

## INNOVATION SYSTEM: WHAT HAVE YOU MISSED?

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Ensuring an organization's structural readiness for innovation is not only a question of appointing Innovation managers, setting up innovation processes, or creating innovation labs .... These subjects are only technical answers to more strategic issues.

This paper describes three structuring concerns of designing an effective innovation system, well-suited to both the purpose of an organization and the specificities of its market.

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## EVERY MEANINGFUL INNOVATION SYSTEM NEEDS A PURPOSE

Innovation has become the modern day mantra and lifeblood of organizations in every sector. With marketing taglines, booklets and annual reports, innovation has spread to every aspect of an organization: culture, governance (Chief Innovation Officer), strategy, processes ... In many cases, these new elements of the organization have been adopted through copying successful innovators and blue chips companies. Year after year, organizations improve their innovation system, adopting new best-practices, copying any "good idea" from different organizations. However, an innovation system with such a variety of features and such implications on both strategy and operations requires optimization and fine-tuning to fit the company's organization. First of all, being more innovative, patenting or working with start-ups cannot be the final objectives of the innovation system.

An innovation system must be adjusted to the organization, and supported by a strategic purpose

**Mission.** Some organizations innovate in order to serve a cause or to overcome a challenge. NASA invested tremendous research effort into getting a man to walk on the moon. More recently, the Hyperloop project, which aims to connect cities in a shorter travel time, has, by working to improve people's lifestyles, triggered a great innovation energy. Many organizations revive their brand image by tackling greater challenges for the first time. In customer-centric organizations, organizations tackle societal challenges like environmental transition, or a healthcare system for everyone, simultaneously creating a new engine of growth.

**Growth.** Innovation is also a synonym for new market opportunities. Unlocking technological barriers, uncovering customers' unmet needs, offering a unique experience... there are many ways innovation can unveil new, untapped market spaces with great potential for growth.

For example, 3M has set the objective that 40 % of the group's revenues should be made from sales of products launched within the last four years.

**Competitiveness.** In the race for product performance, innovation often offers a shortcut by delivering radical performance improvement. Aircraft manufacturers have developed very effective design, methods and materials to deliver lightweight machinery. New additive manufacturing approaches allowed the weight of an aircraft to be reduced by 7%. This indicates a real technological gap.

Moreover, with the Industry 4.0 revolution, companies can take advantage of new "enabling technologies" such as augmented reality, machine learning and the "Industrial Internet of Things" (IIoT), to lay the foundations of the cyber-physical systems that will optimize their entire production process

Last but not least, organizations can also disrupt their product development process, introducing agile or fast-track programs and promoting lean start-up approach to dramatically reduce the time-to-market of their innovation projects.

## AN EFFECTIVE INNOVATION SYSTEM SHOULD CONSIDER THE IMPERATIVES SET BY MACROECONOMIC TRENDS ON THE MARKET

Although the first step of the innovation system is to clearly define its purpose, other prerequisites are essential to ensure its sustainability. One of them is the distinction between R&D and Innovation activities.

R&D activities imply the management of investment-intensive and long-term activities, whereas innovation implies the management of frugal and short and middle-term opportunities.

The distinction also lies in the core competencies of each activity. Relying solely on the R&D organization does not pool capabilities sufficiently, particularly with regards to the generation of ideas. The expertise of the researcher enables them to explore an area of knowledge vertically, whereas innovation

requires them to explore several areas horizontally before finding a creative match.

### Overwhelming technology candidates.

In the automotive industry, there is a strong battle over which technology will overtake the others. Although emerging battery technologies that perform positively are expected to dominate tomorrow's market (e.g. battery with higher energy density ~500 to 1000 Wh/kg, compared with the current 100-160 Wh/kg of the Li-ion battery), all energy-related companies have to choose one solution from a variety of available energy storage technologies.

A majority of battery suppliers and integrators are today laser-focused on the "dominating" Li-ion product development, aiming to improve their own products' performances, or to reduce their manufacturing costs. But the innovation race won't stop there, as alternative battery technologies emerge. Some OEMs are looking at the Li-sulfur (Li-S) battery technology, with car sales predicted for 2018-2020. The increased number of patents (another indicator) on it from the Asian region last year reveals a big innovation activity surrounding the Li-S battery. Big expectations for the Li-S battery are due to the low cost of the sulfur and the improved performance and safety of the Li-S technology. This shouldn't eclipse other battery innovative projects, such as the solid-electrolyte batteries, which would provide a much safer technology, a key feature for car manufacturing. Experts have predicted this new battery to be ready by 2025.

Although batteries, supercapacitors, flywheels, and fuel cells are more adapted for specific applications, they compete more and more frequently for the same applications due to overlap in technical performance. In such a fluctuating environment of emerging and ever-improving technologies, companies may struggle to define their technological roadmap.

**Evolution of companies' research contexts.**

Some will argue that not being fundamentally different from the previous technology race is a true characteristic of R&D activities, but there are some very important issues in today's economic and industrial landscape that transform, not only the energy storage challenge, but all other competition between technologies.

**Accelerating the pace of innovation.** More than ever, organizations must exert more effort just to maintain their current position on their market. Organizations must deliver new products at a much faster pace, and innovation no longer constitutes a competitive advantage- it has become a necessity to survive in this fast-moving 21st century. Product cycle acceleration urges companies to explore new concepts and new technologies, and above all, find different ways to keep innovating.

**Digitalization and Globalization effect.** The possibility of spreading a concept rapidly and commercializing it all over the world, without capital barriers, through the online market, has totally exacerbated the winner-takes-all effect. Developing (and protecting!) a real innovation offers a significant advantage in the run of market shares, even from a simple garage deep in the jungle (as long as it is connected!). And besides technological and IP barriers, the pioneer organization directly benefits from an "innovative and successful" brand image.

**Environment.** Government incentives or environment norms often push innovation. Current China or U.S. Government incentives on eco-friendly vehicle favor battery and "green" vehicle manufacturers. In 2011, the aftermath of the Japanese earthquake increased the need for energy storage battery, and therefore, an innovative mind set.

**Outside the box inspiration.** Organizations cannot rely on their own R&D and brainstorming to deliver enough creative and innovative value to maintain their leadership. Open-innovation has almost become mainstream, leading organizations to gather new external ideas, through scouting acquisition, partnerships or licensing. Recently, Tesla opened

its IP portfolio to others, to leverage further development in the crowd and focus them on its technologies, purely to generate new ideas. More generally, the challenge now is to develop a strong and attractive ecosystem - of academics, start-ups, SMEs... and set the appropriate interfaces between them and the internal organization.

These illustrations of the technological and innovation trends on markets give additional reason to show that R&D is not solely accountable for innovation. These are also important variables to take into account when defining an innovation strategy and system.

At Wavestone, we believe that the answer to these new technological-innovation paradigms lies in making an organization structurally open-minded, with a real innovation culture, and ensuring the so-called "pivots" can be done efficiently, even if this only happens every 6 months.

**EACH PART OF AN INNOVATION SYSTEM HAS ITS IMPORTANCE**

**Start with your teams.** The ability for a team to spontaneously change its target is a prerequisite to avoid a technological lock-in. Focusing the entire organization, investments in capital, resources, competences and network, toward a single technology makes it particularly exposed to any technological discontinuity. They may miss out on radical innovation just because they are too narrowly focused on one technology - or worse, managing daily business and serving current clients - instead of looking for future opportunities. In addition, people in charge of innovation projects should be in charge for a limited period of time, before having the team renewed, avoiding a loss of creativity.

**Get closer to the pioneers, technology suppliers and academics.** Taking the advice of academics allows companies to maintain a technological competitive edge. With the previous example of EV, major OEMs adopted the partnership strategy with battery manufacturers (like Nissan with NEC, Chevrolet with LG Chem or Tesla with Panasonic for instance)

Furthermore, collaborative R&D - through a consortium with an industrial, an academic, a supplier and a start-up for example - is a delicate science, to be adjusted and managed very carefully, yet with some unique advantages. Matching technical issues with experts, ambitious ideas with powerful industrials, and driving the project with special priority, are the some of the benefits of a multipartite R&D project. Industrials collaborate with academics, liaise with suppliers, invest in start-ups... Opportunities arise more and more frequently.

**Encourage new ideas through cross-fertilization.** Fostering joint activities also concerns the internal functions of a business. Breaking down the barriers of the R&D silos, sharing market insights and knowledge on customers, reconnecting "tech" with "business" collaborators or gathering key resources in think tanks, are examples of the best practices for a successful internal collaboration.



**Monitor business indicators.** Through time, there were some key technological indicators that predicted an intense business development, such as the aircraft speed, the microchip calculation power or the cost of DNA sequencing. In the electronic market, battery manufacturers are always competing to provide denser batteries that can last 1 or 2 days at a reduced weight. Meanwhile, the shelf life of such batteries is reduced, as it is expected that the customer will renew their product (e.g. smartphone) every 3 years.

In the electric vehicle (EV) market, battery technology faces other challenges. Cost and range are the main features needed to maintain competition and to justify adoption of EV vs. Internal Thermal Combustion (ITC) vehicles.

Where innovation is incremental in nature, timing will be mainly correlated to its position on the s-curve and prevailing customer expectations. It could be crucial to monitor the key indicators that translate the market linkage to the emerging technologies, so as not to miss the window of opportunity to adapt, especially to a disruptive technology. History is full of companies missing the technological revolution; Kodak being a famous example of this. In the EV industry, the average battery cost is around 400-500\$/kWh and it is still too expensive to compete with

the ITC vehicle on this. However, the roll-out of EV vehicles will only take place when technological improvement reaches a precise target: -100\$/kWh (expected in 2018-2020 by EV car manufacturers).

Moreover, besides technological issues and market expectations, the turning point may happen sooner, due to political and environmental constraints.

**In the innovation competition, companies need to adopt an appropriate organizational model and innovation system, with careful monitoring of market indicators and project selection in order to gain greater value. When an organization delivers great innovative products, with the latest technology embedded, this is a sign of great vision and great marketing strategy. But, when an organization repeats an achievement many times, with a diversity of technologies and final applications, it is the result of thorough work on its organization, embracing the appropriate innovation system; with careful monitoring of market indicators and an unequivocal commitment to collaborating with its valued technological partners.**

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