

Opportunities for innovation in chemical Industry

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Abstract

After the discovery and development of crude oil in the early 1900s, the chemical industry began to take off. The transition from coal to oil sparked advances in both fuels and petrochemicals. Innovative processes and products grew rapidly, improving the quality of life for everyone on the planet. Regrettably, by the turn of the century, this breakthrough had slowed. By the year 2000, the chemical industry had matured into a brick and mortar business with few process and product breakthroughs. In the last two decades, the focus has largely been on enhancing information and expertise, which has resulted in more automated chemical processes. Fortunately, there are still many prospects for major chemical industry innovation. These opportunities exist because the world in which we live has tremendous needs. These possibilities can be categorized as follows: Improved resource use, such as seawater as a source of drinking water and natural gas as a source of olefins, etc. It improved process efficiency by, among other things, improving petroleum, cracking catalysts, and an improved aluminum electrochemical process. This presentation will include an overview of chemical industry innovation growth and slowing over the last century, as well as unique opportunities for spurring innovation in products and processes that could play a key role in the chemical industry's renewal this century.

We live in a world that is changing. All in our environment is evolving at a breakneck rate. In existing industries such as retail, hotels, and transportation, as well as telecom, this disruption has resulted in the development of new categories and goods. The heart of this rapid change is innovation. In this complex world, industries across disciplines are innovating in terms of learning and unlearning, applying concepts differently, or re-designing. As seen through the prism of the chemical industry, it is clear that the industry must be adaptable in terms of innovation and research in order to keep up with the evolving environment. The chemical industry has a long history of innovation. Following WWII, many new chemicals and compounds were discovered and commercialized. Plastics and polymers were discovered in the majority of these discoveries, which were mostly derived from hydrocarbons, especially petroleum. On the basis of these high-value advances, the chemical industry played a significant role in global economic development. For example, as demands on the nonferrous metal industry increased in America, plastic replacements were used wherever possible.

After the 1980s, chemical producers' product pipelines dried up. They began to concentrate on global expansion, relocating output to emerging markets. The financial crisis of 2008, however, put a stop to this period of globalization. Chemical companies focused on acquisitions for growth now that their goods had become commodities. Investing in R&D became secondary for legacy chemical companies as they competed against an entrepreneurial mentality of unpredictable outcomes. As specialty chemicals also became commoditized, price became a dominant factor of competition.

The position of innovation in chemical companies has shifted dramatically in recent years. Companies are being forced to change the way they handle their innovation portfolios as a result of the current dynamics. For years, one discovery – a molecule or a commodity – was a lucrative proposition for businesses. Plastics engineering has been a growth engine for decades. Today's customers – both individuals and businesses – are deliberately reducing their use of plastic in order to reduce environmental harm. Plastic packaging solutions are being investigated by major multinational corporations. As a result, the role of innovation in chemical companies is shifting away from product innovation and toward improving quality, customizing products, and adapting to new market opportunities to the needs of their business customers.

India has the ability to play a significant role in R&D developments, with a domestic chemical industry worth approximately \$160 billion. In India, companies invest 3-4 percent of their revenue on R&D, compared to 7-8 percent globally. The government's research grants to R&D, academic, and industrial institutions are not included in the research expenditure. The Indian chemical industry has viewed science and technology (S&T) as a major source of growth since its inception. However, the pool of scientific expertise that is currently implemented in its development activities varies by industry. Smaller chemical companies primarily rely on in-house technical resources, while many medium and large-scale companies rely on technology transfer from external sources, including overseas agencies. Teamwork in well-equipped laboratories under the umbrella of a large number of research projects is needed for modern S&T application via R&D. R&D is needed in the specialty and knowledge-intensive chemical industries to develop products and orchestrate process improvements for cost savings.

Extended Abstract

The majority of Indian R&D is adaptive in nature, ensuring technical independence and bolstering the country's place in an increasingly competitive world. As a crucial differentiator in a competitive market, creativity is at the heart of Tata chemicals' companies, encompassing various aspects of industry, societies, and the environment to create solutions for a better world and ensure long-term value creation for stakeholders. Chemical companies have been able to diversify and expand thanks to India's growing purchasing power, access to knowledge, and technological advancements. Painting has successfully been transformed from a mundane chore to a decorative activity thanks to a well-known paint business. Personal and institutional customers can now imagine their favorite colors and designs using digital technology, and painting services are also accessible. FMCG, Healthcare, and Wellness are three other industries that could benefit from R&D. Consumers in India are becoming more health-conscious, preferring balanced foods and healthy snacks. Natural and organic goods are also high on their priority list. This trend provided a window for chemical companies to launch

segmented offerings, as well as an opportunity to join new categories or revamp existing products for cross-domain applications.

It necessitates new ways of manufacturing and consuming new goods, markets, and business opportunities, as well as creativity. Actions aimed at accelerating the introduction of safer chemicals and technologies by increasing investment and innovation. This will form companies from a variety of business sectors that have invested in additives, technologies, and product developments – often before and beyond the demands of regulatory enforcement – in order to avoid, recognize, and eradicate the use of substances of concern during the life cycle of their goods and make them more sustainable.

We will need a concerted effort from a number of actors to achieve these goals, including the government and the public sector, companies (including SMEs), investors, academics, and Private/public research organizations.

3rd International Conference on Chemical Engineering
October 02-04, 2017| Chicago USA