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Digital service economics analysis model

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ABSTRACT

Digital services have some different economic characteristics from goods, and digital products can be used as SaaS (Soft as a Service) to promote the welfares of the whole society. The paper analyses the feasibility of turning a digital product into a service. Then the paper studies the traits of digital services and builds a new economics model of fractionized digital services which can analyze digital services why and how to be fractionized. The model illustrates fractionized digital services can bring profits to the producer, bring benefits to consumers and promote the welfares of the whole society.

KEYWORDS

Fractionized digital service; SaaS; Marginal cost; Information economy.

INTRODUCTION

A country's overall economic output can be divided into products and services[1]. The classification can be verified by the definition of GDP which be given by Professor Hongye Gao, in his book he defines GDP as "GDP refers to all final products (goods and services) which be produced with the overall social production factors in a given period"[2]. Goods (physical product) and services have different features, which causes the performance of them have the different economic characteristics. Physical product is tangible, and dividing the original products may cause damage to them and made their value reduced; the service is intangible, highly flexible, and fractionizing them will not cause the economic loss.

As we enter the information times, information products are becoming more and more important, some of information products can be looked as a special type of physical products, such as CD, book, newspapers and so on, but the information has its own characteristics which are different from those of the material. some of information products can be viewed as services such as online news, online game, online video and so on[3].

Digital information products have more service features. Digital products and services have a feature: they can be fractionized to many small parts. This article focuses on analyzing the feasibility that digital products are fractionized and the feasibility that digital products be turned into services; And then establishes the model of fractionized digital services to analyze the effect on the servitization of digital products from a perspective of economics. The model illustrates fractionized digital services can enhance profits to the producer, bring benefits to consumers and promote the welfares of the whole society. To some extent, the model is fit to all the services.

SERVITIZED DIGITAL PRODUCTS

Servitization

At present, the definition of servitization is diverse, some people believe it refers to "products and services," some people think it refers to turn a product into service[4]. In this paper, we choose the latter, which means to turn a product into a service and fulfill the function of the product by a service form. As the services have some unique characteristics, servitization products become a way to increase profits for enterprises. For examples, the ordinary consumers with the low frequency of use copier generally do not buy a copier, and copy files to the copy shop, in which copier is transformed into a servitization product. The basis of this service is still the copier, but the product is turned into a service, divided into a tiny service products. The price of the tiny services is very lower than that of the product. servitization and fractionizing it into tiny services, expand consumer groups, increase the quantity of sales, and increasing the welfare of the whole society.

SaaS (Soft as a Service) is software that is deployed over the internet or is deployed to run behind a firewall on a local area network to provide the functions of the software. It is another example that the product is translated into a service[5]. We also can divide the service time into small period and sale them to the consumer at a lower price, which can increase the profits of company and improve consumer welfares. For software is a digital product and its marginal cost is zero, it is more effective.

Digitized information product

Most of information products can be digitized. In order to ensure preciseness, we take the information products which can be digitized as analysis objects.

Digital product which can be servitized

From the theoretic perspective, digital products and services have a common similar feature: (almost) infinite divisibility which means they can be almost infinitely fractionized, while the physical

product does not have this feature. Digital products can be approximately infinitely fractionized and don't lose the profits for the marginal cost of digital product is zero.

Services also can be approximately infinitely divided, for example, we can divide the service time 1 year into some tiny period of 1 week or 1 day. In practice, the time which it will take for a basic service can be the unit for fractionizing. Digital service is the intersection of digital product and service. It will be illustrated that most of digital products can be servitized.

Digital products can generally be classified into three categories: content products, exchange tools, digital processes and services[6].

Content products include: software, audio and video, books, newspapers, product information and so on (all refer to digital products). It will be discussed by two ways. The first is consumers can accept online services. For the pure content products, you can watch videos, listen to music, and read the newspaper online via the Internet. For the functional products such as software, SaaS can implement the servitization. The second is consumers can not accept online services, such as text, pictures, videos, audio are downloaded and edited, or the data which the software process is confidential, etc, which will be discussed later.

Exchange tools refer to the digital products which represent a contract, such as digital ticket, digital currency. These products can be servitized by the computer network.

Digital processes and services, such as electronic transactions, telemedicine, online games, instant messaging, e-government and other digital interactions are services by themselves.

In conclusion, there are two possibilities: 1) If the consumer accept online services, digital products can be servitized on internet. On one hand, online products can be seen as services; On the other hand, we can use the Internet to turn some digital products into services. 2) If the consumer does not accept online service or online digital services can not content the consumer. At that time, we can use the characteristics of digital products to turn them into the analogs which have the features of digital services. Further analysis of this will be made later, now we focus on analyzing the digital product which can be servitized.

FRACTIONIZED DIGITAL SERVICES MODEL

How to fractionize digital services

Now we analyze the intersection of digital products and services: digital services how to be fractionized. The process that digital services are divided into tiny units is called fractionizing, the units are called fractionized digital service or differential digital service or micro-digital-service.

Digital services can be fractionized by the following ways: the time fractionizing (differential), the quantity fractionizing (differential), functional fractionizing (differential).

Time fractionizing: taking a basic service time as a unit, some digital services can be divided into micro-digital-services from the time point of view, such as one-year service.

Quantity fractionizing: from the quantity point of view, some digital services can be divided into tiny segments, such as translation services.

Functional fractionizing: some digital service with different function can be divided according the sub-functions, which can take single-function digital services as basic micro-service products[7].

Fractionized digital services model

Firstly, when the digital services are not fractionized, we analyze supply and demand of the digital services; and then study them when the digital services were fractionized. we analyze how the micro-digital-services benefit to consumer, company and economy.

Analyze when the digital services are not fractionized

In Figure 1, L_1 shows: given a price P digital services need to reach a lowest sale quantity Q to get equilibrium of costs and profits. So the area above the line is the profits area or production area and that under the line is loss area or non-production area.

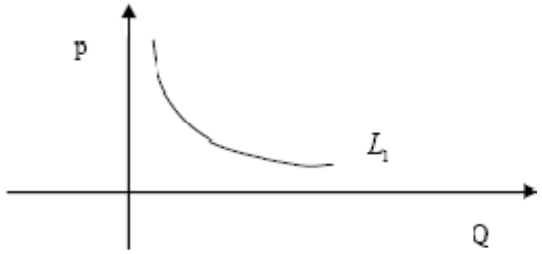

Figure 1 : Curve: cost-benefit equilibrium of digital services

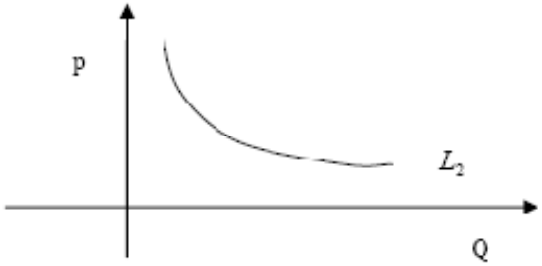

Figure 2 : Curve: demand of digital service

In Figure 2, L_2 is the actual demand curve of the digital services, that is, given the price P, we can get the actual demand of consumer.

If we combine the curves in Figure 1 and in Figure 2, we can get the following four diagrams (Figure 3) for the curves of different services are different.

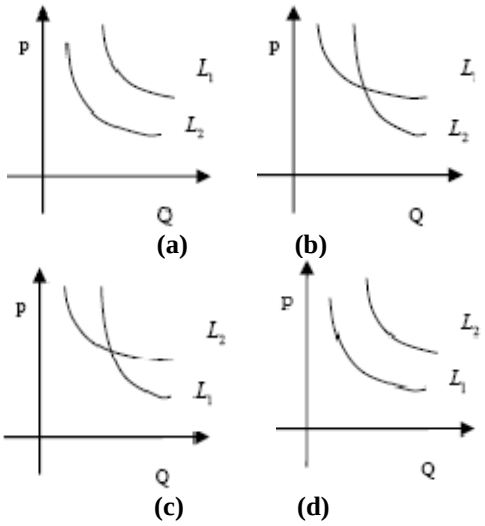

Figure 3 : Curve: combination of cost-benefit equilibrium curve and demand curve

Figure 3(a) shows that at any price level, the actual demand does not meet the minimum requirements for cost-benefit balancing, enterprises will not provide them.

In Figure 3(b), the part of L_1 under L_2 represent that the actual demand surpass the minimum requirements for cost-benefit balancing, enterprise will produce them; the part of L_1 above L_2 represent

the actual demand does not reach the minimum requirements for cost-benefit balancing, the company won't produce them.

In Figure 3(c), the part of L_1 above L_2 represent the actual demand does not reach the minimum requirements for cost-benefit balancing, the company won't produce them; the part of L_1 under L_2 represent that the actual demand surpass the minimum requirements for cost-benefit balancing, enterprise will produce them.

Figure 3(d) shows that at any price level, the actual demand surpass the minimum requirements for cost-benefit balancing, enterprises will provide them.

Analyze when digital services are fractionized

For preciseness, we set several hypotheses:

1)marginal cost of digital service is zero;

2) digital micro-services and digital services market are separate, that is, the consumer of digital micro-services is different from that of original service;

3)One of most important feature of digital services is perishability[8]. The digital services irreversibly vanishes as it has been consumed by the service consumer, which is conducive to the re-sale of digital services, and stimulate enterprise to add the provision of digital services;

4)Digital Services can be approximately infinitely fractionized into countless micro-services.

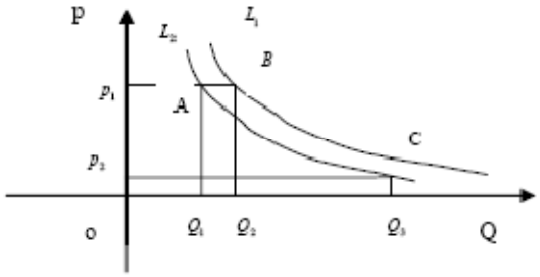

Figure 4 : Curve: economics analysis of fractionized digital services

In Figure 4. We can see L_1 is above L_2, which means enterprise will have a loss if it provides the service. If it pr^{L_1}des the service when the price is p_1, which will result in a loss as the same as the area of rectangle $AB Q_2 Q_1$. Then we make the digital service fractionized according to time or quantity or function. It don't affects the original demand and creates the new demand that digital product is fractionized. The price of micro-digital-service is low, but the demand is huge, which can form the revenue rectangle $p_2 C Q_3 O$. it won't increase the costs for its marginal cost is zero, so the whole area of rectangle $p_2 C Q_3 O$ is the profit.

When the area of rectangle $p_2 C Q_3 O \geq$the area of rectangle $AB Q_2 Q_1$, the enterprise stars to provide the service, at the same time increases the welfare of consumers.

For Figure 3(b), Figure3(c), we can also do a similar analysis as Figure 4. Fractionizing the digital service, we can expand the scope of producibility region, and can improve the welfare of consumers.

For Figure 3(d), we do the same analysis as Figure 4. Although in any case the enterprise is always willing to provide service, if the digital service is divided, which can increase profits and enhance consumer welfare.

EXTEND THE DIGITAL SERVICE FRACTIONIZING MODEL

The model of digital service fractionizing can be extended to all the products which can be divided, such as services, digital products, the physical products which can be divided. But their economic effects are not so obvious and prominent.

The marginal cost of non-digital services, physical products which can be divided, and physical product which can be servitized, is not zero, if we use Figure 4 to analyze the economic effects, the rectangle $p_2 \mathrm{C} Q_3 \mathrm{O}$ is not all profits, Therefore the effect of increasing company profits should be greatly reduced.

The marginal costs of digital products which can not be servitized are still zero, so you can still use Figure 4 to analyze it. But we need some technical means to make them get the characteristics of service, such as using technology to make digital products only used a certain period or numberable times, so the service get the characteristics: perishable and fractionizing. It can be regarded as the sub-digital service, and be analyzed by the same model

CONCLUSION

1, If digital services are fractionized and provide to consumer as micro-digital-services, it will increase corporate profits, consumer welfare and social welfare.
2, digital products can be converted to digital services through technology.
3, Internet is an important means of turning a product into a service.
4, The products (including goods and services) which can be fractionized can be analyzed by the above model, but the economic effect of them is less than that of digital services.
5, Servitization is not "product + service", but is to turn a product into a service and complete the function by a service form, which will be a trend of economic development.

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