenging for firms to use these markets as a starting point for low-end product development which might become the basis for worldwide sales. By delegating ownership for certain product lines to local R&D centers, companies like Siemens can both successfully enter local markets and develop products with global potential. Just recall the example of Siemens' computed tomography device developed in China. Similarly, both its extensive local network within research institutes and higher education institutions helps GE

Table 11.2 Success factors help to overcome barriers to achieve motivations

Barriers	Success factors	Motivations
1. Inexperience with local markets	• Ownership • Global innovation culture • Internal and external networking	• Proximity to attractive local markets • Local R&D talent and know-how pool • Stepping stone for global products
2. High employee turnover	• Personality of the R&D site managing director • Ownership • Global innovation culture • Accurate R&D HR policy	• Local R&D talent and know-how pool • Partly lower costs
3. Reluctance of HQ employees	• Personality of the R&D site managing director • Global R&D strategy • Top management support • Global innovation culture • Accurate R&D HR policy • Internal networking	• Local R&D talent and know-how pool • Stepping stone for global products
4. IP leakage	• Global R&D strategy • Accurate R&D HR policy	• Proximity to attractive local markets • Stepping stone for global products

to attract the brightest graduates and convince professors highly regarded in their expertise fields to spend sabbaticals in the company's R&D laboratories.

An employee turnover above the rates usually experienced by the studied MNCs in more industrialized countries makes it difficult to fully leverage the potential of the local labor pool. If employees quit shortly after their hire, the company cannot profit from their know-how. Moreover, high recruiting investments as well as training costs for constantly new personnel increase total local costs. With the help of an attractive work environment and assignment of innovative projects, companies like SAP are able to reduce their personnel attrition rates well below the local industry average. Due to its appealing working atmosphere and company culture, SAP Labs India has received numerous awards. Both SAP and GE underscore their R&D sites' high product orientation to convince local S&T personnel to plan their careers long-term in-house.

Reluctance of HQ employees with regard to the new R&D sites in low-wage countries is relatively widespread. It seriously hampers the integration of the new R&D site into the firm's existing R&D network and diminishes potential benefits from the new site. If solely back-office operations are transferred to EMs—which is often uncritical from the perspective of HQ R&D—it will be difficult to retain above-average local R&D employees who expect innovative and value-adding tasks with regard to new product development. And without qualified local personnel, also the potential of a stepping stone for global products cannot be realized. Of crucial importance are in this regard top management support and the

personality of the new site's managing director. Just recall the examples of GE. Without a clear positioning of the firm's CEO in favor of the new site and an extensive company-wide lobbying for assigning exciting tasks to the new laboratory by the local managing director, an integration of the EM R&D site is much more difficult.

Finally, IP leakage refrains many MNCs from entering EMs and thus prevents them from using the local fertile ground for local product development with global potential. Two measures mitigating this can be observed within the studied MNCs. First, a global R&D strategy like at Sartorius helps to clearly assign particular tasks to particular R&D laboratories. Spreading responsibilities globally and/or retaining some core competencies at HQ helps to keep crucial IP within the company. Second, Sartorius also tries to reduce turnover rates among its existing employees and uses extensive training sensitizing employees against plagiarism.

11.6 Conclusions

Emerging economies have become increasingly attractive sales markets and sourcing locations for Western MNCs. To fully profit from both developments, pioneering MNCs establish local full-fledged R&D laboratories. These activities are not always risk-free, but the examined MNCs show that advantages seem to outweigh the associated costs. The studied companies—representing different industries and sizes—independently report a number of factors enhancing the buildup and management of captive local R&D centers. They do not claim to be exhaustive; however, they raise a number of important issues which are worth to be considered. First and foremost, there are some strategic aspects. R&D centers in EMs have to be embedded in a clear, long-term international R&D strategy, backed by top management, and assigned a managing director accustomed to working in an international environment and well-networked within and outside of the MNC. Many of the examined firms also gradually delegate more and more challenging R&D activities to their new R&D sites and promote them to equal partners in their international R&D network. Further, cultural aspects come into play. A global innovation culture proves to be a strong booster of a company-wide cohesion. Finally, organizational factors like broad HR measures to recruit and retain the best local personnel as well as the integration of the R&D site into the existing MNC network are of great importance. All these measures can help to better reach the aims of R&D internationalization into EMs and circumvent some of the main barriers.

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