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Research on the Integration and Transition of Pareto Principle and Long Tail Theory

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Abstract

Long tail theory doesn't replace Pareto principle. On the contrary, both of them operate in the economics of abundance. In the condition of abundant products, the adaptability and importance increase for Pareto principle. Meanwhile, the long tail effect brought by abundant economy can not be ignored. The effect includes increased "hot" products, "hot" products converted from "cold" products, the long tail turning to be longer and fatter and the curve of long tail turning to be smoother. The application of long tail theory instead of Pareto principle needs to lower production cost and transition cost, effective search and massive customized production.

Key words: Pareto principle; Long tail theory; The economics of abundance; Integration; Transition

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1. EXPLANATION OF 20/80 LAW AND LONG TAIL THEORY

1.1 Economic Explanations

20/80 law is also called "Pareto principle". It was an important economic law discovered by famous Italian economist Pareto in 1897. He found that 20% people had 80% wealth. As well, 20% goods or customers brought about 80% sales. So the law is also called "important minority law".

The word "long tail" is often found in statistics. It is often used in property's distribution and words' application. In economy, "long tail" refers to a demand curve with two coordinates of quantity and species. Because the curve has a long tail extending to the horizontal axis which represents "species", the phenomenon is called "long tail". From graph 1, we can see the long tail curve is near to a power-law curve (Chris Anderson, 2006), that is $y=c/x$.

In 2004, Chris Anderson, the chief editor of the magazine *the wired,* gave a new connotation to "long tail" and proposed the long tail theory. He wrote an article to point out that goods' marginal cost went down in internet age so that enterprises were capable of paying attention to 80% "tail goods" which were ever ignored. As long as the channels for storage and circulation were big enough, goods ever with slack demand or weak sales would occupy similar market shares as those few hot merchandise does. The opposed long tail theory corrects the past notion of ignoring popular customers which is influenced by 20/80 law. However, this doesn't mean we should abandon 20/80 law.(WU, CHEN, 2010)

1.2 Mathematical Explanations

On the basis of graph 1, we suppose to cut the tail at the place of $x=5n$, then 20% "head goods" is the part before $x=n$. these two parts are as follows:

$$\text{Total} = c+c/2+c/3+c/4+...+c/5n$$

$$\text{Head} = c+c/2+c/3+c/4+...+c/n$$

The famous mathematician Euler proves:

$$1+1/2+1/3+1/4+...+1/n = \ln (n+1) +r$$

Among them, r is a constant called Euler constant, approximately equaling to 0.577218.

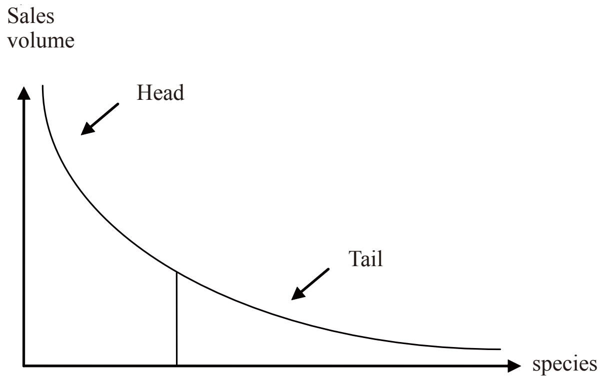

Figure 1
Diagram of the Long Tail Theory

Thus, we get the proportion of 20% "head goods" in the environment of long tail, that is also refer to abundant economy (ZENG, 2006):

$$\text{Head/total} = \frac{\ln n + r}{\ln(5n) + r} = \frac{\ln n + r}{\ln n + \ln 5 + r}$$

Since ln (n) is divergent, the ratio goes near to 100% as n is larger and larger. As n equals to 100, 1000 and 10000 respectively, that is, the total species equals to 500, 5000 and 50000 respectively, the proportion of 20% "head goods" is calculated as follows:

$$\frac{\ln(100) + 0.577218}{\ln(100) + 0.577218 + \ln 5} = 75.3\% \quad (1)$$

$$\frac{\ln(1000) + 0.577218}{\ln(1000) + 0.577218 + \ln 5} = 82.3\% \quad (2)$$

$$\frac{\ln(10000) + 0.577218}{\ln(10000) + 0.577218 + \ln 5} = 85.9\% \quad (3)$$

From the upper calculation, we can deduce that the head is more important as the species become more. That is, 20/80 law is implied in the graph about the long tail theory. However, 20/80 law emphasize on the head part of the curve. Meanwhile, the long tail theory pays more attention on the tail of the curve. On the premise of network popularity, reduced marginal cost and unobstructed channels for supply and circulation, the long tail theory and 20/80 law can have a future of better existence and mutual promotion (ZHU, 2007).

2. ABUNDANT ECONOMY IS THE FOUNDATION TO APPLY THESE TWO LAWS

2.1 Abundant Economy is the Foundation to Apply the Long Tail Theory

Unless we live in abundant economy, it has chance to apply the long tail theory. Abundant economy is the opposite of scarcity economy. The past mode of economy was built on the ground of scarcity economy. Goods were produced so less that people can not consume as much as they wanted. Facing scarce species, people can only try to find out the optimal consumption plan. However, internet effect enjoys indexation growth as internet users become more. The internet externality makes those markets on internet expand rapidly. The website application let certain digital goods become rich enough to go into the category of abundant economics. Unless goods are abundant, people can consume goods which is not necessary as long as they want (WANG, 2006). Then the goods beyond the head of the curve may attract the attention of consumers. Product life circle may need to change because the production and circulation channels change from restricted supply in scarcity economy to supplying according to need.

2.2 20/80 Law is Still Applicable in Abundant Economy

In abundant economy, 20/80 law is not out-of-date. Comparing the calculating result of foregoing equation (1) (2) (3), we can find that when species go up from 500 to 5000 and then to 50000, the sales volume of the front 20% species account for 75.3%, 82.3% and 85.9% of the total, almost reaching or even exceed 80%. This phenomenon implies that 20/80 law still works in abundant economy. Paying attention to the head part can seize most transactions. The reason for the phenomenon taking place may be that the head part has more species, and then enterprises have more chance to earn profit. The 20% head part had only 100 species in the past. However, the same percent head part includes 10000 species now.

2.3 20/80 Law is More Applicable as Goods are More Abundant

To an enterprise, it has more species of goods so that its sales volume becomes bigger. The foregoing equation (1), (2) and (3) show us that 20/80 law is more applicable as goods are more abundant. The same percent head part (20%) creates sales volume from 75.3% to 85.9% of the total as goods become more abundant. The changing figure also proves Harvard University's Elberse's viewpoint is right. He thought that although among digital goods such as books, videos and music, the sales of niche goods account for quite a part, the sales of hot products still bring about the main part of profit. The position of hot products are not weakened, but reinforced by the internet (but the amount of hot products is going up). The world still obeys the 20/80 law.

Then, there seems to be a paradox: since 20/80 law is more applicable as goods are more abundant, the long tail part should be abandoned. The paradox seems to be reasonable. It is built on a wrong foundation: 20/80 law conflict with the long tail theory. In fact, the application of 20/80 law doesn't mean ignoring the long tail and paying attention to the long tail doesn't mean that 20/80 law is of no use. The right strategy is to apply both of these two laws as long as we are capable and energetic to do so. We can earn money from niche species by reducing transaction cost. Meanwhile, we should not give up the existed important client or hot products. Anyway, these two species of goods both satisfy customers' needs. They just diverge with each other in the objects and manners of satisfaction. The divergence will reduced with the development of network, digitization and smooth channels. Such successful enterprises as EBay and Amazon all obey such rules. They never give up hot products as well as products "at long tail curve". These firms work well in both areas and try to get in touch with the biggest possible market. In this way, they earn much more profit.

3. THE LONG TAIL PHENOMENON BROUGHT BY GOODS ABUNDANCE

3.1 The Past Head Part Shrinks

As goods are abundant, the percentage of the past head part shrinks. For example, the percentage of the past head part is 20%. As the species expand 10 times, the percentage of the past head part become only 2%. This brings a new challenge to enterprises: to seize the past 20% transaction which is 2% now, or to seize the new 20% head part? In fact, if firms don't cut down their production cost and transaction cost, they will be incapable of seizing the new 20% head part. They will only seize 2% old head part and lose 98% product market.

3.2 The Species Once at the Long Tail Curve Go into the New Head Part

As goods are abundant, except that new species may go into the new head part, those species once at the long tail curve go into the new head part. Species belonging to former 80% long tail part turn out to be 20% new head part. This phenomenon proves that the divergence between 20% and 80% species become ambiguous. Ever ignored non-core clients are being emphasized now. Many unpopular resources are being explored. The worth of the long tail is underlined. If we say 20/80 law pays attention to creating brand, the long tail theory then aims to expand subdivided markets. It is like what one Amazon Employee says: the books which were hard to sell now exceed those which were hot to sell.(CHEN, 2008)

3.3 More Species, Longer Tail, Longer than We Can Imagine

Kitchen Aid Company found that clients' purchase are characterized by long tail curve since it started to provide products made in any colors. Except that the color of black or white is best seller, other colors (every model has more than 50 colors to choose) have possibility to be chosen by customers.(Chris Anderson, 2006) The research of Bailey et al. found that American true long tail transaction volume in 2004 is 20% higher than the estimation of the government. The fault mainly came from the government's ignorance of small scale traders. Erik et al. (Erik, HU & Michacel, 2010) found that since 2000 to 2008, the long tail part of Amazon Company obviously became larger. Compared with their 2003 paper, Amazon Company's phenomenon indeed lasts long. By 2008, the percentage of total sales volume contributed by non-best sellers of Amazon Company is 36.7%.

3.4 Fatter Long Tail

With the popularity of custom made products and recommendation systems, the traditional hot goods become less popular and the traditional goods not in popular have a more favorable reception. Therefore, the long tail becomes fatter than ever. Reducing cost is the crucial to get the long tail effect. When it makes the long tail effect obvious to cut down cost, the hardness of earning money from the head part products goes near to that of earning money from the long tail part products. This means that the long tail part of the curve becomes fatter and slows down.

3.5 The Long Tail Curve in Fact is the Integral Form of Pareto Distribution

The long tail curve in fact is the integral form of Pareto distribution. That is, the essence of 20/80 curve is almost same as the long tail curve. However, the two curves are different in their slopes. From the viewpoint of statistics, the long tail theory is concerned with a slowing down curve of Pareto distribution.

The curve with steeper slope in graph 2 reflects 20/80 law. It is about the sales distribution of traditional economy: 80% sales volume comes from 20% goods. The gentler curve in graph 2 reflects the sales distribution of long tail economy. The difference of the head part and the tail part becomes small in long tail economy. The head part is no longer sudden rising. The sales volume from the long tail which represents niche markets becomes more important. Therefore, the long tail theory can be treated as surpassing 20/80 law. Although 20/80 law is still applicable in the new economy, the long tail can bring about as much as or more market capacity explored from niche markets (Erik, HU & Michacel, 2010).

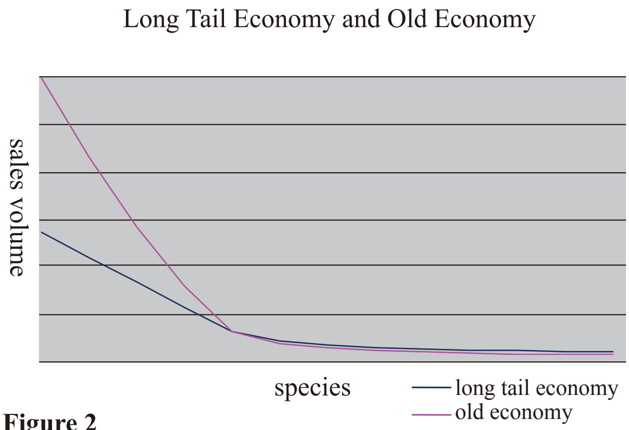

Figure 2
The Comparison of Long Tail Economy and Old Economy

4. THE TRANSITION FROM APPLYING 20/80 LAW TO APPLYING THE LONG TAIL THEORY.

4.1 Reducing Cost

Product cost mainly consists of production cost and marketing cost. Internet times make it possible for some species of goods to let customers participate in their process of production. The prevalence of convenient production tools (e.g. 3D printer) let it come true to subcontract custom made production to many people. This brings about reduced cost and abundant goods which enhance consumers' welfare. On the contrary, reduced cost and enhanced consumers' welfare will promote this kind of custom made production. Thus a positive feedback loop comes into being.

In website era, cost reduction requires companies to increase their management skills, make production tools prevalent and attract customers to participate in the process of production. Further more, clients' loyalty and satisfaction can both be improved in subcontraction. The outcome of production with collective wisdom is often surprising. There are many examples such as Wikipedia, Lego Toys Company and Salesforce.com. Wikipedia works by letting many people participate in its building. Openness makes its content exceed *Encyclopedia Britannica rapidly*. Lego Toys Company encourages customers to participate in toys design so that customers are more loyal to its products. Salesforce.com let its clients use its software only by registration. It further cooperates with many small-scale software firms to improve software and enjoy profit together. Its development seems to exceed Oracle and SAP (YANG, 2010).

4.2 Search Efficiently

Niche products are abundant. However, its information is multifarious and disorderly. So the question is how to accurately locate the information we need. We can solve the problems by special technique - "filter". With filters, we can rebuild disorderly information and gather customers' certain needs. For example, Amazon conducts association recommendation by collaborative filtering. It is a product promotion based on market.

Information recommendation is one powerful marketing tool. Collective evaluation is the most valuable weapon in the internet market. It is more efficient than estimation models used beforehand by experts to work as evaluation tools after the event. Customers' recognition attracts other groups to consume. Clever filter is using this recommendation technique to push consumers' needs to the long tail part of the curve(YANG, 2010).

Besides, popularity rank is also a voice based on the market. Information is passed around by word of mouth. Its effect can form a positive feedback loop. Consumers' mark shows collective wisdom. The quantitative information makes customers easier to compare and classify goods.

When species of products are abundant and market capacity is big enough, estimation beforehand may cause a big difference between estimated data and actual data. However, evaluation after the event can not only reflect the true operation, but also bring about a positive feedback loop.

4.3 Mass Customization is Possible

Transaction cost theory holds that as long as the transaction cost within an entity is lower than that in the market, the entity is able to change many producers in the market to be part of it. Otherwise, many producers in the market still exist. As production tools become prevalent, the fix cost is reduced, dispersed production becomes possible and the chance is possible for mass customization.

Customization is the mode of production in agricultural society. It is quite different from mass production in industrial society. However, information improves production conditions; it makes small scale production get low level of cost which can only ever get in mass production (YANG, 2010). When diversified needs are satisfied and supplied goods gathered, scale economy effect of website production is transferred to sales area.

CONCLUSION

Long tail theory doesn't mean to overthrow 20/80 law. It in fact guides us to review minority's markets, dispel the lingering notion and find out proper long tail market.

In the past, people live in an era of poor resources. Therefore, our thoughts pay more attention to "zero-sum game". Competition is the successful trump of companies. Nowadays, in some markets with infinity capacity, supplement is always the right strategy. Coase believes that the existence of transaction cost brings about the emergence of firms. However, the development of future technology will enormously slow down the production cost and transaction cost. That will cause the disappearance of many firms. We will step to a new agricultural era: everybody has his own advanced production tools and then build family workshop with advanced technology. The lifestyles such as cooperation, participation of design and demand-based consumption will confuse the distinction between production and consumption. It can be expected that the markets for minority will expand in the future and human character will be more respected than ever.

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