

**KONDRATIEFF WAVE CONCEPTS VS GOLDEN AGE FOR INDUSTRIAL DESIGN::**  
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**Abstract:**

This paper is about new perspective on the history of golden age for Industrial Design. It can be a promising approach to correlate Kondratieff waves, especially the dominant technologies in the respective periods; to cycles / periods / fashions / ideologies / ... of design. All along the 20<sup>th</sup> century the strategies used by economic agents to create competitive products have lead to the evolution and diversity of Design. It was a time characterized by the systematic application of scientific knowledge to the resolution of economic problems, aiming the sustainable growth of the life-standard of people.

The new materials and the new technologies at principle of century XXI are a challenge for designers. They begin to make use of a bigger shared area of action. They provide a very important and accessible operating principle bridging science and history, and their understanding would fill the existing lack to operacionalize the long wave approach as a useful forecasting tool. We consider that there exists indeed a connection between what happens in the global socio-economic realm and the evolution of Design that, as we know, is strongly related to the context of the technologies developed in the corresponding periods. This finding allows alerting Designers to the probably time span involving the entire life cycle of a product, since its conception till elimination of the market; however the variety of products and forms will probably continue to expand. The importance of Design will continue to grow.

Within this general picture of reference, the role of Industrial Design can be synthesized as the activity that relates the technically possible with the culturally acceptable. Such activity allows confronting the set of relations depending of numerous interactions among the aggregation of several elements that connect them, and make them multidisciplinary. It is known that the values of product design are located in between the identities of things and the time at which they are embedded, in the realm of the effective socio-economic systems.

Some recent discoveries are presented suggesting a strong relationship between some socio-economic aspects of the long economic cycles (Kondratieff waves) and the known periods of the history of Design. It was found that amid the apparently random oscillations of the informational content, at least two characteristic periods of 25-30 and 50-60 years were present. We may conclude that there exists indeed a connection between what happens in the global socio-economic realm and the evolution of Design that, as we know, is strongly related to the context of the technologies developed in the corresponding periods. This finding allows alerting designers to the probably time span involving the entire life cycle of a product, since its conception till elimination of the market. The paper is a preliminary exploration of a challenging and difficult topic, linking design history with broad economic and technological cycles.

**Keywords:** History of Industrial Design; Long Waves; Kondratieff Cycles.

## 1. Introduction

During the 20th century, the scientific interest in design process has grown rapidly. We have seen an amazing transformation of our society from that of hand-made consumer goods designed and made by skilled craftsmen to one of mass-production with new materials and technologies. Design is everywhere. Design history is not merely a chronology of objects and their forms, but a record of the forms of life, because the relation of human beings to the objects they produce and use reflects, especially in the last century, a large segment of cultural history (Carvalho Rodrigues, *et al.*, 2001).

The world economic depression of the 1980's witnessed a growing confrontation, between traditional functionalism and new designing principle that rejected the old models of design-simplicity, reduction to pure function, and also the definition of industrial mass production. Since the onset of the world economic depression there has been, too, a renewed worldwide interest in the study of long-term macroeconomic rhythms, most commonly referred to as long waves or Kondratieff waves (Devezas, 2000).

In last years, the theory of long waves is a very useful tool to construct future scenarios, not only regarding the future of technology, but also the future of human reasoning (morals, ethics, and common values). In this study, the authors analysed the relationship between some socioeconomic aspects of the long economic cycles (Kondratieff waves) and the known periods of the history of Design (Hauffe, 1998) and their social impact.

## 2. The Kondratieff Waves

The Kondratieff Cycle is a theory based on a study of nineteenth century price behavior which included wages, interest rates, raw material prices, foreign trade, bank deposits, and other data. Kondratieff was convinced that his studies of economic, social, and cultural life proved that a long term order of economic behavior existed and could be used for the purpose of anticipating future economic developments. The Kondratieff cycle (or long wave) theory holds that capitalistic economies grow in a cyclic fashion with an average periodicity between 50 to 60 years (Duarte, 2001). It was identified four Kondratieff cycles (Devezas, 1996). There is today very strong and robust empirical evidence of the existence of these long waves in world economic activity (Marchetti, 1986). The cluster of innovations at the start of each wave is associated with a shift towards a new technological transformation, with a combination of new technologies, the development of new industrial activities and a deep transformation of human behaviour (Devezas, 1999). Each *new technology system* grows logistically until it reaches market saturation and then declines and begins to be replaced by a newer technology system - there is a successive alternation of growth and decadence with duration of 50 - 60 years (Devezas, 1997).

Devezas and Corredine (2001a), describe the long wave behaviour in socioeconomic growth and development how is essentially biologically driven. This swinging behaviour is a natural manifestation of social systems as a response to their survival and improvement capability, that is, for their evolution in the most pure Darwinian logic (Devezas and Corredine, 2002).

Thus each long wave can be conceived as an evolving learning dissipative structure bounded by instabilities. At each long wave a new technoecomomic environment is created, used and exhausted, following the path of an overall logistic curve, dragging within it not only new technologies and industries, but new ways of life, new occupations, new forms of organization, not only in business but also in politics and social order.

The first one is triggered during the ceiling (saturation) of the previous technoecomomic system, a period of high instability corresponding to economic stagnation and recession, soon followed by a deep economic depression, the downswing of the long wave. It corresponds to a phase of renovation, mutation, and selection, during which basic innovations accumulate and interact synergistically, and new ideas emerge apparently out of nowhere. Society begins to deal with a new technological environment, while old structures collapse and gives place to the emergence of new ones. This process takes time and the endogenous mode of operation is the rate of achievement of basic knowledge, or in other words, the rate of learning, dominated by a new cohort leading generation (Devezas and Corredine, 2001b). Once the necessary knowledge is established and accumulated, the new technological environment expands throughout society, new infrastructures are built in great scale, and a phase of economic expansion starts again, carrying the upswing of the long wave. It corresponds to the second structural cycle, a phase of consolidation and maturing. Now the endogenous mode of operation is the rate of consolidation of knowledge, again a rate of learning, but now corresponding to the transfer of relevant knowledge to the following leading generation and designers for tomorrow.

### **3. Kondratieff waves and the periods of the history of golden age for Industrial Design**

This relationship between some socioeconomic aspects of the long economic cycles (Kondratieff waves) and the known periods of the history of golden age for Industrial Design, starting at the end of the Second War, as well as the Kondratieff fourth wave.

Before, at brief introduction, the period between two world wars and socialist revolution in Russia (1917) and in Germany (1918), the Kondratieff third wave was marked by radical economic and social changes in all the industrial nations and appoint the average of 3<sup>rd</sup> Kondratieff wave, try to be reconciled art and technology. Art into Life, Futurism, Constructivism; The Soviet Union – Vladimir Tatlin; The Netherlands and De Stijl – Piet Mondrian and Gerrit Thomas Rietveld; The Bauhaus – Walter Gropius and Ludwig Mies van der Rohe; The International Style – Le Corbusier, Marcel Breuer and Alvar Aalto. So many new industrial activities brought to economics the factor of *complexity*, ever growing since the beginning of 20<sup>th</sup> century. But the synergistic aspect of this wave was very strong. The chemistry industry expanded very fast, as the growing use of textiles triggered greater use of soaps, bleaches and dyes (Bayer and Hoechst were founded in 1870!). The steel industry, as well as the petrochemical industry, opened the way for the internal combustion engine - this was the birth of the automobile, and soon after that of the airplane. The rapid expansion of the automobile industry triggered the expansion of another branch of industry- the Portland cement industry for the construction of paved road networks. It is important to observe the synergistic combination of telephone and road networks - the necessity of a more efficient communication system as individual freedom of movement grew.

More lately, with the end of third wave in its depression phase, an age of contrasts, in Germany, war, revolution, and economic crises resulted in massive unemployment and poverty. The Wall Street Crash of 1929 is the dividing line between the '20s and the '30s and between European 'moderne' and American 'streamlining'. The secondary plateau ends with a sudden shock (financial panic/stock market crash) and the economy rolls over into the next contractionary phase, which is characterized by deflation and the start of an economic depression. The other side, the financial elite maintained its previous life-style. Extravagant

decoration gave way to greater simplicity and restraint in design to allow easy machine mass-production, and cheap prices. A new profession emerged in the 1930s, as industrial designers applied art deco styling to consumer products, to attract Depression buyers. American popular culture was fast becoming the country's top export.

Art Deco and industrial design – Henry Dreyfus and Norman Bel Geddes; Design in the Third Reich and the Volkswagen, a car for every person, known to most of the world as the “Beetle”. Its cluster of innovations began during the recession of the 1930's and expanded during and shortly after the II World War. The radical technological innovation is the Fermi's battery (1942), with the introduction of radio, television, and computers, synthetic materials (plastics and polymer fibers). Alvar Aalto, a Finnish architect emerges in Scandinavia, and he remains one of the most individual and poetic masters of functionalism in modern architecture and furniture design.

With the end of the Second War and the Kondratieff fourth wave (Fig. 1), the first relevant period of the history of golden age for Industrial Design is knowing by “The Economic Miracle” (1945-1960) with the petroleum as a dominant energy (50% in 1970).

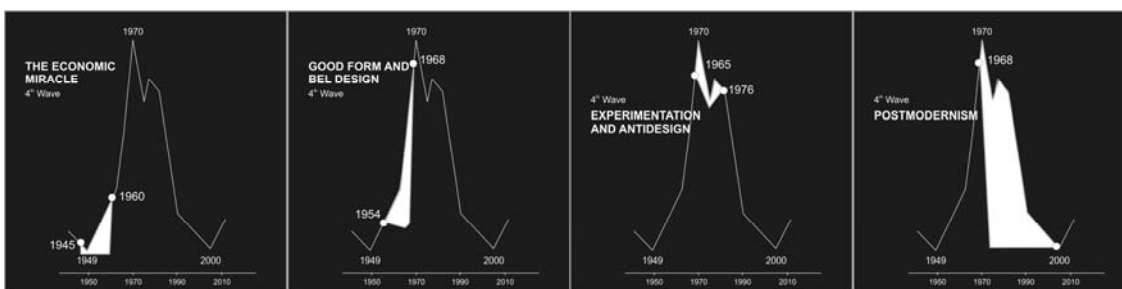


Fig. 1.

*4<sup>th</sup> Kondratieff wave and the periods of the History of golden age for Industrial Design with two characteristic periods of 25-30 years.*

Start a new wave and new phase of economic expansion. The post-war period and the 1950's, brought about deep changes not only in politics but also in international style. The so-called American way of life (Raymond Loewy) influenced almost all areas of life and culture. The United States of America takes the lead. The Marshall Plan begins in 1947 to help rebuild Europe. In 1957 the Treaty of Rome establishes the European Economic Union. But the most significant development was the invention of the transistor in 1947 at Bell Telephone's laboratory, a new radical technological innovation, which enabled the miniaturization of electrical products. In 1959, Sony produced their first transistorised television, an incremental technological innovation.

The 1950s were a fertile time in the history of the furniture industry. Designers with backgrounds in architecture created organically shaped pieces using the new technologies and materials developed during the war. Organic Design – Charles Eames, Art and Design (the Italian economic miracle) – Alpha Romeo and Ferrari. Italian style was marked by improvisation – Achille Castiglioni, Good Form and Theoretical Foundations – the Ulm model in Germany and Scandinavian home design. In 1960's the technology and prosperity had an influence on Design and the patterns of consumption in America and Europe – “Good Form and Bel Design” (1954-1968).

The economic boom lasted up to 1964 in the United States, allowing it to lead the world in all areas of consumer culture, industrial design, and manufacturing. This was due to high demand for American-made products, and particularly to the rapid development and advance in technology: in transportation, space exploration, communication, and even the processing of the new plastics to introduce products with new forms and colours. Design utopias; German design and ergonomics (Dieter Rams and the Braun Corporation); Italy and *bel* design (Mario Bellini and the Olivetti); Synthetic Materials (Verner Panton); the plastic wave (Joe Colombo and Kartell). The emerging role of industrial designers covered issues not only of fabrication and aesthetics, but human engineering, ergonomics and market research.

The next period “Experimentation and Antidesign” (1965-1976), corresponding to economic stagnation and recession, soon followed by a deep economic depression. It corresponds to a phase of renovation, mutation, and selection, new ideas emerge apparently out of nowhere. The crisis of functionalism, pop design, alternative design, recycling design – the Woodstock festival and culture of “flower power”; the miniskirt (Mary Quant) spread throughout the world; furniture made by PVC become stylish as the essence of youthfulness and flexibility.

The “Postmodernism” (after 1968) corresponding to the recession phase of the present wave - new technical and process innovations. Redesign with Studio Alchimia and Memphis (Alessandro Mendini and Ettore Sottsass); New Design (Ron Arad, Jasper Morrison, Oscar Tusquets Blanca, Javier Mariscal, Jean-Paul Gaultier and Philippe Starck). In the nineties the effects of technological advances are wide-spread.

In 1989, dismantling of the Berlin Wall. Dissolution of the Soviet Union at 1991 and the Maastricht Treaty strengthens the European Community in 1992. The High-tech Design and miniaturization (for example: Sony and Japanese design) and the current use the computers and the growth of the internet, as a radical innovation for the common of us. With the design boom of the 1980's the products assumed the images of the corporation as well as for the consumer, an example: the Swatch – Design and Marketing. The relation of New Design to art. The interdisciplinary connections between the applied arts, art, media and industry. Designing for comfort and ergonomics became an increasing concern of designers as environmental issues proliferated. The world ecology, wildlife and health issues inspired designers to explore functionalism in entirely new ways: Ecologic Design and sustainable.

So, much controversy exists on whether the Kondratieff wave is valid for the post II World War economy. If the 50-60 year cycle were based on generation aspects, then it would naturally be 'stretched' beyond 60 years. Since these cycles of wars and economic birth and renewal occur every 2-3rd generation, it's possible to say that when the generation to last see a depression dies off, it's time for another cycle to begin. Maybe we can say that the deferent's periods of design depends of the economic cycles, how we can be synthesized this activity that relates the technically possible with the culturally acceptable.

#### **4. Conclusions**

The Kondratieff wave concept provides a very important and accessible operating principle bridging science and history, and their understanding would fill the existing lack to operationalize the long wave approach as a useful forecasting tool. Some recent discoveries are presented suggesting a strong relationship between some socio-economic aspects of the long economic cycles (Kondratieff waves) and the known periods of the history of Design. It was found that amid the apparently random oscillations of the informational content, at least two characteristic periods of 25-30 and 50-60 years were present.

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## 5. References

- Carvalho Rodrigues, F.; Duarte, Carlos A. M.; Ribeiro, André S.; Devezas, Tossaleno C.; Côrte-Real, Eduardo (2001). *Quantidade de Informação na Arquitectura Portuguesa, 1050-1950*. Academia das Ciências de Lisboa.
- Devezas, Tossaleno C. and Corredine, James T. (2002). *The nonlinear dynamics of technoeconomic systems: an informational interpretation*. *Technological Forecasting & Social Change*, **69**, pp. 317-357.
- Devezas, Tossaleno C. and Corredine, James T. (2001a). *The Biological Determinants of Long Wave Behavior in Socioeconomic Growth and Development*. *Technological Forecasting & Social Change*, **68**, pp. 1-57.
- Devezas, Tossaleno C. (2001b). *Cycles Patterned Repetition or Chaotic Behaviour*. 21st International Symposium on Forecasting, Callaway Gardens, Atlanta, USA.
- Devezas, Tossaleno C. (2001c). *The Causality of Long Waves*. Presented at the 4th International Kondratieff Conference, Moscow, Russia.
- Devezas, Tossaleno C. (2000). *Learning Dynamics of Technological Progress*. 3rd International Meeting of the Research Committee on Sociocybernetics (ISA/RC51), Panticosa.
- Devezas, Tossaleno C. (1999). *Diffusion-Learning Subsystem Dynamics: A new approach to explain long waves in socioeconomic development*. 2nd International Meeting of the Research Committee on Sociocybernetics (ISA/RC51), Crete.
- Devezas, Tossaleno C. (1997). *The Impact of Major Innovations: Guesswork or Forecast*. *Journal of Future Studies*, Volume **1**(2), pp 33-50.
- Devezas, Tossaleno C. (1996). *Succeeding Technospheres*. Presented as "From Smart Materials to Intelligent Structures: A Future Survey. 8th General Assembly of the World Future Society", Washington D.C., USA.
- Duarte, Carlos A. M. (2001). *Análise Relativista da Quantidade de Informação para Avaliação de Comportamentos Emergentes no Design*. Covilhã, Universidade da Beira Interior.
- Hauffe, Thomas (1998). *Design – A Concise History*. Laurence King Publishing, London.
- Marchetti, Cesare (1986). *Fifty-Year Pulsation in Human Affairs*. *Futures*, **17** (3), pp. 376-378.