

PLM's Strategic Role in Emerging Markets

CIMdata Position Paper

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Key takeaways:

- *Unprecedented convergences of technology and demographics are driving emerging markets and highlighting the need for PLM strategies to help turn emerging markets into emerging economies*
- *In guiding economic transformations, ministries and other government agencies are adapting the “product” aspect of PLM for policies and planning processes, with Saudi Arabia in the forefront*
- *PLM can be invaluable for guiding emerging market transformations—from subsistence to sustainability, from borrowing to investing, and from extraction to innovation*

Product Lifecycle Management (PLM) has a crucial role to play in creating the products on which emerging nations and developing markets will depend for jobs, tax revenue, and improving their balance of trade. That role is speeding the heartbeats of emerging economies with innovative new products, systems, and services.

As both technology and strategy, PLM is ideally suited to drive the creation of business in today's “emerging economies” that are being drastically overhauled through rapid industrialization.

Why PLM? Only PLM strategies can enable the development and support of new products and services that bend paradigms, disrupt settled ways of thinking, and ensure success in highly competitive world markets. Further, only PLM can effectively monitor and guide emerging new economy transitions from resource extraction through resource-based commodity products and on to true innovation.

Which developing countries are we talking about? Economists usually list Saudi Arabia, Indonesia, Turkey, and Iran among many other nations.¹ As developing countries and emerging nations go, the BRICs (Brazil, Russia, India, and China) are old news.

A dramatic example is Saudi Arabia, which is developing a new economy based not on oil, but other products. With a new king on the throne in Riyadh, the Saudi government plans to raise US\$100 billion in economic and social transition money with an IPO of 5% of the kingdom-owned Aramco oil colossus.

The Saudis are under no illusions about oil being “limitless.” CIMdata is actively involved in consulting on some of these planning processes and this work has verified many of the insights in this position paper.

Some other examples of developing or redeveloping economies:

- Taiwan, despite being overshadowed by mainland China, is a global powerhouse in smartphones.
- India (yes, a BRIC) became an IT juggernaut from outsourced call centers and behind-the-scenes programming.

¹ Often mentioned as “developing” are Argentina, Australia, Bangladesh, Bulgaria, Chile, Colombia, Ecuador, Egypt, Estonia, Hungary, Iceland, Ireland, Kenya, Laos, Lebanon, Malaysia, Mexico, Morocco, Myanmar, Nigeria, Pakistan, Peru, the Philippines, Poland, Qatar and the other Arabian Gulf states, Romania, Taiwan, Thailand, Tunisia, Venezuela, and Vietnam. Some analysts still include Korea among the developing nations.

- And a comeback: the U.S. in textiles thanks to high-tech fabrics woven into sportswear, suits, and everyday clothing.

The key to every new economy is innovative products—better connected, more intelligent, and lower-priced goods and services. PLM enhances innovation by bringing people, processes, information, and business systems together. Equally important, PLM shows people how much better it is to collaborate, to work in extended teams, sharing efforts and insights rather than struggling in small, isolated groups.

In emerging markets, the “product” in PLM means much more than physical and digital things, virtual systems, and services; for them, PLM is widely used. “Product” also means factories, infrastructure (e.g., roads, railways, airports, IT networks), and electricity, plus sanitation, potable water, healthcare, environmental protection, industrial health and safety for workers—all of which each new economy will require quickly.

Emerging economies are being driven by a largely unforeseen convergence of technological opportunities and demographic challenges.

- In technology, the opportunity is the convergence of the Internet and smartphones, with an explosion of information in all forms (e.g., video, still images, audio, and text), plus the democratization of technology and the platformization of engineering tools and systems² to exploit that technology. This convergence may be unique in economic history, yet its benefits are available to everyone, everywhere.
- Demographics. For many developing countries, revving up the economy with meaningful jobs may soon be crucial. High birth rates and high rates of youth unemployment are good predictors of future political upheavals.

PLM's Value in Policies and Planning Processes

The “powers that be” in the ministries and other government agencies should be pressing industry and engineering to use PLM. But that’s not the entire story. There are many reasons why officials themselves and their advisers should use PLM. Potential roles for PLM strategies in policy and planning include helping to:

- Redefine the relationship of the public and private sectors of new economies. As development proceeds, the newest and most productive assets may accumulate in private hands. If so, control of the economy (or the illusion of control) migrates away from the public sector into marketplaces with low barriers to entry.
- Rebalance exports and imports if exports are subsidized and imports face high tariffs.
- Decide which opportunities need public funding and which are best left to private initiative.
- Maintain cultural and ethnic identities in new products despite the global use of English as the language of business.
- Guarantee the rights of private property and improve living standards.
- Establish a footprint in the Internet of Things (IoT), ensure cybersecurity, and develop industry-consensus standards.
- Upgrade medical care, clinics, and hospitals and build worker safety and health programs.
- Define new missions for government ministries, think tanks, and the International Monetary Fund.

Each of these eight bullet points, like any product, generates a stream of value that can be measured. Each has requirements, inputs, changes, and outcomes, all of which can and should be tracked, at least roughly. This is the essence of a PLM strategy.

Basically, PLM technologies and strategies are vaccines against potentially harmful decisions. Absent the use of PLM strategies, the practical value of these programs often approaches zero. This is because inadequate tools such as spreadsheets are used to massage data that is incomplete, outdated, inaccurate, or biased.

Substituting ‘Policy’ and ‘Planning Processes’ for ‘Product’

There is a more speculative side of the new economy PLM opportunities story—applying PLM strategies to public policy and planning processes. By these we mean the plans and

² Among the many: CAD/CAM/CAE, collaborative robotics, the cloud, Model-Based Engineering, the IoT, 3D printing, social/mobile communications with digital collaboration for everyone, big data and analytics, artificial intelligence and machine learning, and e-commerce—all of which are being woven into workforce development programs.

decisions of government ministries, the position papers and analyses of think tanks, and doings of many other interested parties and stakeholders.

Here we are substituting “policy” and “planning processes” for “product.” Beyond the name swaps, this is familiar PLM territory: analyses and decision making have much in common with the requirements of ordinary engineered-and-manufactured products. Economists see “product” as anything generating a stream of value.

Planning ranges from simple land zoning to allocations of public and private capital to keeping exports and imports in balance. “Policy” and “planning” can be seen as anything impacting that stream, including the plans of government agencies and think tanks. After all, it is value streams that are transformed in emerging markets.

Managing plans and policies may well be the next frontier for PLM. The ground is already being mapped in bank loans, insurance coverage, and other financial services.

STEM and STEAM

Lamenting the chronically low enrollments in science, technology, engineering, and medicine (STEM) programs produces no results, and radical changes are underway. One is adding the technical aspects of “arts,” such as industrial design, to STEM to yield STEAM. Without “arts,” science, technology, engineering, and medicine may come to a standstill.

Another is creating high school and university courses that draw students into hands-on experiences, instead of just learning how these processes are supposed to work. Opportunities for these experiences are many and global. Industry programs include General Motors’ PACE (Partners for the Advancement of Collaborative Engineering), FIRST Robotics, FORMULA racecar programs, the Maker Movement that builds on 3D printing, and Kickstarter for crowdfunding ideas.

A third proposal is to teach kids—even first graders—how to write software code. Every worthwhile new product is both “smart” and “connected,” and crammed with sensors and code. Virtually any other product soon becomes a commodity. Most industrial and consumer goods that are commodities can be delivered to the customer’s door in days. Suppliers are as diverse as Mexico, Malaysia, and Morocco—not just China.

There will always be a place for inspired and inspiring teachers. Many of the best, however, are stepping out from behind their lecterns to get in front of video cameras. Through MOOCs, or massive open online courses, these teachers reach hundreds or even thousands of students a year rather than dozens. They are expanding knowledge bases, not just filling gaps. All of them use one or more forms of PLM.

Managing New Economy Intellectual Property with PLM

In CIMdata’s consulting work within multiple emerging economies, we see a big PLM opportunity. That opportunity is keeping all of the emerging economy’s stakeholders supplied with the information they need, when they need it, and in forms that they can readily understand and use. This is intellectual property (IP), the information backbone of PLM. Information in PLM solutions reveals what has been done, when, and by whom, what remains to be done, and in what sequence, expectable difficulties, and likely outcomes.

Whether a given new economy is based on industry or agriculture, its IP has to be turned into tangibles that appeal to customers in developed economies. No matter who generates the IP, PLM is a proven way to manage it. A corollary: PLM must include access for non-engineering

users to IP in the Cloud. How else are all the stakeholders to be kept aware of developments?

Every new economy also needs skilled people to develop new products that meet the requirements of globally competitive markets. Diverse sets of skills are needed to build tooling, program machinery, launch production, decide when and how to change production runs, build service and repair organizations, and manage new enterprises.

But these product-related skillsets are just a starting point. Developing economies have to persuade hundreds of talented people to immigrate, build their careers, and perhaps live in a new country as engineering innovators, entrepreneurs, and managers. New economies also need to incentivize recent graduates to return home from engineering schools, technology institutes, and business schools in the “developed” world.

Summing Up: The Central Role of the Lifecycle

All these innovation opportunities remain highly dependent on understanding lifecycles, managing them well, and using them to the fullest extent.

Consider a 100-year-old bridge in an earthquake zone that has been repaired several times and rebuilt once. If anything needs PLM's power to bring together people, processes, information, and business systems, that bridge does. The alternatives are deduction, extrapolation, conjecture, reverse engineering, and spreadsheets. With PLM, repairs, maintenance, and so on can start with a solid base of information. That information transforms the decision-making processes of industrialization into yet another product—something, as noted, that generates a stream of value.

Managers and government ministries could start with PLM's digital twins. As computerized analogs of physical products, digital twins capture and archive user experiences, in large part from real-time IoT connectivity. This information includes what we have done and how well, where we are going now and the priorities, what we can expect, and how we will deal with glitches that arise. PLM can make these available as virtual and augmented realities with avatars to walk users and owners through it all.

The myriad of PLM solutions and opportunities in developing economies are also mileposts in a four-in-one journey. Each emerging economy is transformed from subsistence to sustainability, from borrowing and doling-out to building and investing, from extractive to innovative to disruptive, and from passive investing to getting one's hands dirty.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata's services, visit our website at <http://www.CIMdata.com> or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.