

## VILFREDO PARETO – BIOGRAPHY, MAIN IDEAS AND CURRENT EXAMPLES OF THEIR APPLICATION IN PRACTICE

### **Introduction**

The seventies of nineteenth century played very important role in the history of economy. From that time for the nearest half of the century we see the most economical changes and the scientifically-organizational progression in almost every area. A great impact for those changes had a rising system of a global economy. There was a place for multilateral exchange of goods, capitals, services and human resources leading to enormous development of the countries. Frequent changes caused that economic reality was every day more and more complex. This complexity was caused by increasing amount of data which extended number of variables complicated conducting precise analysis. The progression required making wide analyzes of economical processes which were not possible in that time. The end of XIX<sup>th</sup> century was a period in which the economy derived a lot from mathematics. During this time there was also an application of the differential calculus which enabled making more accurate analyzes of the economical processes. Throughout this time there was an emphasis of marginal values. That is why some theoreticians describe the 1870's as a 'marginal revolution'. What is more a notion of the 'marginal utility' was applied almost in the same time by three schools of economic thought: Austrian, Lausanne and British-American. The end of XIX<sup>th</sup> century was a period when economy proved that it belongs to exact sciences.

### **The Lausanne School and its Representatives**

The Lausanne School also known as a Mathematical School contributed to usage of procedural language in economical literature<sup>1</sup>. Antoine Augustin Cournot was the precursor of that economical school. Well-known for his passion to mathematics he created the law of demand and was leading an advanced analyzes about demand, supply and price in changing market conditions such as monopoly, oligopoly, duopoly and the perfect competition. The crown of his analyzes was a book 'Researches into the Mathematical Principles of the Theory of Wealth' which was appreciated after the economist's death.

Léon Walras and his successor Vilfredo Pareto are main representatives of Mathematical School. They contributed to the fact that Lausanne School started to exist in the international area. Léon Walras was a master of Lausanne School. He was a man with an amazing analytical aptitude. A general equilibrium theory created by him is the base of making current econometrical models. Vilfredo Pareto improved not only the general equilibrium theory made by his predecessor and thanks to it strengthened the importance of his school in the world of economy. For a lot of years he was making analyzes of economy and society which to this day these analyzes are the incredible facilitation in a lot of branches of knowledge. Moreover the creativity of Italian economist is these days commonly used in such branch of knowledge as quality management.

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<sup>1</sup> W. Stankiewicz, *Historia myśli ekonomicznej*, Warszawa 2000, s. 254.

## Vilfredo Pareto

Pareto was born in 1848 in Italian aristocratic family in Paris. He was a person of a wide range of interests. As a self-educated man he pored over the theories of economy and humane studies with the success. He studied engineering at the Polytechnic Institute of Turin. He acquired here his proficiency in mathematics and basic ideas about mechanical equilibrium which he developed in the future. After graduation at the top of his class in 1870, Pareto took his first job as a director of the Rome Railway Company. In 1874, Pareto becomes the managing director of an iron and steel concern, the Societ  Ferriere d'Italia in Florence<sup>2</sup>. From that time his life was devoted to discovering new economical and sociological dependences. He is a creator of the consumer theory which enables us to describe behaviors of individual consumers on the market through the use of mathematical tools. We can also explain how the market mechanism works in the range of distribution goods and creating prices. Very helpful in the theory mentioned before is Pareto's next discovery – indifference curve described as a bundle of such combination of goods and services which brings customer the same total utility. There is also a notion connected with this illustrious economist, such as 'Pareto optimality' (known also as a Pareto efficiency or Pareto optimal). This is a definition of economic phenomenon in which no one can be made better off by making someone worse off.

The next great achievement of the Lausanne School representative is the Pareto principle. This rule was made in 1897 as a researcher's effect on the incomes distribution of Italian economist. Pareto noticed unbelievable dependence. According to the results of his analyzes as many as 80% of the wealth of whole country was in possession of 20% of society. What is more after the result of the analyzes were spread such dependence was noticed in a lot of life's fields.

Pareto proved that 80% of the effects are made by 20% reasons. That is why, while making revision we have to focus on these reasons which cause the superlative effect.

### Principle 80/20 and some examples of its application

- 80% of complaints are made by 20% of clients
- 80% of bad loans are made by 20% of creditors
- 80% of total costs are made by 20% of products
- 80% of incomes from sales are made by 20% of products
- 80% of products are bought by 20% of clients

### The Importance of the 80/20 Principal in Quality Management

Nowadays quality is becoming more and more important in creating competitive advantage of the enterprise and that is why we need tools to help us in controlling this advantage. The practice distinguishes two types of such tools. There are traditional tools and new tools group. Traditional tools include cause-and-effect Ishikawa diagram<sup>3</sup>, Pareto-Lorenz analysis, block diagram<sup>4</sup> and histogram<sup>5</sup>. New tools group include interrelationship diagram<sup>6</sup>, affinity

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<sup>2</sup> F. L. G o n   a l o, *The history of economic thought website*, <http://cepa.newschool.edu> [access: 03.2009].

<sup>3</sup> It is a graphical tool used to presentation of bilateral connection of causes which make the particular effect.

<sup>4</sup> It is a tool presenting successive action in a projecting algorithm.

<sup>5</sup> It is a graphical tool used to presentation of a characteristic's distribution.

<sup>6</sup> The aim of interrelationship diagram is to find logical connection and dependences of that factors which influence for analyzing issue.

diagram<sup>7</sup>, tree diagram<sup>8</sup>, matrix data analysis<sup>9</sup>, process decision program chart<sup>10</sup> and arrow diagram<sup>11</sup>. An extremely useful and interesting tool is a Pareto-Lorenz analysis which is closely connected with the 80/20 principle. The Pareto-Lorenz analysis is a tool that enables putting in the order all factors which influence on the final results. It is a graphical image showing relative and absolute distribution of mistakes, problems and their causes<sup>12</sup>.

### **Pareto–Lorenz Analysis Process and its Performance<sup>13</sup>**

Pareto-Lorenz analysis is divided into five steps:

- 1) defining causes which influence on the final result of the particular process;
- 2) collecting quantitative data about causes mentioned above;
- 3) putting in the order causes taking as a criteria: frequency of their occurring (from the most frequent to the less) or their influence on the final result (from the strong influence to the weak) – drawing bar charts which represent particular causes (Pareto graph);
- 4) drawing points which represent cumulated values of causes and after that linking them - creating Lorenz curve;
- 5) putting percentage values for the chart.

### **Application of the Pareto–Lorenz Analysis**

The statistics are taken from the annual reports (made in 2007, in bln \$) of particular branches of South-Korean Samsung holding company, also known as a ‘chaebol’. Pareto-Lorenz analysis should help us to answer for the question: which branch brings to Samsung the highest incomes?

First of all, it is necessary to specify all branches with achieved incomes in the particular year. It is shown in chart no. 1.

The next step is to put in the order incomes of particular branches. From the branch which brings the highest to the lowest incomes. It is shown in chart no. 2.

Basing on the chart no. 2 we can start drawing the graph which will present values regarding incomes above. The process of making a graph to the Pareto–Lorenz analysis is divided into three steps.

First of all we have to specify particular branches on the X-axis together with their values in bar chart.

Secondly we draw the line which represents the cumulated values. It is useful because after that it is easier to see if the 80/20 principal works in that particular case.

Finally we assign percentage values for particular causes (branches) and effect (values in bln \$).

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<sup>7</sup> A universal tool, which is very useful in putting in the order the data from the ‘brain storm’.

<sup>8</sup> One of the tool in the planning process.

<sup>9</sup> Used mainly in market analysis, helps in forming product market strategy and finding the market niche.

<sup>10</sup> A tool which aim is to define an optimal way to achieve the goal.

<sup>11</sup> A very useful tool in planning processes which are repetitive.

<sup>12</sup> J. J. Dahgaard, K. Kristesen, G. K. Kanji, *Podstawy zarządzania jakością*, Warszawa 2000, p. 91.

<sup>13</sup> E. Konarzewska-Gubala, *Zarządzanie przez jakość*, Wrocław 2006, p. 196.

Chart no. 1

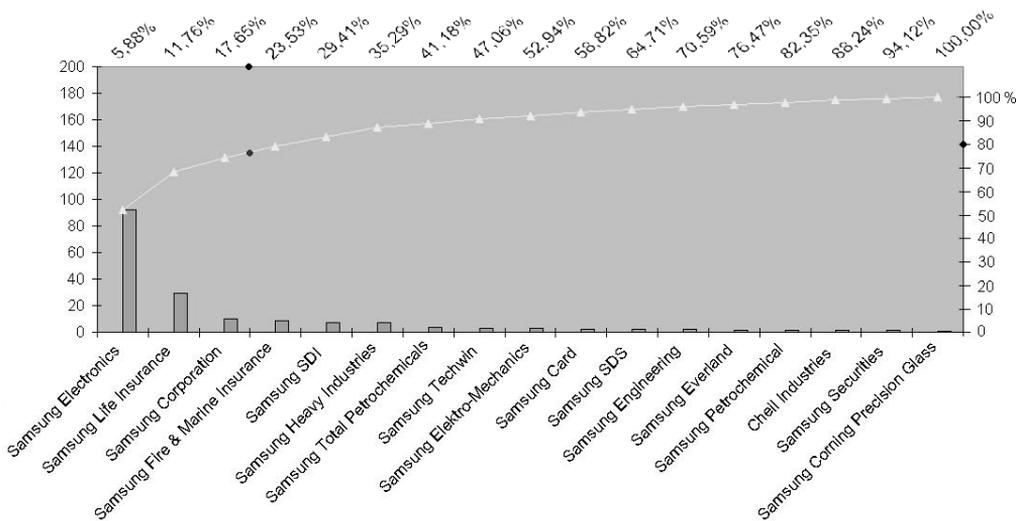
Name of the branch	Incomes (in bln \$)
Samsung Electronics	91,9
Samsung SDI	7,2
Samsung Elektro-Mechanics	2,6
Samsung Heavy Industries	6,8
Samsung SDS	2,3
Samsung Life Insurance	29,1
Samsung Corporation	10,2
Samsung Fire & Marine Insurance	8,8
Samsung Techwin	3,1
Samsung Everland	1,6
Samsung Corning Precision Glass	0,9
Samsung Card	2,4
Cheil Industries	1,5
Samsung Engineering	2,2
Samsung Securities	1,3
Samsung Total Petrochemicals	3,5
Samsung Petrochemical	1,5

Chart no. 2

Name of the branch	Incomes (in bln \$)
Samsung Electronics	91,9
Samsung Life Insurance	29,1
Samsung Corporation	10,2
Samsung Fire & Marine Insurance	8,8
Samsung SDI	7,2
Samsung Heavy Industries	6,8
Samsung Total Petrochemicals	3,5
Samsung Techwin	3,1
Samsung Elektro-Mechanics	2,6
Samsung Card	2,4
Samsung SDS	2,3
Samsung Engineering	2,2
Samsung Everland	1,6
Cheil Industries	1,5
Samsung Petrochemical	1,5
Samsung Securities	1,3
Samsung Corning Precision Glass	0,9

Source: Samsung Electronics.

Pareto-Lorenz analysis



Source: Own elaboration.

Thanks to foregoing Pareto–Lorenz analysis we can notice that such branches as: Samsung Electronics, Samsung Life Insurance and Samsung Corporation which participate only in 20% of all branches of South-Korean chaebol bring about 80% of annual incomes.

Nowadays Pareto–Lorenz analysis enables us not only to specify in unequivocal way on which part of our enterprise we should focus but also it shows how to make improvement of our product by identifying problems which should be removed first.

### ABC Classification

Pareto–Lorenz analysis was popularized in first half of XX<sup>th</sup> century by American economist Joseph Juran who was engaged in the theory of quality management. From that time Pareto–Lorenz analysis was applied in a lot of areas. That is why it needed to be adjusted to changing conditions. These adjustments did not change its original postulates<sup>14</sup>. ABC classification is such an example which is applied mainly in logistics especially in warehouse economy.

### ABC Classification Process and its Performance

ABC classification is divided into four steps:

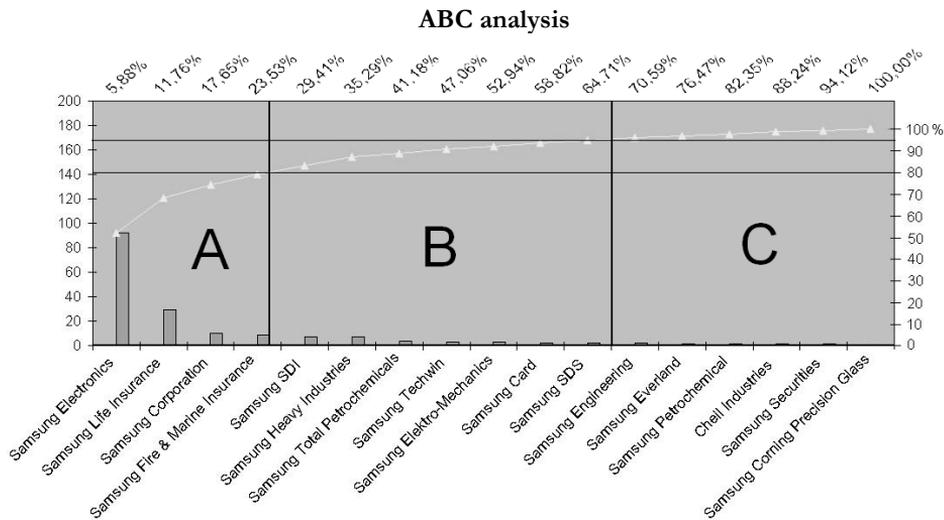
- 1) collecting data and making Pareto-Lorenz graph;
- 2) drawing two horizontal lines. First line represents 80% of cumulated values, second line represents 95%;
- 3) we divide whole graph into three parts – A, B and C.

All categories for which Lorenz curve lays below 80% is the A part.

All categories for which Lorenz curve lays between 80% and 95% is the B part.

All categories for which Lorenz curve lays above 95% is the C part.

- 4) we make an analysis basing on the new chart.



Source: Own elaboration.

<sup>14</sup> J. Ł a n c u c k i, *Podstawy kompleksowego zarządzania jakością TQM*, Poznań 2006, p. 296.

## Conclusion

All of the figures used in our examples i.e. 80% of effects are the result of 20% of reasons are not sole proper solution. It could be also 90% and 50% respectively. Pareto used such figures to describe only the tendency. Moreover an empirical approach of economical reality – because of its complexity – makes finding such example almost impossible.

Because of the simplicity of Pareto–Lorenz analysis and ABC classification mostly are used in low-budget enterprises. The practice shows that in big corporations Pareto–Lorenz analysis is often used together with fishbone-shaped Ishikawa diagram. Such mixed analysis is perceived by the management team as a more effective and accurate tool in managing the enterprise.

To sum up Pareto–Lorenz analysis together with ABC classification can be very useful tools in creating and controlling competitive advantage. Through the use of empirical approach they definitely can create benefits for whole company.

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### VILFREDO PARETO – BIOGRAFIA, GŁÓWNE IDEE ORAZ WSPÓŁCZESNE PRZYKŁADY ICH PRAKTYCZNEGO ZASTOSOWANIA

Koniec XIX w. był okresem wielu przemian w światowej gospodarce. W związku z postępem techniczno-organizacyjnym, który miał miejsce w owych czasach, nastąpiła potrzeba dokonywania analizy procesów gospodarczych na niespotykaną dotychczas skalę. Głównym problemem jaki napotykali ekonomiści był brak narzędzi pozwalających przeprowadzić tego typu analizę. Z tym problemem skutecznie walczyła szkoła lozańska, która od początku swego istnienia przyczyniła się do powstania niezwykle prostych narzędzi stworzonych do analizy procesów gospodarczych. Wybitni przedstawiciele tej szkoły tacy jak: Antoine Augustin Cournot, Léon Walras czy Vilfredo Pareto opracowali użyteczne teorie ekonomiczne, które stanowią do dziś podstawy współczesnej ekonomii. Celem artykułu jest przybliżenie sylwetki znanego włoskiego ekonomisty szkoły lozańskiej Vilfredo Pareto oraz jego głównych postulatów ze szczególnym uwzględnieniem „reguły 80/20”. W artykule została również dokonana prezentacja zarówno analizy Pareto–Lorenza, jak i analizy ABC, wraz z przykładami zastosowania tych teorii w praktyce.