

Some Expected Effects of an Industrial System Reorganization

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Abstract: The history of industrial products is one of a products evolution towards high perfection and utility. In this sense, a question arises: how to have new industrial products of world class quality, socially necessary and ecologically sustainable?

This article presents a proposal to reorganize the industrial system globally to attain new, better levels of the above challenge based on an independent examination of all product designs before manufacture to avoid mediocre, unnecessary or non-eco-friendly products. It also introduces the Centers of Design Excellence and Prototyping, as well as the main educational lines of future designers in accordance with the proposed reorganization.

It is suggested that products are approved by a single global entity before being manufactured. This entity, formed by a scientific-technical committee and a social committee, would examine the products on the basis of their technical suitability, i.e. innovation and perfection of design and operation, as well as social suitability, i.e. feasibility to be implemented in society. These transparent, worldwide quality committees would rely on active democratic citizen participation to take decisions. The effects of this reorganization on society and other areas and the solution to some current problems are also discussed.

This industrial reorganization could cause profound changes in society and social research of these anticipated changes might be needed.

1. Introduction

This communication is a continuation of the first part of the previous work [1], presented at the International Workshop on Impact of Design Research on Practice held at the Institute of Product Development of the Technical University of Munich in 2013. This article set the basis for a proposal of reorganization of the industrial system, which is expanded and detailed in the present paper. Here, its possible effects on society and other areas are briefly discussed.

Society advances through increasingly complex structures that are constantly under construction, like those found in the evolution of life in nature. This proposal for an industrial reorganization could be one of these future structures.

The industrial system that has succeeded throughout history is the free market system. While limited by certain regulations, this economic model has led to the natural development and improvement of industrial products because the buyer acquires the best available product, thereby stimulating competition and promoting product innovation.

Since the Industrial Revolution in the 19th century, humanity has gained experience in mass production, a manufacturing method provided by the industrial system.

People want new products and applaud the industry for making them increasingly available to more parts of the world. The current wealth of technological devices and services increases user comfort and the possibilities of connectivity and democratization of knowledge. The level of automation and interaction with users is also expected to rise.

By competing in the free market, a company selling better products will earn more. Nevertheless, it has to deal with risk or uncertainty to obtain sufficient financing, develop its products, organize

innovation, counteract competitor moves, tackle the lack of market opportunity, etc. Moreover, the luck factor or other types of influences cannot be ignored. Risk or uncertainty can lead to a fear of failure, or perhaps to a flight forward, pushing companies to do things better. This type of response can yield great results, but tension causes stress on company managers and, in turn, on the rest of employees, on the whole supply chain, on sales and after sales, and indirectly on a large part of society. Fear of failure also results in cheating and unethical or illegal company practices. This dark side will be discussed below.

2. Proposal for the Reorganization of the Industrial Production System

Free individual or group initiative has historically produced spectacular results in the development of advanced societies while lack of it, in the frame of a fully controlled economy, has led to failure. Some major problems have also arisen, but this proposal for the reorganization of the industrial production system could solve them, at least partially.

It is proposed that free initiative in industrial mass production of products be modulated, namely only the most appropriate product must be produced at any given time, putting aside mediocre, defective, or not socially interesting designs. Thus, after the design phase, the product would be tested and approved (Fig. 1) in order to obtain the design title of Product Approved for Industrial Manufacturing. Only then would the product be ready for manufacture.

A scientific-technical (technical hereinafter) and a social-economic (social hereinafter) committee would grant the approval of products. These bodies would be democratic institutions of global scope similar to the United Nations (UN), or belonging to it, but solely dedicated to industrial products.



Figure 1 Proposal for this industrial reorganization. Introduction of an external examination

The paper also briefly presents the Centers of Design Excellence and Prototyping (CDEP). These Centers would compete with each other by designing new products and their prototypes which would be tested until they are ready to be produced industrially. The kind of education required by their designers is also briefly dealt with.

Figure 2 is a diagram of the structure of the new process including the three main phases: Design, Examination and Manufacture. This figure it presents a more detailed scheme of this reorganization:

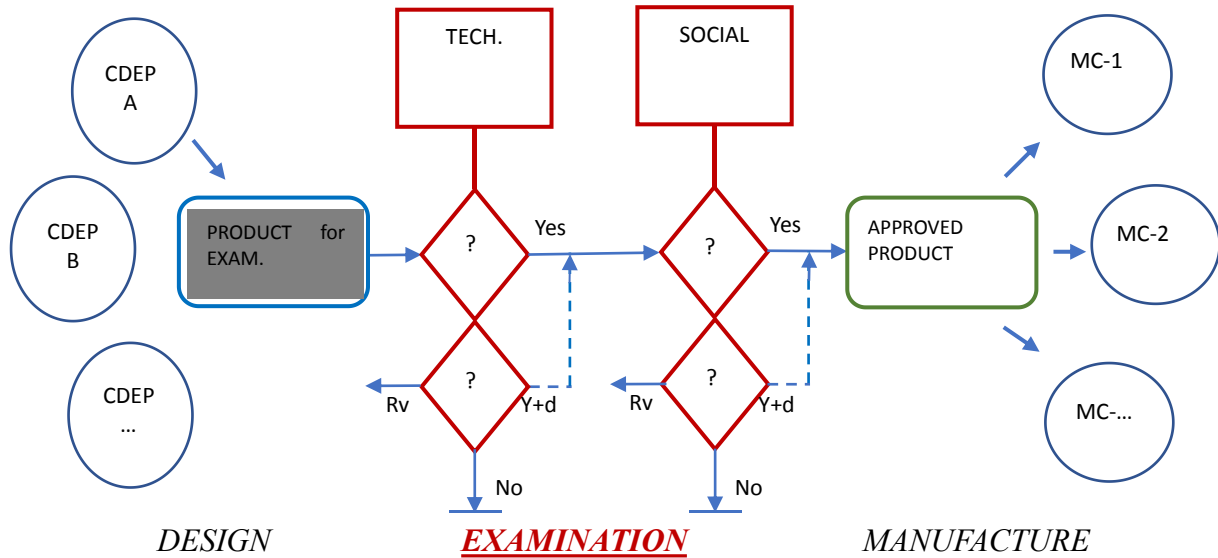


Figure 2 Reorganization of industrial production. CDEP: Centers of Design Excellence and Prototyping. Technical and Social Committees. Y+d: (Yes with delay) Pending. Rv: Revision. MC: Manufacturing Companies.

The technical committee would examine the designs for innovation or excellence of performance after exhaustive prototype testing. Designs would be given immediate or pending approval, or be returned for revision or improvements. On the other hand, the social committee, composed of democratically elected representatives of society, would grant its approval based on the degree of social interest and economic possibilities of the product. This committee could even organize consultations among all relevant civil society stakeholders.

Designers and their work groups in the Centers of Design Excellence and Prototyping (CDEP) would continuously produce and test new designs until coming up with an excellent innovative product. With total freedom of design and testing, these Centers, scattered all over a globalized world, would compete among themselves. There would also be freedom of product production in factories in various places around the world. These factories could or not be related to the design Centers and would compete among themselves to manufacture products remaining faithful to the original designs or offering variations in the finish of products.

The diagram shows a CDEP (A) that has prepared and presented a product design with a prototype in the examination phase. The technical and social committees rate the design: Approved; Pending approved; Requiring revision to improve certain aspects of the product by the corresponding CDEP; or, Not approved. If the design passes the two filters, it is sent to the manufacturing companies (MC).

3. Expected Effects of the Proposed Industrial Reorganization

This section briefly discusses five issues describing the current situation and related problems, and looks at the effects of the reorganization on these issues.

3.1. About a Society Immersed in the Industrial System

Since the Industrial Revolution and its success, many activities in certain societies have focused on boosting their industrial system since a strong and competitive industrial economic sector is a source of wealth and power. Other economic sectors, such as agriculture, would not be understood without the modern machinery provided by the industrial sector, or the services sector, which requires computer infrastructures that are essential for various tasks.

Thus, the society in general is very influenced by the technological-industrial development, the products it uses, and the work it provides. Industrial development has required a considerable part of the population which, attracted by factory job offers, migrated to large cities in the past century. Schools and universities have become Centers that prepare students to take up technical and

administrative positions in the industrial system.

Competition in the industrial sector is a success factor that boosts activity at the productive level. However, this competition has set an increasingly fast pace in the whole society, leading to stress in individuals and in society as a whole which has changed habits, ways of communication and transports.

A further consequence of this competitive model and the need of the industry to sell products is the increasing amount of advertising, sometimes excessive sometimes deceptive, and based on insistence over time. Society at large is focused on obtaining material well-being, with consumerism growing at a strong pace. As Victor Lebow (George Orwell) [2] wrote:

“Our enormously productive economy... demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption...”

The industrial production system is artificially forced by the natural interest of companies to sell more.

3.1.1. Effects of the Industrial Reorganization at Social Level

With the proposed reorganization of the industrial system, products would have to pass "exams" to obtain the industrialization approval. This would imply that products are recyclable and have a higher quality and safety of operation, reparability and minimal impact on the environment. Poor-quality or non-innovative products or those providing a small aesthetic improvement only would be eliminated. Furthermore, since products would previously have been technically and socially approved, consumer confidence in products would increase. Finally, the smaller product offer would result in a decrease in product advertising. However, despite the reduction in product offer, there would be no shortage of products but a more moderate production system.

On the other hand, new products representing a significant technical leap would be manufactured. A slower chain of purchase, maintenance and replacement of products would be established.

3.2. On the Impact on Political Systems

Currently there is a tendency towards democracy where ultimate power resides in the people. Democracy is perfectible and requires constant vigilance. In democratically mature societies, their institutional system plays an important stabilizing role. A well-informed and educated society will be the best for a democracy.

In practice, representatives are elected according to their skills or the most persuasive electoral propaganda, and there is usually a correlation between the money spent on election campaigns and poll results. However, in their electoral programs, politicians often include certain political actions of interest to industrial lobbyists in exchange for financial support for their campaigns. Inclusion of these actions can be translated into more votes, and lobbyists will get all their money back when the elected politicians return the favor by putting the actions into practice, even if they have side effects.

Other distortions of democracy include companies spending money to exert influence as lobbyists so that policies or regulations which tolerate abusive practices for their benefit or allow them to pay less taxes are adopted. Moreover, corruption often extends to other companies for sheer survival. Thus, large financial-industrial corporations shape politics to their own benefit, for example through work organizational policies or procedures that bend the rules to obtain resources irrespective of collateral damage to society or the environment. To fight corruption, there must be a transparent legal system that punishes those who practice it.

3.2.1. Effects of the Industrial Reorganization on Politics

The proposed industrial reorganization would be difficult to put into practice in the current economic structure due to vested interests and normal resistance to change. However, it would provide a greater degree of transparency and democratic control because products suitable for manufacture would go through the social "filter", which would be democratically linked to social interests.

Probably the new industrial activity would continue to have a significant weight in the economy of societies, but it would not be as important as it has recently been. The industrial economic sector

would be relativized and less influential, and have a slower pace, minimizing the effects of some bad practices of the current production system. Furthermore, if transparency and control of the system were a reality, there would be no place for corruption, only for fair play.

3.3. Other Fraudulent or Unethical Practices

Industrial companies are non-risk-free businesses. If everything goes well, they generate profit from the invested capital. In exchange for these benefits for themselves and their investors, companies supply products, create jobs, pay taxes and ultimately create wealth for society. But companies go through periods of economic ups and downs, crave for more profit or power over others, or simply want to survive. This can result in unethical practices.

As business practices evolve, laws for the regulation of business activity have been passed to curb abuses and preserve the principles of free competition. For instance, when a company takes the whole market, without competition, the *antitrust law* prevents businesses from concentrating too much power. It may also happen that a few companies dominate the market and secretly agree to distort competition to make more profit. The *anti-oligopoly law* exists to stop such behaviors.

There are several ways to earn more profit, for example to reduce costs by paying employees as little as possible, delocalizing manufacture, or bargaining with suppliers, carriers or sellers, according to the laws of supply and demand. Some companies may even resort to fraud during manufacture or sale of products despite knowing, for instance, that certain components are harmful to people's health or the environment. Producing or launching these products into the market has typically been justified by fraudulent control systems or "scientific" studies financed by the companies themselves.

Another way, often secretly agreed upon among manufacturers, is to design products that last less, namely *planned obsolescence*. Products are expressly designed with one or several defective elements or materials. This causes products to fail after a certain period of use, thus forcing consumers to repair or directly replace them if they have been designed to be difficult or expensive to repair. The same result is achieved when a product that could be updated simply by replacing a piece is designed in such a way that the piece does not fit, promoting "use and throw away" culture (The Light Bulb Conspiracy) [3], which in excess is called consumerism (Story of stuff) [4].

Finally, companies resort to sometimes insistent, exaggerated or even misleading advertising to draw consumers into consumption, and thus increase profit. Consumers are attracted by the new product, which may simply have minor changes in appearance or insignificant innovations. *Planned or Induced obsolescence* makes the production wheel spin even faster, bringing consumers into a dual state of satisfaction-constant dissatisfaction.

3.3.1. Effects of the Industrial Reorganization on New Design and Manufacturing Companies

New companies based in CDEPs would give directions to their designers to design substantially innovative, repairable, ecological products that are not affected by short-term obsolescence. These products would subsequently be well tested before being sent for examination to obtain the approval of the corresponding technical and social committees. In this way, all current vices associated with some products to a greater or lesser degree, such as defective design, planned obsolescence, minimal innovations, non-reparability and unsustainability, would be avoided. Moreover, as approved products to be manufactured in series and sold on the market would be of social interest, induced consumerism would be reduced.

3.4. About the Industrial Secret and Patents in Product Development

The development of an innovative product requires significant time and resource effort from companies. In order to prevent their product idea from being stolen, companies need to keep it a secret during the development and manufacture of the product to surprise competitors and be leaders in the market. Because it is very difficult to keep the whole process secret, industrial patents are used.

The current patent system is complex and based on claims, the most important part of the patent from a legal point of view. In the claims, some technical elements of the product are specified with

drawings and words which often cause problems of patent interpretation and litigation. For example, new patents may be obtained because of the vagueness or broad meaning of some words in the claims.

Knowing what rival companies are up to is sometimes a necessity for the survival of a company, because it needs some reaction time to equal or exceed the leading company's offer and not lag behind. To have more reaction time, information is sought legally, i.e. from publications, patents or other known sources containing details about the leading company's activity, or illegally, i.e. by industrial espionage.

3.4.1. Effects of the Industrial Reorganization on Industrial Secrecy and Patents

The proposed reorganization would not avoid industrial espionage. However, the risk of secret leakage would decrease simply because fewer people would work in CEDPs than in current factories.

The current system of industrial product patents could evolve as follows. Designs emerging from CEDPs would have to obtain a seal of approval for manufacturing. This authorization could act as the product patent, and the technical committee would not allow other similar products presented at a later date to be manufactured. In this way, most functions of the patent system could be taken over by this global technical committee, thus simplifying or even eliminating the current patent system with its enormous complexity and bureaucracy.

3.5. About the Technical Staff

Traditionally, engineers and designers have not had satisfactory or highly satisfactory jobs, even though they earn a good salary. Forced to produce new designs non-stop, they lack time to think about more significant innovations. In addition, some are compelled to incorporate planned obsolescence in their designs against their convictions. Other have to make purely aesthetic changes to a design to attract buyer attention and, along with advertising, encourage consumption (i.e. induced obsolescence) to increase sales and company profits.

3.5.1. Effects of the Industrial Reorganization on Designers and Design Teams

With the reorganization, designers would be able to take time to think of more substantial innovations and their creativity would be enhanced. Designs with planned or induced obsolescence, those that ignore environmental solutions, or those going against the designer's conscience would be eliminated. In this way, designers would feel positively motivated to do a good job.

The design team would be key in this reorganization of the production process. It would be recognized for its merits and provided value, and its work would allow the best designs to be competitive.

4. Training Designers for Centers of Design Excellence and Prototyping

The Centers of Design Excellence and Prototyping (CDEP), where products would be conceived, designed and tested, would be the soul of the new system of industrially manufactured product design. CDEPs would ensure that designs are of sufficient quality to pass the technical and social committees' filter. CDEPs could be formed by several sub-specialized Centers that support the head center in the search for solutions and the testing process.

The training of future CDEP designers should be consistent with their future work. Most contents of current design curricula (e.g. design methods) would continue to be part of the new program, but there would be new ones in accordance with the new philosophy of production.

Curricula would be extensive and flexible to be able to meet the interests and abilities of each student, who would take responsibility for his/her own learning with the tutor's support and guidance. Creative individual and team work and certain specialties could be taught at CDEPs. Students would also receive scientific research knowledge at the beginning of the degree and could create or participate in a line of basic or applied research throughout their studies.

After obtaining their degree and on the basis of their preparation and skills, students could apply for a position in CDEPs or sub-Centers.

5. Discussion and Conclusions

The actors required by the reorganization of the industrial system are shown in Figure 2. The Centers of Design Excellence and Prototyping (CDEP) would compete among themselves to produce new product designs. Two global, democratic and transparent committees would examine the new design. Some factories would compete to manufacture the new products. Finally, a surveillance and control system would monitor the new industrial process.

The technical and social committees would be the filters for the approval of new products. They would be highly competent and democratic; they could even rely on the active participation of people thanks to transparent e-participation tools. The boundaries of the committees' responsibilities and roles would have to be established.

The reorganization would bring about a reduction in product offer. The industrial economic sector would continue to be important, but would carry less weight than other economic sectors, just like some technical university degrees.

Manufacturing would probably become increasingly automated facilitating the level products of world class manufacturing, and leading to the emergence of new specialized jobs. Demand for industrial workers would decrease and the surplus of workers would be absorbed by other economic sectors, probably the services sector. In this transition, it would be necessary to distribute tasks and reduce working hours without reducing salaries and establish social wages.

Changes and advantages brought about by the new system include:

- Trust of users on new products: more reliable, durable, repairable, non-toxic, eco-friendly, recyclable; energy and resource consumption reduced, cleaner manufacture...
- Smaller variety of products, which would reduce advertising and confusion, and increase interchangeability and global product knowledge
 - Reduced corruption and unethical practices
 - Simplified, unified, universal patent system
 - Better and more motivated designers
 - More innovative, socially interesting designs
 - Active participation of people in the query about the manufacture of new products
 - Reduced environmental impacts

The proposed industrial reorganization can partially or totally solve some problems, but also create new ones. Probably could cause great changes in society.

Nevertheless, it could be a step towards the ideal situation, a guide for practices towards a fairer, more sustainable world.

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