THE USV ANNALS OF ECONOMICS AND PUBLIC ADMINISTRATION | VOLUME 21, ISSUE 2(34), 2021

THE SHADOWY SIDE OF INNOVATION - WITH AN ECOLOGICAL PERSPECTIVE

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Received 10 September 2021; Accepted 29 November 2021

Abstract:
For more than one century, innovation has been the key to companies' success and competitiveness. Actually, besides inventions, innovations have always brought some advantages to those economic competitors, whether they were farmers, craftsmen and traders, who understood to apply them in their daily activities. The industrial revolution of the early 19th century would not have been possible without the widespread application of inventions and innovations, the positive effects of which were immediately seen: the increase in the average income of the population and the Gross Domestic Product in industrialized countries. The negative effects would be observed after many years, effects that influenced the health of people, environmental pollution and the increase of economic gaps between countries. This paper tries to highlight a series of unwanted or unexpected consequences of innovation "at any cost", motivated only by the increase in sales of companies.

Key words: Innovation, benefits, drawbacks, environmental impact

JEL classification: O30, Q50

1. INTRODUCTION

The benefic effects of innovation are well known and the usefulness of innovation as an engine of enterprise growth is widely accepted. Less well known, however, are the unwanted, unforeseen effects, which often have negative consequences, including on society as a whole.
Surprisingly, quite a few people confuse or do not make a clear distinction between invention and innovation. According to the Cambridge Dictionary, for the purposes of this article, *invention* means (Cambridge Dictionary #):

1) something that has never been made before, or the process of creating something that has never been made before;
2) a product or a way of doing something which has never been made or never existed before.

The same dictionary gives for *innovation* the following definitions:

1) a new idea or method, or the use of new ideas and methods;
2) the development of new products, designs, or ideas.

In short, *invention* refers to the creation of things or methods absolutely new that were unknown before, while *innovation* refers to the improvement of existing products, services or methods. Both terms are related to another concept, *creativity*, without which the two would not be possible. Creativity is about the ability of the mind to conceive new ideas. These ideas could manifest in various ways, but most often, they become something we can see (visual arts), hear (music, sound industry), smell (perfumes industry), touch (kinds of products) or taste (fruits, gastronomy). Sometimes, creative ideas are immaterial, as the imaginary experiments within one person's mind.

Depending on the area of application, we can classify innovation as Public and Private. Public innovation refers to an assembly of actions and changes meant to provide quality public services and better respond to the evolving society's needs.

Private innovation takes place in companies and targets several segments. The following classification is generally accepted for Private innovation: 1) product innovation; 2) process innovation; 3) marketing innovation; 4) organizational innovation (OECD 3rd 16-17).

Product innovation is "the introduction of a good or service that is new or significantly improved in terms of its characteristics or intended uses." These include significant improvements in technical specifications, components and materials, embedded software, user-friendliness or other functional features. Product innovations may use new knowledge or technology or they may rely on new uses or combinations of existing knowledge and technology. The term "product" is used to cover both goods and services.

Process innovation is the implementation of a new or significantly improved production method (e.g. new manufacturing processes or technological flows) or a new delivery method. This includes significant changes in techniques, technological equipment and / or software. The result of the process innovation must be significant in terms of: the level of production, the quality of the products or the reduction of production and distribution costs.

Marketing innovation consists in the implementation of a new marketing method that involves significant changes to the design of the product or packaging, new methods of sales, product placement, product promotion or pricing policy. Marketing innovations aim to better meet customer needs, to open new markets or a new positioning of the company's products on the market, with the aim of increasing the company's sales.

Organizational innovation refers to the implementation of a new method of organization in the company's business practices, as in the organization of jobs or in the external relations of the company. The new methods aim to increase the company's performance by reducing administrative or transaction costs, improving job satisfaction (and thus labor productivity) or reducing supply costs (Carvalho & Gomes, 2020, #). This type of innovation now seems to offer better solutions for a sustainable organizational development that is harder for competitors to imitate.

The 4th edition of OSLO Manual, 2018, introduced a new taxonomy of innovation (OCDE4th 70-78), that is, in our opinion, rather conceptual:

1) by object: Product and business process innovations
2) by novelty and impacts.

Based on the novelty and impact, the innovation may be Radical or Incremental. As the names suggest, radical innovations are basic innovations and revolutionary, while incremental innovations are improvements, adaptations or further innovations leading to evolutions.

Regardless of the classification, innovation is a process that must be conducted and cannot be left to chance. It needs organization, planning, funds and resources, tools for measuring and evaluating results. It is an expensive process and the failure of innovation can have consequences that are difficult to estimate for the companies or governments.

2. FAILURES

Because companies do not disclose their failures in innovation, they remain unknown to the general public. However, all companies, from small to very large, face such situations that cause them serious financial losses. The causes are also multiple depending on the type of innovation. In the case of product innovation, all cases may be limited to the inability to harmonize the manufacturer's expectations with those of the market. This includes both the lack of courage to launch an innovative product, as was the case with the first digital camera made by Kodak, but which was not launched on the market for fear of the effects it could have on the film market (Mui, 2012), and the inability to noticed the evolution of the market, as was the case of Nokia, which created the first network of mobile phones, but which did not notice the potential of smartphones, continuing to produce classic phones for too long and ended up disappearing from the smartphone market (Surowiecki, 2013). A more detailed classification of reasons for innovation failure may be found in (Nieminen, 2019). According to this study, the most possible challenges that could be anticipated in developing an innovation program are those depicted in figure 1.

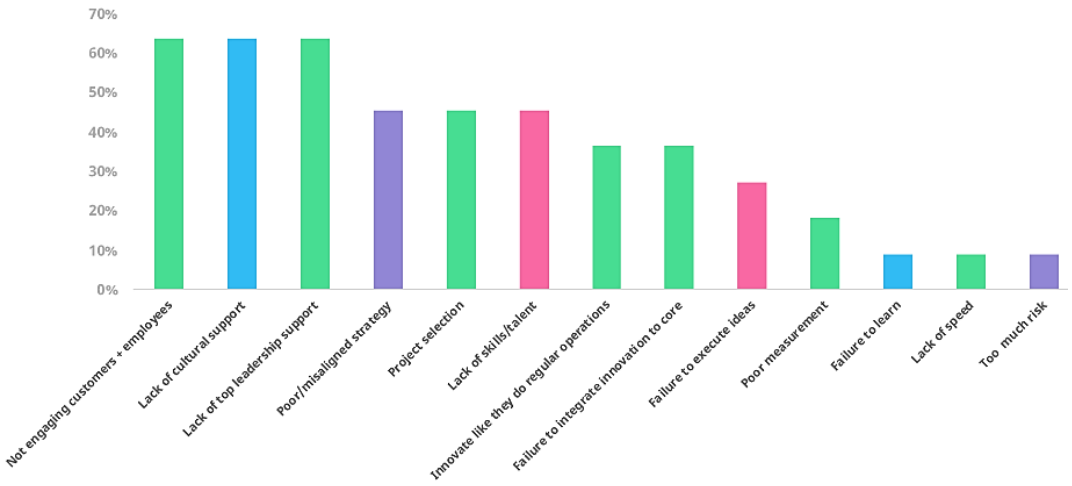

Figure 1. Common causes for for innovation programs failure
Source: https://www.viima.com/

In the following sections we will refer to private innovation. An extended article published by A. Meijer and M. Thaens, based on an in-depth literature review, presents the unexpected effects of Public Innovation (Meijer & Thaens, 2021, #).

2.1 PRODUCT INNOVATION FAILURE

In 2001, *Segway* company launched a two-wheel self balanced scooter but the success was delayed and was not as expected. As a result, the company stopped in 2020 the production of these weird and expensive devices which never gained public popularity.

Larger companies have also had failures due to non-adaptation of their ambitions to the technological level of the components. Thus, in 2014, *Apple* IT giant planned to launch the iPhone 6 equipped with a super-resistant Sapphire screen. But the process of making those screens took a long time, so that the constraints of the product launching plan led Apple to abandon the idea.

General Motors was the first company which mass-produced electric cars (EVs) in 1996. But the car was only available in two US states, California and Arizona, because in the rest of the state, low temperatures compromised battery performance. With just over a thousand cars of this kind sold, the company stopped manufacturing the model.

I conclude the enumeration with another famous case (2011), the Touchpad HP that was operating with the mobile Operating system, WebOS. The tablet was intended to compete with the iPad from Apple, but sales did not meet HP's expectations so, just a month and a half after the tablet was launched, the production was discontinued and the stocks were sold at a reduced price. Consequently, HP took a loss of hundreds of millions of dollars which is a lot of money including for this IT giant (Morgan, 2019).

2.2 MARKETING INNOVATION FAILURE

Much of the failure of marketing innovation is given by product names. Generally, manufacturers look for names that sound good for their products, such as Pajero (read Pahero and

that doesn't mean anything in English), Espero, Pinto or Bensi for cars. It's just that, addressing a global market, the names of these products have meanings in certain languages around the world, some not at all inspired.

1. One of the best SUVs in the world, the Mitsubishi Pajero whose name was inspired by the name of the pampas cat (leopard pajeros), had a lot of problems when they entered the market of countries where languages of Spanish origin are spoken. In Spanish the name Pajero has a pejorative meaning and nobody is excited to drive a car with such a name. As a consequence the car is sold as Montero for the Spanish-speaking market.

2. Ford was also wrong when marketing the Pinto model in Brazil, because the term in Brazilian Portuguese means “small penis”.
3. Neither Mercedes-Benz was too inspired when it entered the Chinese market under the brand name "Bensi", which means “hurry to die”.

These are just a few examples of product names that have different meanings in some of the world's most widely spread languages, but they can be followed by other examples for lesser-used languages: Starbucks *Latte* in German means “erection”; Schweppes “tonic water” in Italian means “toilet water”; Ford *Kuga* means “plague” in Croatian and so on.

To get rid of such problems, Google has given up naming the new versions of the Android OS, starting with the 10th version. Prior to this release, each had a funny name: Donut, Eclair, Lollipop, Marshmallow and so on.

2.3 PROCESS AND ORGANIZATIONAL INNOVATION FAILURE

There is little data on process and organizational innovation failure. Manufacturing processes are, in most cases, secret. Although each branch of industry processes are generally known and standardized, the aspects in detail - those that make the difference, are kept secret. For example, in the automotive industry: the painting of metal parts is practiced in all factories, but only in some brands the paint lasts longer than in others. Thus, any innovation in this process automatically becomes top secret and we will never find out if it was a success or not.

There is a popular story about Toyota that, for decades, opened its doors to any visitor, including those in the automotive industry, who could see the car's manufacturing lines, which is an unusual practice. The explanation was that Toyota was changing the production processes so quickly that copying them outside the company would not have created any advantage for competitors, Toyota being always one step ahead.

3. INNOVATION: SIDE EFFECTS

Many innovations appear in response to the need to cover certain market requirements, others appear only to give the impression that a product has undergone improvements (think only of marketing strategies for cosmetics and toothpaste, which sell the same product adding certain suffixes like Plus, Extra, Ultra, Repair etc) and others are imposed by political decisions.

Let's focus a little on electric vehicles (EV), which are seen as a solution for the future to reduce carbon emissions and the effects of climate change caused by the greenhouse effect. The EU's strategy for a cleaner environment aims to reduce carbon emissions to 0 by 2050, which is a challenge for all manufacturers of cars and engines based on fossil fuels.

As mentioned in section 2.1, electric vehicles are not new to the landscape of self-propelled cars. Due to technological advances in industry, inventions and innovations, they are today a reality that more and more people accept, despite some disadvantages that are annoying: low autonomy, long loading time, lack of a specific infrastructure. However, some big car manufacturers have already announced that by 2030 they will replace the production of classic cars with electric ones because after 2035 the sale of cars with heat engines will be banned in the EU. At first glance, the measure is beneficial for the environment because electric cars do not emit greenhouse gases, do not pollute. From a broader perspective, covering the entire manufacturing chain, to the neutralization of machines and components, things look a little different. EVs need to be charged quite often because their range is low and strongly dependent on driving style. The charging energy of the electric car comes from several sources, currently mostly based on fossil fuels. Thus, an equivalent carbon footprint can be determined, which is less than 50% of the emissions of a conventional car in the same class (https://www.carboncounter.com/#!/explore, 2021). These values are an average, valid for the USA, whose energy comes from a mix of fossil and renewable resources, but for some states the situation may be worse, in the sense that the equivalent footprint is higher than for a conventional car. The same is true for European countries, because there is great variability in the energy structure of each one. Figure 2 shows the share of coal, gas and solar + wind sources in the energy needs of three countries, Denmark, Poland and Romania. The remaining up to 100% is covered by other sources, such as nuclear or hydroelectric energy.

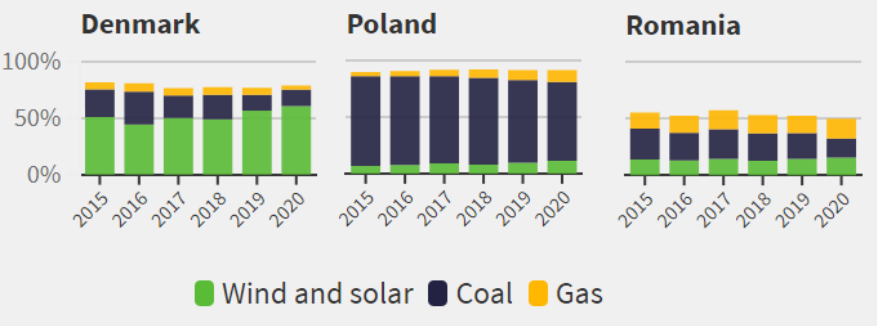

Figure 2. Power Sector in three different European countries, 2020
Source: https://ember-climate.org/project/eu-power-sector-2020/

From here we can see that there is a big difference between Denmark and Poland, where driving an electric car is more harmful to the environment than a classic one.

On the other hand, electric cars use materials obtained from rare and expensive raw materials: copper, lithium, cobalt, etc. The extraction of these materials raises major environmental problems, from the polluting technologies used to the storage of tailings that infect the soil and water sources.

Recycling Li-ion batteries is a very problematic issue, from storing used batteries to dismantling and separating components (Harper & Sommerville, 2019, #). Current recycling technologies are complicated and expensive, which makes them unprofitable.

In the future, the increase in the number of batteries from electric vehicles will accentuate the problem, which is why, currently, solutions are being sought either for the reuse of batteries or for the invention of new recycling technologies.

Last, but not least, the total efficiency of energy usage for EV charging is not very great: the cumulative efficiencies of the conversion processes, from the manufacturer, transporter, distributor and the charging itself, all these must be considered. Just the charging efficiency of electric vehicles varies from 60-95%, depending on several factors such as: the state of charge and battery wear at the time of charging, the outside temperature, the power supply voltage of the public network and the type of charging: normal or fast (Voelker, 2021).

From a certain point of view, this EU strategy can be considered a public innovation that changes the natural flow of development of sophisticated technologies to reduce vehicle pollution.

But this is another discussion because we said, from the beginning, that we will deal with private innovation.

Another debatable innovation in terms of environmental protection is the wireless charging of mobile devices. It is quite popular because of the convenience it offers to users. Recently, Apple announced that it will generalize wireless charging to all phones produced by the company. Energy transfer through electromagnetic fields is much less efficient compared to cable. A published study, focused mainly on charging mobile phones (Girish Bekaroo, 2016), showed an energy consumption about 30% higher when charging the same phone from a wireless charger and a wired one.

The waste of energy may seem small enough to be neglected (0.005 to 0.008 kWh) but multiplied with the numbers of smartphone users (over 1 billion iPhone users in 2020), it matters. Therefore we can wonder if this product innovation is in line with the declared aspirations of the civilized world, to reduce energy consumption to limit greenhouse gas emissions.

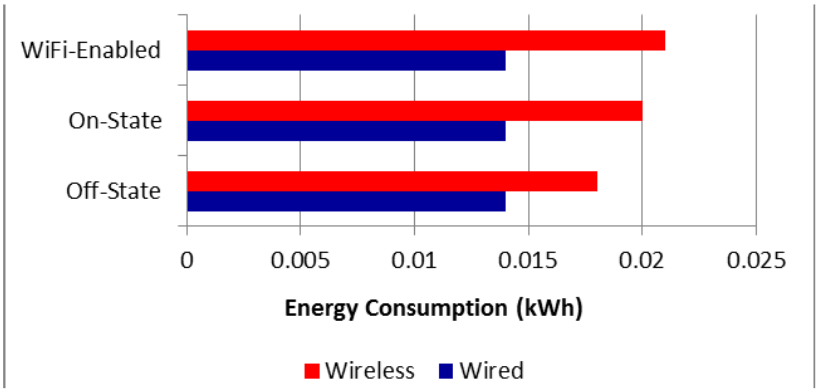

Figure 3. Energy consumption comparison of iPhone charging

Source: Girish Bekaroo, Amar Seeam, 2016

The question is even more relevant these days when the price of energy and fuels have reached record values, which can destabilize the world's economies.

4. CONCLUSIONS

It is a fact that innovation is very important for companies because it helps them stay competitive. It is also useful to consumers insofar as it responds to their real needs and produces more pleasant experiences in the interaction with the environment. But often innovation is pushed beyond the limits and then the effects can be unpleasant for companies (financial losses to bankruptcy) and for the environment, by slowing down global efforts to reduce pollution. This forcing of innovation can be the decision of companies but also the result of political decisions. The reality of the year 2021 shows us that some political decisions attract unpredictable effects, such as rising prices for energy, fuels and natural gas. These increases, generated by the speculation of the respective political decisions by the big oil and gas producers , turn-back like a boomerang against the citizens of the countries and their economies, alike.

REFERENCES

1. Carvalho, N., & Gomes, I. (2020). Knowledge Sharing between Enterprises of the Same Group. In *Information Diffusion Management and Knowledge Sharing: Breakthroughs in Research and Practice* (pp. 403-423). Information Resources Management Association (USA).
2. Girish Bekaroo, A. S. (2016). Improving Wireless Charging Energy Efficiency of Mobile Phones: Analysis of Key Practices. *2016 IEEE International Conference on Emerging*

Technologies and Innovative Business Practices for the Transformation of Societies (EmergiTech) (pp. 357-360). Balaclava, Mauritius: IEEE.

3. Harper, G., & Sommerville, R. (2019, Nov 7). Recycling lithium-ion batteries from electric vehicles. *Nature, 575*. Retrieved from https://www.nature.com/articles/s41586-019-1682-5.pdf
4. https://www.carboncounter.com/#!/explore. (2021). *Cars evaluated against climate targets.* Retrieved from Carboncounter: https://www.carboncounter.com/#!/explore https://www.forbes.com/sites/blakemorgan/2019/09/09/10-recent-product-design-failures-and-what-we-can-learn-from-them/
5. Meijer, A., & Thaens, M. (2021). The Dark Side of Public Innovation. *Public Performance & Management Review, 44*(4), 136-154.
6. Morgan, B. (2019, Sept. 9). *10 Recent Product Design Failures And What We Can Learn From Them.* Retrieved from Forbes:
7. Mui, C. (2012, Jan 18). How Kodak Failed. *Forbes*. Retrieved from https://www.forbes.com/sites/chunkamui/2012/01/18/how-kodak-failed/
8. Nieminen, J. (2019, May 29). *Why Do So Many Innovation Programs Fail?* Retrieved from WIIMA: https://www.viima.com/blog/why-do-innovation-programs-fail
9. OCDE. (n.d.). *OSLO Manual 4th edition 2018.* Retrieved 05 05, 2021, from https://www.oecd-ilibrary.org/docserver/9789264304604-en.pdf?expires=1620204704&id=id&accname=guest&checksum=B5894ABCE4A3D67840B2255C7C3550F1
10. OECD. (n.d.). *OSLO Manual, 3rd edition 2005.* Retrieved 05 05, 2020, from https://ec.europa.eu/eurostat/documents/3859598/5889925/OSLO-EN.PDF.pdf/60a5a2f5-577a-4091-9e09-9fa9e741dcf1?t=1414781154000
11. Surowiecki, J. (2013, Sept 3). Where Nokia Went Wrong. *The New Yorker*. Retrieved from https://www.newyorker.com/business/currency/where-nokia-went-wrong
12. Voelker, J. (2021, 04 10). *EVs Explained: Charging Losses*. Retrieved from Car and Drivers: https://www.caranddriver.com/features/a36062942/evs-explained-charging-losses/
13. (n.d.). Retrieved from https://dictionary.cambridge.org/dictionary/english/invention