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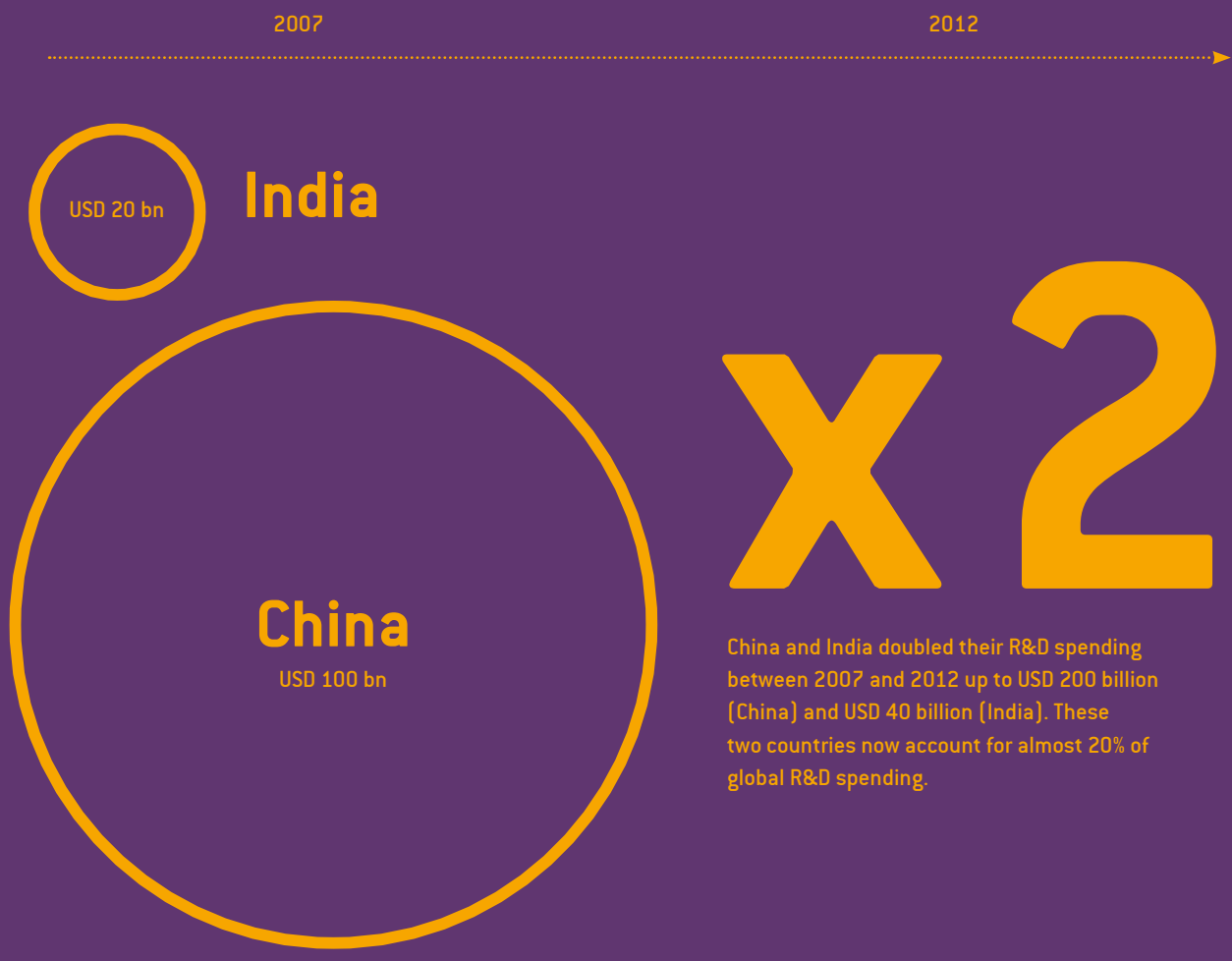

China and India doubled their R&D spending between 2007 and 2012 up to USD 200 billion (China) and USD 40 billion (India). These two countries now account for almost 20% of global R&D spending.

Innovation – how the emerging markets are driving the global innovation agenda

GLOBAL TOPICS
8 BILLION

Competition is heating up in emerging markets as more and more local companies innovate rather than rely on low costs to attract customers. Not only are emerging countries investing a higher proportion of global R&D spend, but emerging market competitors are applying innovative techniques to manufacture a new class of frugal products that could transform markets across the world.

The market potential for an innovative and affordable car like the Tata Nano is enormous in developing and emerging countries

GLOBAL TOPICS

8 BILLION

Innovation – how the emerging markets are driving the global innovation agenda

INTRODUCTION

WHY EMERGING COUNTRY INNOVATION QUICKENS COMPETITION THROUGH R&D HUBS AND FRUGAL PRODUCTS

European managers see exciting prospects in emerging markets. Higher growth rates, rising young populations, an expanding middle class, major infrastructure projects and changing trade patterns are just some of the factors that promise substantial new business opportunities. But emerging country companies also spot these opportunities. And they are drawing on strengthening R&D capabilities to innovate and deliver competitive products across every sector.

China is the world's most prominent emerging R&D hub, lifting its share of global R&D expenditures between 2007 and 2012 to reach about 14% of total worldwide R&D spending. Over the same period, shares of developed countries' R&D investments dipped significantly.[1]

China and India have also become net exporters of R&D services to the EU as their growing R&D competence and status attract more R&D projects. Between 2005 and 2010, the value of EU 27 imports of Chinese R&D services quadrupled from EUR 211 million to EUR 953 million, while imports from India increased from EUR 507 million to EUR 734 million. A previous EU 27 external R&D services trade surplus is now a deficit of EUR 659 million for India and EUR 454 million for China.[2]

More and more emerging country manufacturers deliver products with a speed, design and price that make for daunting competition. In reaching for a competitive response, European manufacturers may find that their innovation management and product development expertise and experience can, ironically, be a hindrance. Why?

A slightly waggish answer is that advanced economies enable more people to buy products by comparing features rather than functions. Design elements, performance options and non-essential items are features manufacturers introduce to differentiate and justify higher prices. Many manufacturers have become quite adept at juggling these non-essential features to increase margins or encourage customers to buy a newer model. But emerging market customers can't afford these features. Manufacturers must compete on the value and performance of core product functions. Cost/value competition is much more demanding when the customer rates the performance of only a small set of functions. The competitive vocabulary is very different in emerging markets.

Today, many European manufacturers recognize that stripping down advanced economy products originally engineered to promote features will not make a competitive platform in emerging markets. The price often can't match local competitor prices, and local competitors increasingly offer better performance and value across a few functions. The challenge for European companies is how to apply their manufacturing, technical and marketing expertise to support products engineered and manufactured in emerging markets. Because if they can't transfer and translate significant relevant corporate knowledge and experience to help local R&D and manufacturing, European companies lose a potential "value add" advantage competing with local manufacturers.

The changing global R&D landscape with the emerging country innovation hubs and local engineering is inaugurating a new class of competitive products designed, engineered and priced for the low- to mid-range market segments. These inventions are called frugal products. In many industries and sectors, they are the world's fastest growing segments. For example, strong demand in emerging and developed countries is boosting sales of medium and low-end mechanical engineering technologies above world market averages. According to Roland Berger estimates, global CAGR 2010-2015 for high-end technologies is a respectable 6%. But low-end and mid-range technologies will likely enjoy very robust growth at 11% and 10% CAGR.

Frugal products pitched to low- and mid-range consumers are growing profit centers in emerging markets. And the welcome surprise is that good-quality, limited-function machines and products can often create profitable new market niches in advanced economies – very often without cannibalizing sales of higher priced, more feature-laden products. This "reverse" or "transnational" innovation shift introduces a new era in world economic development.

This publication will look at how emerging country R&D hubs and frugal product manufacturing are changing competition in the Focus 20[3] – and forging new business opportunities across both advanced and emerging markets. We will:

Review the changing global innovation environment and rise of emerging country innovation and R&D, noting representative developments in selected Focus 20 countries.

Rethink innovation strategy for emerging market success and identify the basic principles guiding frugal product innovation.

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1) Battelle (2012) **2)** Eurostat (2012) **3)** Publication 1 introduced 20 emerging markets projected to have the most economic growth up to 2030: Argentina, Brazil, China, Colombia, Egypt, India, Indonesia, Iran, Iraq, Malaysia, Mexico, Nigeria, Pakistan, Peru, Russia, Saudi Arabia, South Africa, Thailand, Turkey and Vietnam.

THE RISE OF EMERGING MARKET INNOVATION HUBS

WHERE TO FIND THE INVENTORS OF TOMORROW

Global R&D spending is projected to rise by about 5.2% in 2012, to reach more than USD 1.4 trillion, slightly below the 6.5% increase in 2011 after the global recession and government R&D incentives.

The global R&D landscape is changing. Emerging markets are advancing from production sites and work benches to become important innovation hubs. Many emerging countries have not only increased R&D investments but also moved up the global innovator league tables.

F1 Most notably, over the last few years, China and India substantially boosted their share of global R&D spending. Between 2007 and 2012, they doubled their spending from USD 100 to 200 billion (China) and USD 21 to 40 billion (India). These two countries now account for almost 20% of global R&D spending.

Focus 20 country developmental priorities currently limit total resources dedicated to research, but R&D spending will rise as their economies grow. Indeed, some emerging market companies already allocate considerably higher percentages of revenue to research than national averages. One result is that five Focus 20 companies from China, India and Brazil now rank among the Top 20 of Forbes 2011 Most Innovative Companies. In 2010, 44 of the 1,000 biggest technology companies (in terms of R&D spending) were headquartered in emerging markets, more than double the 16 enterprises cited five years earlier. Chinese and Hong Kong companies represent most of these high spenders, followed by Indian and Brazilian companies.

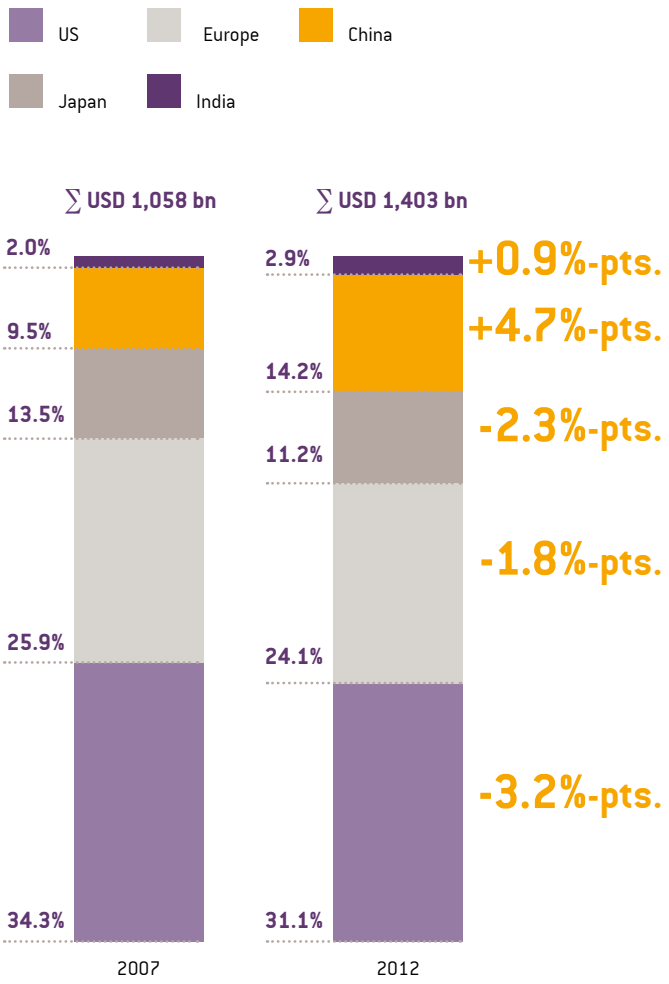
Skilled people are, of course, a prerequisite for boosting innovative performance, and several emerging markets are enjoying a brain gain as the number of young skilled workers increases. For example, between 2004 and 2011 the BRIC student population grew by more than 7% annually, while large European countries such as Germany saw student enrollments increase by only 2%. The availability of researchers and engineers, especially across Asia and Africa/the Arab world, is also improving. Between 2004 and 2007, Chinese engineering graduates doubled from 1 to 2 million, while in Iran and Saudi Arabia, the number of engineers expanded threeto fivefold. But it should also be noted that across many emerging countries, educational quality remains a concern as educational institutions invest to improve standards.

F2 The legal protections granted to intellectual property are one indicator of a country's evolution toward higher "information society" economic development. According to the World Economic Forum, China, Saudi Arabia, Malaysia and South Africa quite successfully affirm the intellectual property rights of foreign investors. Unfortunately, countries such as India and Indonesia are still low performers as regards intellectual property protection.

F1

Emerging markets' shares of world R&D budget are increasing

Share of global R&D spending[4] (USD bn, %)

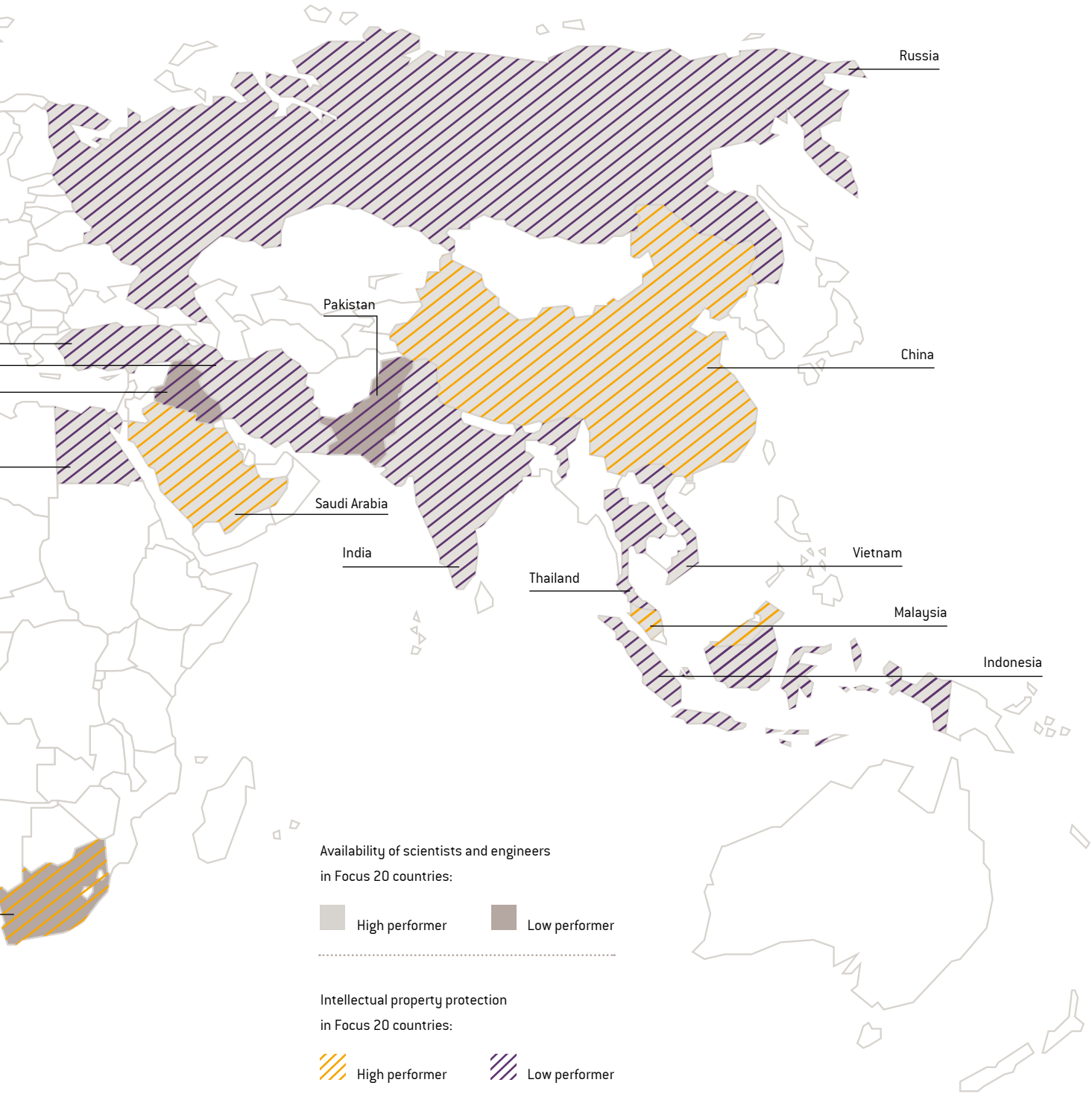


Source: Battelle **4)** Gross domestic expenditure on R&D

F2

The availability of scientists/engineers and intellectual property protection differs significantly among Focus 20 countries

Source: WEF Global Competitiveness ranking


Russia
Pakistan
China
Saudi Arabia
India
Vietnam
Thailand
Malaysia
Indonesia
Availability of scientists and engineers
in Focus 20 countries:
High performer
Low performer
Intellectual property protection
in Focus 20 countries:
High performer
Low performer
Note: Country positions relative to average
WEF Global Competitiveness ranking

Emerging market R&D output is increasing. Between 2000 and 2010, emerging country patent registrations in Europe and the US grew significantly. Not only do well-known innovators such as China and India show double-digit patent registration growth rates, but countries such as Brazil, South Africa, Russia and Saudi Arabia also record similarly high figures.

F3

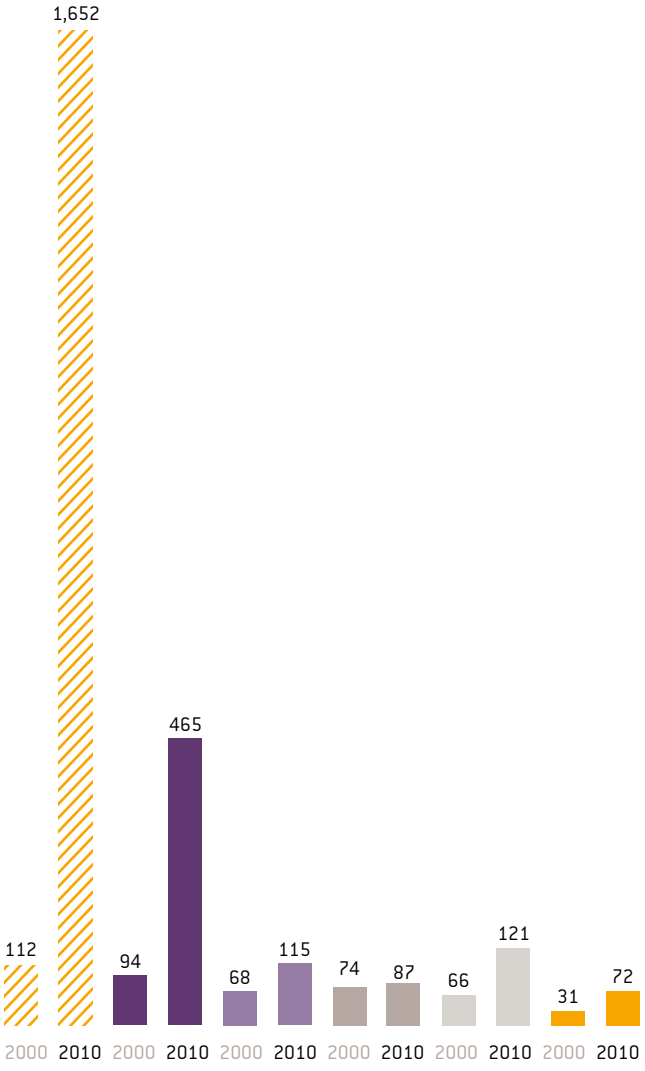
High innovation output

Patents registered in Europe and the US by country of origin (number)

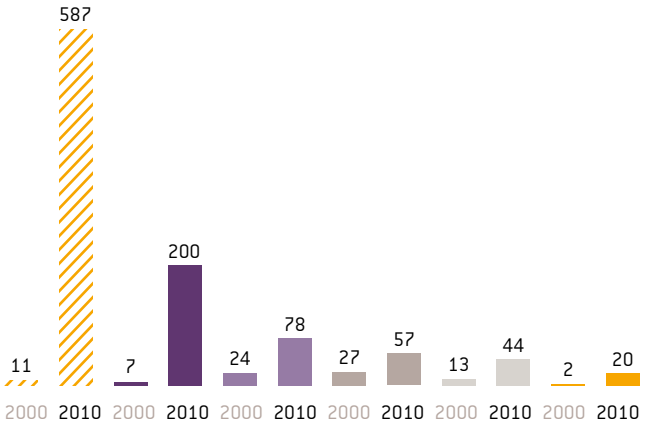
Source: Euromonitor

China
India
Russia
South Africa
Brazil
Saudi Arabia

US Patent and Trademark Office



European Patent Office



LOOK BEYOND CHINA AND INDIA

THE CHANGING PROFILE OF EMERGING MARKET R&D HUBS

To date, most global company R&D hubs are in either India or China. Eight of the ten global companies funding the world's largest R&D budgets are establishing R&D facilities in these two countries. Some companies, such as Microsoft, Nestlé, Intel and Novartis, support both Chinese and Indian hubs. But R&D internationalization is expanding as multinationals seek greater local capabilities and market access. They are looking closer at setting up R&D hubs in other emerging economies. We have chosen four up-and-coming R&D hubs from Latin America, Eastern Europe, the Arab world and Asia to demonstrate the changing international R&D environment.

F4

New emerging market R&D hubs are on the rise

Innovation centers of leading companies in selected emerging markets

	BRAZIL	INDONESIA	RUSSIA	SAUDI ARABIA
R&D investments in USD billion	19.4 (2011)	1 (2010)	23.1 (2011)	0.7 (2007)
% of GDP	0.9 (2011)	0.1 (2010)	1.2 (2011)	0.3 (2007)
Availability of scientists	–	+	+	+
Intellectual property protection	–	–	–	+
University/industry collaboration	+	+	–	+
Innovation industry fields	Renewable energy, IT, petrochemicals	IT, automotive	IT, pharmaceuticals	IT, high-tech

Note: Country positions relative to average WEF Global Competitiveness ranking

Source: Battelle, Roland Berger

BRAZIL

19.4 bn

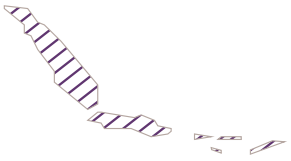
R&D investments in 2011, 0.9% of GDP

Brazil, the "green giant" rich in natural resources and biodiversity, has enormous R&D potential to develop for new forms of energy, agrotechnology and biomedicine. Brazilian advances in renewable energies win worldwide recognition. Notably, Empresa Brasileira de Aeronáutica (EMBRAER) launched the first aircraft to fly exclusively on ethanol. Petróleo Brasileiro (or Petrobras), a semipublic Brazilian multinational energy corporation, plans to invest USD 4.5 billion in R&D over the next five years. The company focuses on advancing technologies for ultra-deepwater oil production.

Brazil offers labor scalability and R&D skills across many types of manufacturing, IT and petrochemicals, positioning the country favorably compared to other Latin American countries that do not share a similar range of R&D services. To date, automotive manufacturers are the principal companies building R&D centers. But IT infrastructure enterprises and R&D engineering are beginning to arrive. For example, General Electric will link its latest USD 100 million Global Research Center in Rio de Janeiro with other GE research hubs in Niskayuna (USA), Shanghai, Bangalore and Munich.

Brazil has been continuously improving its patent protection system, although its current position in the World Economic Forum's Intellectual Property Protection Index at 3.2 (84 out of 142) remains below average. Recent actions by the Brazilian Patent and Trademark Office and the National Council of Justice have reduced the time required for foreign patent applications, and more generally, diminished intellectual property processing times for both Brazilian and foreign companies.

INDONESIA



1 bn

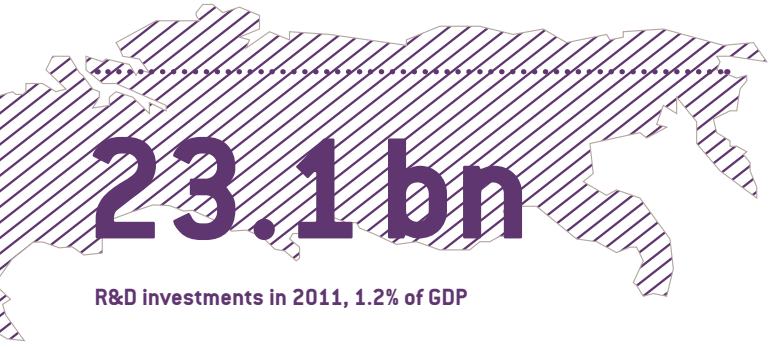
R&D investments in 2010, 0.1% of GDP

Indonesia's current R&D investment is double that of five years ago, and the government now identifies R&D as a principal driver to develop the economy. Indonesia set a long-term goal to increase R&D investments from less than 1% of GDP to 3%. To reach this objective, the country offers various tax and trade incentives, as well as technical assistance, to businesses – whether private, state-owned, or cooperatives – that invest some of their profits in research.

Prominent international companies, such as Unilever, recently launched R&D hubs in Indonesia. In 2011, RIM began R&D activities, the same year Nissan set up an R&D center. Daihatsu intends to use Indonesia as a base to expand regional activities, and in 2011 the automaker inaugurated an R&D center on the site of its new manufacturing plant.

Indonesia offers two forms of patent protection: patents (20-year term) or simple patents (10-year term and lower level of inventiveness). The patent registration and application processes have become more streamlined, and revised intellectual property pre-hearing procedures now considerably reduce both time and expenses. Regarding availability of scientists as well as university/industry collaboration, Indonesia performs above average.

RUSSIA

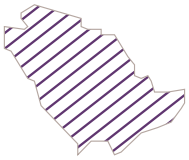


23.1 bn

R&D investments in 2011, 1.2% of GDP

The Russian government plans to develop a Russian Silicon Valley near Moscow where Nokia recently inaugurated a handset R&D facility. Announced in 2012, the plan is to invest USD 3 billion over the next three years to build the Skolkovo Center for Innovation and Entrepreneurship as the cornerstone for a major high-tech presence in the mobile market. Intel is one of the most active major companies investing in Russia, and former CEO Craig Barrett co-chairs the Skolkovo Foundation Council. Other prominent industrial investors include Quintiles and Astra Zeneca. Russian high-tech R&D support also extends to funding wireless infrastructure joint ventures between Russian state-owned manufacturers and such foreign partners as Nokia Siemens Networks and Huawei. However, a concern restricting large vendor investments has been the poor intellectual property protection record. While Russia is expected to strengthen rules to match international standards, the country's current position in the WEF Intellectual Property Protection Index at 2.5 (position 126 out of 142) is below average.

SAUDI ARABIA



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R&D investments in 2007, 0.3% of GDP

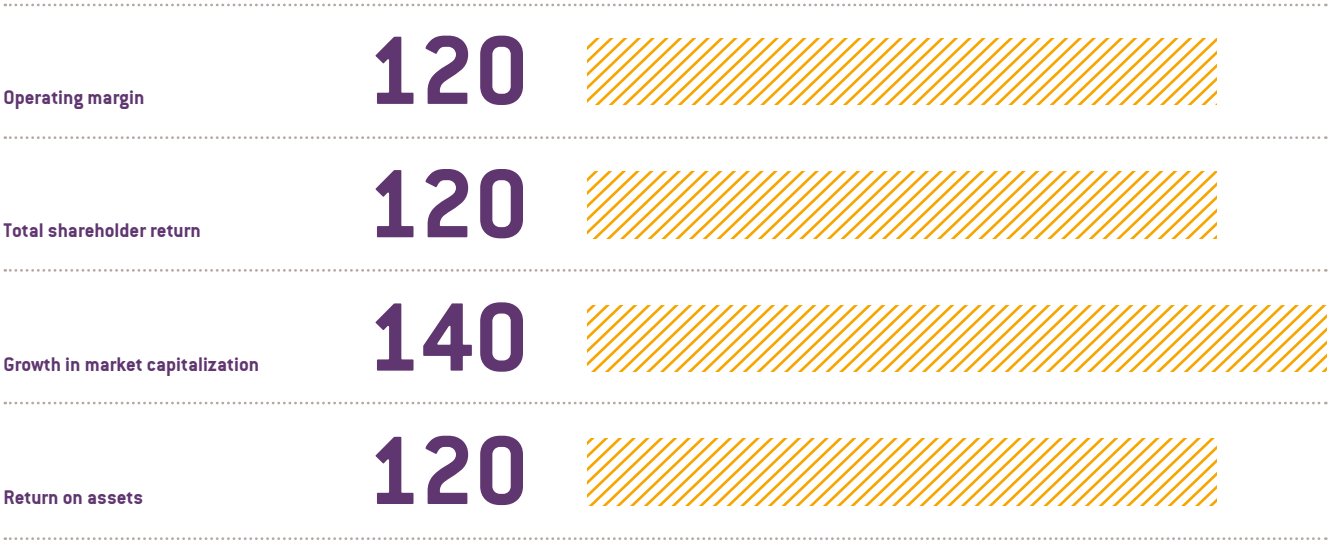
The Saudi economy is highly dependent on petroleum and related products. The government issued development goals to create a more knowledge-driven economy, and 96% of respondents in the GE Innovation Survey reported that the Saudi innovation environment has improved over the past five years. The King Abdullah University of Science and Technology (KAUST), inaugurated in late 2009, seeks to promote university/business collaboration by attracting world-renowned scientists and top students.

In 2011, Siemens Energy founded an R&D center with the King Fahd University of Petroleum & Minerals in Dhahran, a leading Middle East research and teaching institution, to offer R&D support for energy related issues, as well as university student and outreach training. In 2010, Intel opened an R&D center to explore wireless applications in the Kingdom and surrounding region. Patent protection in Saudi Arabia lasts 20 years, and the time between application and registration is about three years. The country has a satisfactory score of 5.1 (position 25 out of 142) in the WEF Intellectual Property Protection Index.

F5

Companies that invest more than 60% of their R&D spend in international research operations showed a 40% increase in market capitalization

Index: 100 = firms with < 60%
The basis is a detailed analysis of the 184 technology companies that spent the most on average on R&D in 2005-2007



Source: Jaruzelski and Dehoff

EMERGING MARKET R&D HUBS ARE STRATEGIC LOCAL SUCCESS FACTORS

The United Nations World Investment Report estimates that approximately 21,500 multinationals do business in emerging countries. Prominent multinationals such as Microsoft, PepsiCo, IBM, Cisco, Nokia, GE and Xerox have also established R&D hubs in emerging markets to conduct scientific and engineering research and explore next-generation business models and organizational structures. A top motivation is to design economical, sustainable products and methods for global rollout. These companies want to create new designs that could potentially reduce costs by orders of magnitude – a 90% reduction rather than 10% cost savings.

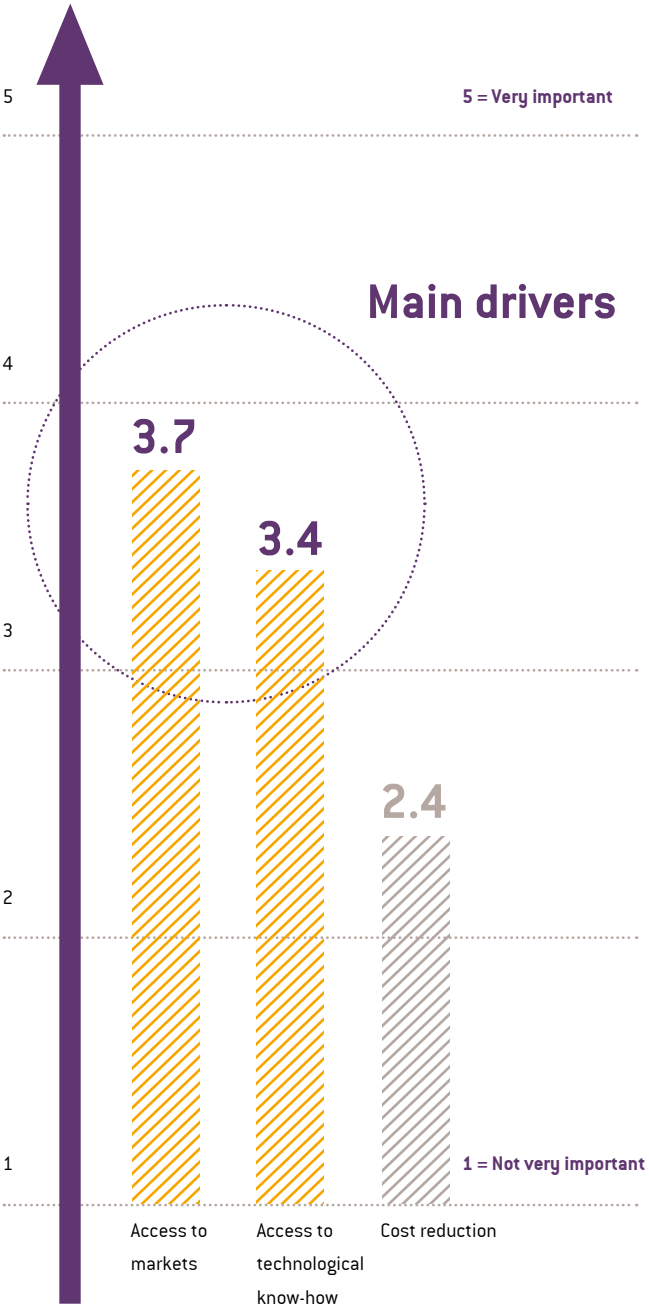
F5 For global companies, an international platform of R&D hubs is essential because local R&D capabilities help position products for local markets and customer requirements. A study by Jaruzelski and Dehoff (2008) found that technology firms with global R&D activities can, on average, demonstrate better financial performance: higher margins, profits and market capitalization. Companies that restrict foreign R&D to a few locations and focus on low-wage countries such as China and India also see above-average financial success.

F6 However, cost is not the principal motivation in selecting an R&D location. A Roland Berger R&D study confirmed an intuitive assessment that access to markets and technological expertise are the most important criteria when deciding where to base R&D centers. Cost considerations may heavily influence project investment decisions, but are generally less relevant when determining where to set up strategic R&D hubs. Access to international talent can also be a prime motivator for moving R&D.

Managing extended supply chains is a standard function of contemporary multinationals. But while some industries and manufacturers are now looking to reduce supply chain complexity, many managers recognize that supply chain components also need to change because competition shrinks time-to-market across numerous sectors and countries. To bring out better products faster, R&D functions must align more closely with local sales and marketing. And in the Focus 20 countries, this means looking at new ways to manage local innovation.

F6

Market and technology access are clearly more important than cost in setting up corporate R&D



Source: Roland Berger

RETHINKING INNOVATION STRATEGIES FOR EMERGING MARKET SUCCESS

WHAT THE STRATEGIC SUCCESS FACTORS ARE

THE RIGHT MINDSET FOR INNOVATIONS

Favorable regulations and ready access to well-educated local scientists and engineers are frequently mentioned when considering locating R&D hubs in emerging countries. However, they are not the only key success factors. Western corporations need an open mindset to understand a country's culture and consumer behavior patterns.

Consider Heinz, the food company that learned very early how to match products and distribution methods to local needs and values. Heinz's emerging country food ventures apply a rigorous "4A" program to score a new product's Applicability, Availability, Affordability and Affinity in emerging markets. Managers first consider applicability. Could the product's ingredients, appearance and taste complement the prospective country's culture? Availability identifies appropriate sales channels. Affordability reviews how to deliver the product at an attractive sales point. Lastly, if these analyses suggest potential, managers explore branding. Does the product have sufficient local cultural affinity to develop an effective brand?

This open corporate mindset extends to R&D efforts. Many emerging country scientists, engineers and researchers have a different mindset than their Western colleagues. Purchasing parity statistics can compensate for differences in pay scales, but they can't capture differences in outlook, cultural knowledge and an almost intuitive feel for local sensibilities. Statistics cannot accurately rate the value to corporations of accessing new mindsets. And while the characteristics of a mindset may be relatively simple to identify – for example, an instinct to economize rather than elaborate, or an engineering eye for different patterns – it is sometimes difficult for researchers raised and educated in the West to imitate.

This mindset is especially valuable when designing and manufacturing competitive products for the low to mid market. Indeed, frugal engineering in more common products is often faster to market and more financially rewarding than high-profile R&D efforts to produce world-class patents. As we shall see, not only are frugal products less expensive to manufacture, but the strong performance of a few, highly desirable functions can make them formidable cost-effective competitors.

FRUGAL PRODUCTS UNLOCK EMERGING MARKETS

Ten, fifteen years ago, many multinationals could rely on stripped-down products to earn revenue in emerging markets because scarcity of competition and novelty made the sale. Today, understanding emerging country customers' unique cultural requirements is only the first step. Customers increasingly choose from among several inexpensive, easy-to-use, good-quality products. Rising competition over the past decade is driving many local competitors and multinationals to offer better products and empowers customers to demand products with ever more buyer-favorable price/performance ratios.

Entry-level product innovations have expanded to become a very important growth lever, expanding worldwide at an annual rate of 7%. The rate is 10% in China and India. This growth has attracted prominent multinationals. Siemens, for example, now generates annual entry-level sales of USD 10 billion, which represent 14% of total sales.

However, many companies from industrialized countries typically do not correctly position their products for these high-growth markets. And by failing to do so, they lose out on potential sales. For example, German machine tools are recognized worldwide for their quality, durability, performance and range of features. Along with automobiles and automotive parts, they are one of Germany's star export industries. But as mentioned in the introduction, advanced economy manufacturers often compete on features rather than functions. German machine tool manufacturers are no exception.

German machines are even slightly over-designed for European customers! Most EU machine tool operators use fewer than 80% of a product's features. But the Chinese, who are major customers, use on average far fewer product features. More than half of operators report using fewer than 60% of a machine tool's features, and only 14% access more than 80% of the machine's feature set.

These heavily over-designed machines will face increasingly difficult emerging market competition in the fast-growing mid-range segment as local competitors improve the performance of their more functional machines.

WHAT ARE FRUGAL PRODUCTS?

Frugal products, designed for low-end and mid-end market segments, limit performance to a narrow set of functions. Successful frugal products are volume-driven, simple, robust/maintenance-friendly, timely-to-market designs sold at a comparatively low price. They should be conceived from the bottom up and integrate selected higher-end components or features only when absolutely necessary.

Frugal products can be found in many industries.

F7
Frugal products are characterized by special attributes

ATTRIBUTES	CHARACTERISTICS			
Performance	Low-low-end	**Low-end**	**Mid-end**	High-end
Simplicity	**Simple**		Complex	
Robustness	**Robust/maintenance-friendly**		Fragile/laborious to maintain	
Economies of scale	**High volume**	Medium volume	Low volume	
Pricing	**Low price**	Medium price	High price/premium	

Source: Roland Berger

1 Tata Nano

▶ Family transportation for the Indian mass market as an alternative to two-wheelers

▶ Improvements as compared to two-wheelers
- Safe
- All-weather
- Affordable

▶ Filling the "white spot" between two-wheelers and mini cars

2 Chip x-gold 101

- Mobile phone chip enabling "ultra-low-cost mobile phones" for emerging markets
- Improvement as compared to conventional chips: single chip integration
- All functions in one piece of silicon
- Material cost reduction
- Reduced phone design effort

3 Annapurna salt

- Refined iodized salt sold in small, affordable sachets

- Improvement as compared to normal salt: iodine is released only when salted food is ingested

4 USD 100 laptop

- Cheap and robust laptop for educating children
- Specially created for developing countries as a charity project to improve education standards, but also for industrialized countries
- Target: Create a laptop that is as cheap as possible using standard low-end parts
- Production of high volumes ensures economies of scale

5 X-ray apparatus

- Siemens entered emerging markets with cheap X-ray machines
- Mass market has significantly higher volumes (> 1,000 pcs. p.a.) than established markets (approx. 100 pcs. for mid-price segment)
- Customized for local requirements (heat, humidity, power blackouts)

6 Maggi noodles

- High-nutrient (dietary fiber, protein) and low-cost variant of Maggi noodles
- 2-per-packet product developed for the rural poor in India and Pakistan

7 Danimal yoghurt

- Yoghurt enriched with vitamin A, iron and zinc
- Launched in 2005 in South Africa, Danimal helps fight malnutrition and create jobs
- 10% of sales are made by Daniladies who sell door-to-door in the townships, supervised by Danigrandmas, women with a high level of education
- Yoghurt sold for approx. EUR 0.20

8 Solar radio

- Mobile and robust solar radio
- Hand crank for charging radio if no solar power is available (1 min. of cranking is sufficient for 20 min. of listening)
- Thus, users are independent of electricity and batteries
- AM and FM reception
- Radio sold for EUR 12.50-18.50

FRUGAL INNOVATION SUCCESS FACTORS

Successful frugal product innovation and rollout requires local decision-making authority as managers and engineers allocate local/regional resources. And to allow this authority, the process will encourage multinational companies to evolve toward a more decentralized, culturally diverse global profile.

Key frugal product success factors are:

MINDSET

Frugal product innovation must start in the company's mindset, because innovation can succeed only if foreign R&D sites are as integrated into the corporation as home country innovation centers are.

LOCAL RESOURCES

To encourage a decentralized, local-market focus, most if not all the people and resources dedicated to frugal innovation must be native to the emerging country.

LOCAL DECISION-MAKING

Local growth teams (LGTs) need decision-making authority to choose which products to develop and how to manufacture, sell and offer after-sales service.

LOCAL FINANCIAL RESPONSIBILITY

LGTs must have profit and loss responsibility, which has often been a key hurdle for American multinationals.

ACCESS TO GLOBAL CORPORATE RESOURCES

LGTs should have the right to draw from corporate global resources, which is essential for leveraging corporate assets in emerging markets.

DEVELOPING FRUGAL PRODUCTS STEP BY STEP – THE ROLAND BERGER APPROACH

Unlike advanced economy products, which frequently differentiate across an array of distinctive features, frugal products compete on very rigorous performance/cost criteria. But frugal product innovation is more than cost reduction. To deliver superior, cost-effective performance over a limited set of functions, business models often need to be reconfigured to create entirely new production processes and supply chains.
Holistic methods are very much in vogue today, and for good reason. Holistic analysis is particularly appropriate for global companies looking to enter emerging markets, and developing frugal products is a case in point. To bring out successful frugal products, management should review the entire spectrum of business and manufacturing activities – from the business case, product design and value chain configuration to the manufacturing process, risk monitoring and marketing. Frugal product innovations originate in emerging markets, and the most nimble practitioners today work in these countries. Many companies from developed nations will need new corporate policies to enable emerging country engineers and managers to design, develop and manufacture competitive frugal products from the bottom up. Local personnel will mostly use local or regional resources, coordinating where and when appropriate with corporate assets, skills and capabilities.

A very promising and potentially profitable way to leverage corporate assets is "reverse" or "transnational" innovation, when a multinational distributes emerging country frugal products across the home and other global markets.

But more on that later. First, let's review the basic steps:

For a German engineered products company, we developed a frugal product concept for the Chinese market. Rising competition due to customer consolidation and Chinese machine copies was increasing cost pressure and misaligning products with customer requirements. A new strategy focusing on the low/medium segment and adapting sourcing to a novel production concept reversed declining sales by earning additional revenue of EUR 50 million.

 But how did we achieve this impressive business potential? To help companies assess and execute the many business, engineering and manufacturing steps that comprise frugal product design and production – and see how these activities can be integrated into the larger corporate organization – Roland Berger designed a comprehensive six-step framework to plan and manage the entire frugal product development process.

Here's a quick look at each step:

1 READINESS ASSESSMENT

This initial phase reviews how well the company's current product line corresponds with the target markets and customer segments, and identifies other potential products that would better satisfy customer requirements.

2 MARKET ANALYSIS

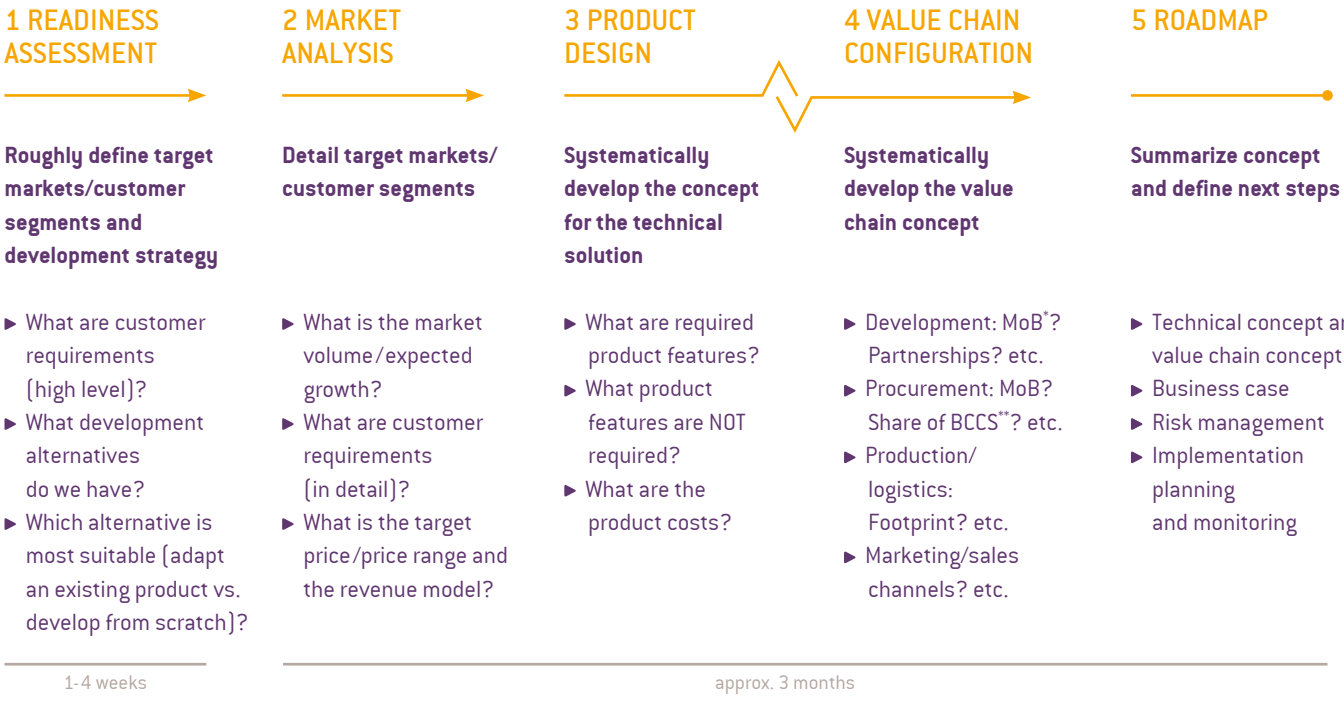
In-depth profiles of the target markets/customer segments, buyer needs and specifications are used to build pricing and revenue models. This phase defines the frugal products' functions and competitive advantages, discovered through expert interviews, cross-functional workshops and extensive market research.

3 FRUGAL PRODUCT DESIGN

A three-phase process identifies essential and non-essential functions to satisfy customer requirements, estimates costs using different technical and engineering approaches to produce the components, then uses a cost/performance matrix to derive design options.

F8

Roland Berger's frugal products framework



Source: Roland Berger

4 VALUE CHAIN CONFIGURATION

Because cost is a major competitive factor, it is essential when designing a value chain to improve the efficiency of development, procurement, production footprint, logistics, marketing and sales. Various analytical methods consider make vs. buy decisions, sourcing and quality control to create a lean logistics model with fast throughput.

5 ROADMAP

The previous design phase findings, analysis and recommendations are integrated into a comprehensive implementation plan to cover the business case and risk management, as well as execution and monitoring rollout.

6 CHANGE MANAGEMENT

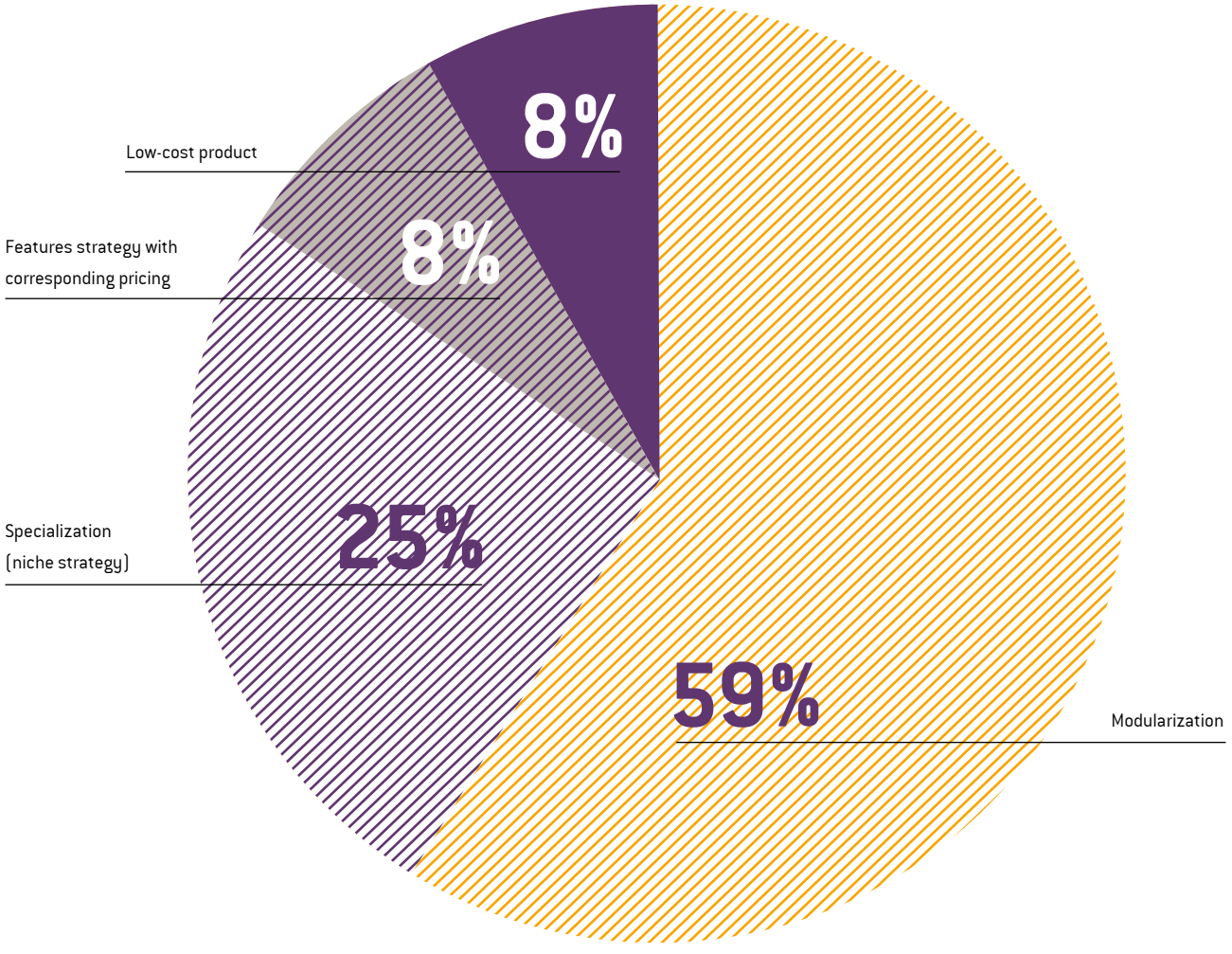
As previously discussed in publication 2, to compete successfully in new emerging markets, many European companies should encourage corporate cultural diversity and greater autonomy for emerging market subsidiaries. Frugal product development encourages this evolution because low- to mid-end products will generate the majority of emerging market revenue for most companies.

Some multinationals will need to consider revising relevant corporate policies and organizational procedures. Different change management techniques and programs can be adapted to suit a company's particular situation.

F9

Modularization is considered the most important factor for a successful product strategy in emerging markets

Levers for successful product strategy in emerging markets (%)



Source: Roland Berger

MODULAR DESIGN – AN ESSENTIAL PRINCIPLE OF FRUGAL PRODUCTS

F9 A Roland Berger study in March 2012 surveyed more than 50 companies from various industries and of all sizes – 57% rank among the top three in their business – to inquire how they use modular designs. Modularization takes different forms depending on the industry and product, but the basic concept is to find an acceptable compromise between common standardization and individual customization.

Modularization is a hot topic. Most companies have been pursuing modularization for more than three years, and 60% for more than five years. Two-thirds of all companies surveyed plan to extend the share of products based on platforms or modules to reach 67% of revenue share in 2015.

Modularization principles and techniques originated in manufacturing to see how product platforms and modules could better serve customers. Companies now look to apply these concepts across other functions, such as sales, service and marketing.

Study respondents cite three top reasons to expand modularization:

- **Reduce product cost**
- **Improve time-to-market/speed**
- **Reduce complexity**

Surprisingly, despite the importance of accurately understanding customer needs when building platforms and modules, less than a third of surveyed companies follow a structured approach to collect and use information about customer requirements.

Strong growth prospects raise the profile of emerging countries in the surveyed companies' business plans. Today, emerging markets account for close to a third of the surveyed companies' revenues, and they are expected to generate almost half of total revenues by 2020. In 2010, the surveyed companies' emerging market EBIT share was an average 19%, projected to climb to 38% in 2020. Companies that apply a modularization strategy win more sales in emerging markets. They can adapt faster to local customer requirements and reduce costs, often by rapidly adapting existing modular components. Companies using modularization strategies lifted emerging market revenue share by 25% in the decade after 2000, considerably higher than the survey group's average 18% increase.

Most multinational enterprises and also smaller companies plan to significantly increase their emerging market R&D activities. By 2020, more than two-thirds of study respondents intend to engineer more than 20% of their products in emerging markets. This figure will increase, as ultimately around half of the world's companies expect to produce more than 40% of their products in these countries.

Emerging market customers rate performance/value and quality as particularly important for their purchasing decisions. So it is no surprise that the overwhelming majority of surveyed companies see modularization as their most important lever in planning a successful emerging market product strategy. The default historical strategy of lowest-cost pricing is no longer relevant in today's emerging markets.

TRANSNATIONAL OR REVERSE INNOVATION

Frugal products for advanced market niches are a new business trend. These transnational or reverse innovations are typically successful frugal products created in an emerging country that then become excellent candidates for global distribution. Often these products are manufactured through modular assembly techniques, or pioneer radically new applications.

For example, the car industry is an enthusiastic advocate of modular techniques to produce automobiles with different prices and design features. The Indian Tata Nano car is constructed from modular components that can be built and shipped separately for assembly at different locations. In effect, the Nano is designed for distribution in kits that are then assembled and serviced by local entrepreneurs – whether in other emerging countries or, as planned, in Europe.

F10 Some prominent emerging market competitors also sell frugal product innovations beyond their national borders. For instance Qoros, a Chinese car manufacturer, expanded across other emerging countries and plans to enter the European market in 2013. BYD is the world's largest manufacturer of rechargeable batteries. Huawei, the global Chinese telecoms and consumer electronics giant, serves a growing base of European clients. Likewise SMEW India, the winding machine manufacturer, produces successfully for the Italian and Spanish markets.

Here are some other examples that show the diversity of frugal products competing in advanced economies:

▸ Siemens introduced inexpensive X-ray products and turbines to attract new emerging market customers – and then marketed these cheaper products across more advanced markets. Indian engineers working almost independently designed an X-ray machine that uses little Siemens proprietary technology and costs 40% less than other feature-laden Siemens X-ray equipment. The company has already launched eight products originating in India, such as a new steam turbine, a fetal heartbeat monitor and a low-end rail signaling system – soon to be directing Malaysian trains. And with healthcare costs rising universally, small hospitals in advanced economies are discovering the price/performance advantages of "Made in India". For Siemens, these relatively inexpensive Indian products are the vanguard of more than 50 in development.

▸ Microsoft's research laboratory in Beijing produced clever programs for computers to recognize handwriting or transform photographs into cartoons.

▸ Logitech developed an affordable mouse for the Chinese market that sells for the Chinese equivalent of USD 19.99 and is now also available in Europe and the United States.

▸ U.S. Deere & Company designed and manufactured a small tractor in India, the 35-horsepower Krish, priced to compete with the market leader, Mahindra & Mahindra. Krish design elements now appear in Deere products distributed worldwide.

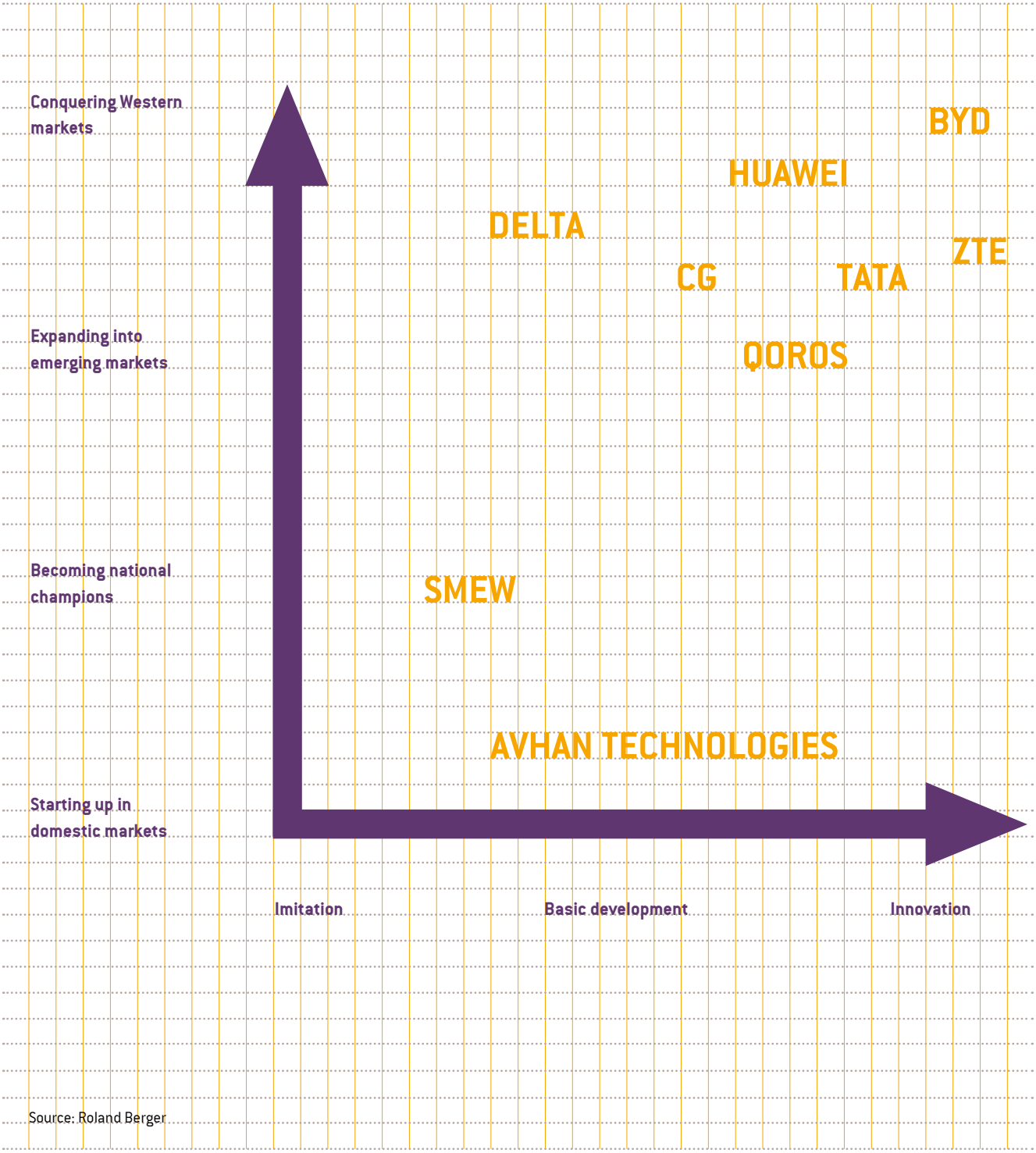
▸ GE Healthcare successfully produced a low-cost electrocardiogram for the Chinese market and then marketed the machine in the US without compromising significant revenues earned by their more expensive electrocardiogram line.

▸ The microfinance institution Grameen Bank established a branch in the US – Grameen America – to serve the poor.

▸ Coca-Cola launched Pulpy Orange Juice, the first Chinese brand that the company introduced in the United States.

F10

Emerging market companies are arriving in industrialized markets



Source: Roland Berger

CONCLUSION

HOW TO BENEFIT FROM THIS CHANGE IN GLOBAL INNOVATION MANAGEMENT

Until very recently, innovation was almost exclusively an advanced economy competitive advantage. No longer. Emerging countries and prominent companies are raising public and private R&D budgets to fund innovation. And emerging markets' share of global R&D spend is set to climb significantly over the next couple of decades.

Important R&D hubs are now appearing on every continent as manufacturers seek to create products that cater to cultural diversity. Emerging market customers are much more sophisticated and demanding. The lowest-cost, stripped-down products and a "one-size-fits-all" mentality are strategies of the past. Today, reliable performance across a narrow set of functions, moderate price and excellent value make frugal products the most visible sign of emerging market innovation.

Many multinationals from developed nations are in the midst of an organizational transition to support much more localized product design, engineering and manufacturing. This transformation is an essential step toward manufacturing frugal products that can attract the low- to mid-end customers who will account for most emerging market sales in the coming decades. And through reverse innovation, some of these products will win new customers in advanced economies.

Emerging markets are looking to encourage innovation through legal, regulatory and economic assistance. The pace will vary from country to country, but emerging market R&D hubs are already part of the next wave of globalization. Whether through independent initiatives or by joining research ventures, European manufacturers should make frugal products and emerging market innovation part of their global strategy.

Author

Bernd Brunke
Partner and Member of the
Global Executive Committee, Berlin

bernd.brunke@rolandberger.com

Benno van Dongen
Partner, Amsterdam

benno.dongen@rolandberger.com

William Downey
Partner, New York

william.downey@rolandberger.com

Co-Authors

Christophe Angoulvant
Partner, Paris

christophe.angoulvant@rolandberger.com

Duce Gotora
Project Manager, London

duce.gotora@rolandberger.com

Dr. Wilfried Aulbur
Partner, Mumbai

wilfried.aulbur@rolandberger.com

Carolin Griese-Michels
Principal, Hamburg

carolin.griese@rolandberger.com

Andreas Bauer
Partner, Munich

andreas.bauer@rolandberger.com

Maren Hauptmann
Partner, Munich

maren.hauptmann@rolandberger.com

Daniel Himmel
Project Manager, Berlin

daniel.himmel@rolandberger.com

Nicklas Holgersson
Project Manager, London

nicklas.holgersson@rolandberger.com

Fabian Huhle
Principal, Munich

fabian.huhle@rolandberger.com

Dr. Johannes Klein
Principal, Berlin

johannes.klein@rolandberger.com

Frank Lateur
Principal, Brussels

frank.lateur@rolandberger.com

Per I. Nilsson
Partner, Stockholm

per-i.nilsson@rolandberger.com

Dr. Verena Reichl
Senior Expert, Munich

verena.reichl@rolandberger.com

Tina Wang
Partner, Beijing

tina.wang@rolandberger.com

Dr. Tim Zimmermann
Partner, Munich

tim.zimmermann@rolandberger.com

Dr. Michael Zollenkop
Principal, Stuttgart

michael.zollenkop@rolandberger.com

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If you have any questions, please contact us at:
global_topics@rolandberger.com

Roland Berger Strategy Consultants GmbH
HighLight Towers, Mies-van-der-Rohe-Str. 6, 80807 Munich, Germany

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Strategy Consultants