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### CHANGE, ORGANISATIONAL CULTURE AND ETHICAL PRACTICES IN R&D



IB Business Management asks us to examine how the pace of **change** in an industry, organisational **culture** and **ethical** considerations may influence research and development practices and strategies in an organisation.

Here we will tackle each of these three themes relating to research and development practices and strategies affect an organisation's research and development strategies and practices, in turn.

### RESEARCH AND DEVELOPMENT AND THE PACE OF CHANGE IN AN INDUSTRY

The factory floor at Pittsburgh's Aquion Energy doesn't look much like the steel mills that once populated this Rust Belt city. Retooled industrial-age machinery sits alongside robotic-manufacturing equipment. Science and engineering professionals work closely with experienced technicians to produce next-generation batteries, not forged metal.

But just as U.S. Steel did in an earlier era of manufacturing, Aquion and innovative firms like it are spearheading economic and employment growth across the country. Spun out of Carnegie Mellon's materials science research department in 2008, Aquion now employs 130 workers, manufacturing batteries to store electricity generated by intermittent renewable resources. This is the kind of technology—and the type of firm—that will make renewable energy more efficient and more cost-effective.

Aquion is a modern success story for American industry. But in order to create and foster more such firms, we need to recognise that today's most cutting-edge industrial players are not monolithic; they straddle the lines between manufacturing and services, and production and innovation. Indeed, in a world where globalisation and rapid technological changes are the norm, manufacturing, high-tech development, and innovation clearly require a high level of research and development support.

Developed economies and the firms operating in them are increasingly shifting into high value areas that require technological innovation. The defining characteristics of companies in this super-sector are a commitment to innovation and a focus on science, technology, engineering and math (STEM) skills in the workforce. The industries that we deemed “advanced” are those with research and development spending that exceeds \$450 per worker and a workforce with greater than the U. average (20%) of highly intensive STEM occupations. Applying this standard, there are at least 50 US industries that can be identified: 35 advanced manufacturing industries such as automotive and aerospace manufacturing, pharmaceuticals and semiconductors; three energy industries including electric power generation; and 12 service industries, from software design to telecommunications.

Together, these industries have an outsized impact on the U.S. economy. They employ 12.3 million people, or 9% of total U.S. employment, and they generate \$2.7 trillion in output annually, adding up to 17% of GDP. Advanced industries are the most globally competitive industries, accounting for a full two-thirds of U.S. exports. These industries have led the economic recovery through research and development leading to successful innovation – employment and output growth since the great recession have been 1.9 and 2.3 times higher, respectively, than all other industries combined.

Still, output and employment are not the only—and perhaps not even the main—contributions of advanced industries. Companies in this sector account for 80 percent of private-sector R&D investment, and so they are disproportionately responsible for the development of disruptive technologies that have affected the entire economy, decreasing transaction costs and waste, and increasing productivity and standards of living. A recent report from the McKinsey Global Institute identified a series of these disruptive technologies – from advanced materials to big data – that the firm projects will transform how we do business and live our lives. Many of these technologies are the direct products of advanced industries, even though their economic impact will radiate throughout a much more diverse set of industries.

In being able to successfully innovate and create competitive advantages, ambition is crucial: Research from McKinsey finds that most low-performing research-intensive U.S. firms are merely “sleepwalking” through their R&D investment decisions, simply maintaining their existing R&D initiatives, unwilling to incur greater risk. New investment decisions should place more value on “open innovation,” which demands multichannel partnerships among firms, universities, and research labs. General Electric provides a good example of how this approach can work: It has partnered with the University of Louisville to create FirstBuild, an open-source factory for building next-generation appliances. Students, researchers, designers, engineers, and programmers gather under one roof to experiment with product concepts and tinker with everything from design to rapid prototyping. In a world in which consumer preferences and technological change are evolving more rapidly than ever, this open innovation model is intended to get new ideas from concept to product more quickly.

### RESEARCH AND DEVELOPMENT AND ETHICAL CONSIDERATIONS

Here we are discussing the moral principles that govern an organisation's behaviour in conducting research and development. When businesses undertake research and development, they are representing themselves in the wider community and must consequently adopt in their R&D research practices and procedures that guide the organisation to endeavour to attain good ethical standards. An organisation's R&D practices contribute to their reputation within their own community and beyond.

There have been many instances of unethical research and development procedures and practices. Using animals to test cosmetics has resulted in much unnecessary pain and suffering to sentient beings. Many pharmaceutical firms also exploit animals in developing new medical treatments. Companies in the oil and gas industry have funded research and development laboratories that support and promote pseudo-science that attempts to undermine the factual basis of man-made climate change.

So how do organisations undertake research and development ethically? Six key principles should govern the practices and strategies associated with their R&D programmes.

#### **1. Do no harm.**

In terms of an organisation's research, a good place to begin with is to adopt the first maxim of the Hippocratic Oath, above all, 'do no harm'. In designing and carrying out an organisation's research, firms must endeavour, above all, to do no harm. In order to accomplish this, strategists and researchers will find it useful to think about the potential harms that could arise while conducting a particular research project. Management should think about the field within which they are situating their research and the institutions, organisations and individuals who may be affected by the research and development – both inside and outside of the R&D laboratory. Organisations should endeavour to think of all the different kinds of harm that might possibly befall participants in the research, and externally, in the wider community. Obviously, solutions should be thought through as to how harm might be circumvented or avoided.

#### **2. Integrity**

A second or allied basic tenet of research and development ethical considerations is integrity. The value of every aspect of the research project is predicated upon the integrity of the research and development team and the guidance provided to that team by senior management. A pharmaceutical firm which suppresses inconvenient clinical trials or worse (i.e., falsifying and manipulating data) would be a prime example of a firm acting unethically and without integrity.

#### **3. Plagiarism and intellectual property theft**

Plagiarism is a most serious offence. In the R&D lab, it would be the presentation of someone else's work as their own. Suspicions of plagiarism can completely undermine perceptions of

the integrity of the research. Examples abound in the press of executives being accused of trying to start their own companies using stolen secrets. Apple and Samsung are forever in court accusing each other of copying their own technology and incorporating it into rival products.

### **4. Validity**

Above all, a research and development project must be a valid research project. The concept of validity in research is a question of how logical, truthful, robust, sound, reasonable, meaningful and is useful the research. In order to be valid, a research project must make a contribution to knowledge. The evidence gathered for a research project must be valid. The issue of validity can be examined in terms of the methodology, data gathering methods and data analysis and presentation of results.

### **5. Power**

This is an ethical issue in all research and development. Every researcher engaging in R&D should critically examine their engagement with their research project in terms of their own power as researchers. The very title of 'researcher' confers a degree of power on the holder because it implies a high degree of expert skill and knowledge. The power that accrues to researchers from these sources is very useful and it is particularly helpful in field research, where the researcher engages with real people and organisations in the process of carrying out their research. People may be coerced and manipulated into participating in an R&D programme by an expert. Companies may use their financial and lobbying power to gain favourable legislation. The classic example here would be those banks who successfully lobbied for the watering down of financial of regulations to allow new types of securitisation and financial products that initiated the great financial crisis of 2008.

### **6. Transparency**

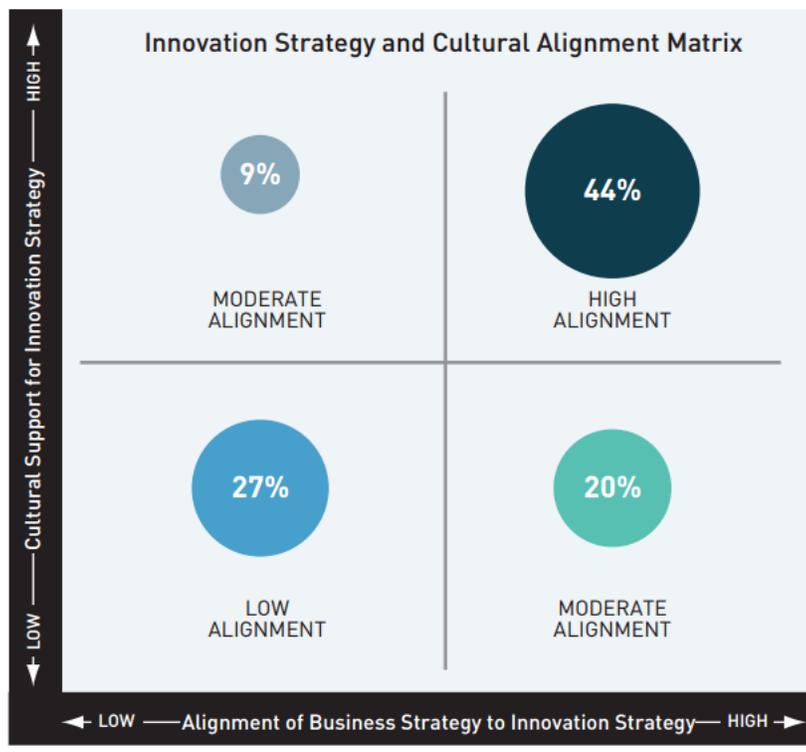
One tried and tested way of avoiding potential harms in the design and development of a research project is through the use of openness and transparency. If a firm openly, honestly and clearly communicates their research with everyone involved in the project, including outside agencies and the participants in their research, they are likely to uncover potential harms before they become harmful. Once uncovered, steps can be taken to ensure that they are neutralised or rendered harmless.

### RESEARCH AND DEVELOPMENT AND ORGANISATIONAL CULTURE

The elements that make up a truly innovative company are many: a focused innovation strategy, a winning overall business strategy, deep customer insight, great talent, and the right set of capabilities to achieve successful execution. More important than any of the individual elements, however, is the role played by **corporate culture — the organisation’s self-sustaining patterns of behaving, feeling, thinking, and believing** — in tying them all together. Yet according to the results Booze’s Global Innovation 1000 study, **only about half of all companies say their corporate culture robustly supports their innovation strategy**. Moreover, about the same proportion say their innovation strategy is inadequately aligned with their overall corporate strategy.

#### Exhibit 1: The Alignment Advantage

Only 44 percent of companies surveyed have both highly aligned cultures and highly aligned innovation strategies, and it pays off in performance: They outperform on growth in both profits and enterprise value.



This disconnect, as the saying goes, is both a problem and an opportunity. Research shows that companies with unsupportive cultures and poor strategic alignment significantly underperform their competitors. Moreover, most executives understand what’s at stake and what matters, even if their companies don’t always seem to get it right. Across the board, for example, respondents identified “superior product performance” and “superior product quality” as their top strategic goals. And they asserted that their **two most important cultural attributes** were “**strong identification with the consumer/customer experience**” and a “**passion/pride in products.**”

These assertions were confirmed by innovation executives we interviewed for the study. Fred Palensky, executive vice president of research and development and chief technology officer (CTO) at

innovation leader 3M Company, for example, puts it this way: “Our goal is to include the voice of the customer at the basic research level and throughout the product development cycle, to enable our technical people to actually see how their technologies work in various market conditions.”

If more companies could gain traction in closing both the strategic alignment and culture gaps to better realise these goals and attributes, not only would their financial performance improve, but the data suggests that the potential gains might be large enough to improve the overall growth rate of the global economy.

To that end, it is important to emphasise the key finding that examining the world's biggest spenders on research and development has reaffirmed in each of the past seven years: **There is no statistically significant relationship between financial performance and innovation spending, in terms of either total R&D dollars or R&D as a percentage of revenues.**

Many companies — notably, Apple — consistently underspend their peers on R&D investments while outperforming them on a broad range of measures of corporate success, such as revenue growth, profit growth, margins, and total shareholder return. Meanwhile, entire industries, such as pharmaceuticals, continue to devote relatively large shares of their resources to innovation, yet end up with much less to show for it than they — and their shareholders — might hope for.

Management consultants, Booz Co., examined the ways that critical organisational systems and cultural attributes support capabilities that are most likely to promote innovation success. The results suggest that the ways R&D managers and corporate decision makers think about their new products and services — and how they feel about intangibles such as risk, creativity, openness, and collaboration — are critical for success.

As part of the study, almost 600 innovation leaders in companies around the world, large and small, in every major industry sector were surveyed. **Almost half of the companies reported inadequate strategic alignment and poor cultural support for their innovation strategies.** Possibly even more surprising, **nearly 20 percent of companies said they didn't have a well-defined innovation strategy at all.**

### Three Corporate Cultures and Associated Strategies

Examining innovation strategy based on an organisation's approach to incremental versus breakthrough innovation and the role that end customers play in defining future product needs, three corporate cultures linked to innovation emerge:

- **Need Seekers** actively and directly engage both current and potential customers to help shape new products and services based on superior end-user understanding. These companies often address unarticulated needs and then work to be first to market with the resulting new products and services.
- **Market Readers** closely monitor both their customers and competitors, but they maintain a more cautious approach. They focus largely on creating value through incremental innovations to their products and being "fast followers" in the marketplace.
- **Technology Drivers** follow the direction suggested by their technological capabilities, leveraging their sustained investments in R&D to drive both breakthrough innovation and incremental change. They often seek to solve the unarticulated needs of their customers through leading-edge new technology.

Just as companies following any of these three strategies can succeed, so any company can manifest strong strategic and cultural alignment, no matter which strategy it follows. However, it is suggested that companies perfecting one strategy — **the Need Seekers — are relatively advantaged.**

They consistently demonstrate better achievement on a number of strategic and cultural variables. Additionally, Need Seekers are more likely to financially outperform their rivals than companies following one of the other two strategies.

Overall, for example, Need Seekers are more than three times as likely to report that their innovation strategy is strongly aligned with their business strategy as other companies. And Need Seekers perceived their performance in carrying out the two most critical innovation goals — “superior product performance” and “superior product quality” — to be much higher than did companies using either of the other two strategies.

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