

# **An Academic Research on Business Process Reengineering**

## **——Based on Books Borrowing Process of Library**

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### **Abstract**

Business Process Reengineering, a hot issue in modern management, is a significant and creative idea on administration based on a series of management theories and successful carry-outs. All along, people have been used to defining and studying it in view of management, overlooking its intimate affiliation with division theory of economics. Here, the author tries to analyze the economic background and academic basis of Business Process Reengineering from a new point of view. While, the business process of any corporate is quite complicated. Here, through the case of books borrowing, the author makes an analysis of its division of labor, and probes into the relations between the four factors which are division of labor, the extent of market or throughputs, information technology and business process, and attempts to explain this administration issue by the combination of administration and economics knowledge.

### **1. Introduction**

According to Adam Smith's theory of division of labor, the division of labor is limited by the extent of the market and throughputs, and appropriate division of labor helps to meet the demand of market. For a worker to do a series of different activities, there must be a sequence; with the emergence of division of labor, the work formerly for one worker is then disintegrated into different parts, which are taken up orderly by different workers. Such a sequential series of activities may be called as a process. It can be said that the business process exists together with the division of labor, and the process bases itself on division. However, Adam Smith's theory of division of labor overlooks technology's impacts on division of labor and business process. Under the condition of new technology, the division would not remain the same, and a simple automation or informationalization of former working manner is not enough; at the same time, the progress of information disposal influences the changes on division as well, with the existence of information exchanges between various activities and divisions. Accordingly, a timely and appropriate process should be created after a drastic reengineering, instead of any imitation or technical improvement of former process. In this way, the process efficiency would be largely improved, and the corporate capabilities would be strengthened.

### **2. The background and significance of BPR**

As a creative and significant idea on administration, Business Process Reengineering has wiped over a great number of countries, and is always taken as promising. It is a fruit in management field that goes well with the times.

#### **2.1 The pressure and challenges that corporations are facing appear as the impetus for BPR**

In the world of fierce competitions, corporations are in the face of piles and piles of pressure and challenges, from both of the outside, which features "3C", and the inside. The corporations are beginning to realize that, for a better survival and development, not only the advanced technology is needed, but also a flexible administration mechanism and organizational structure which responds to the circumstances promptly and suitably, is in great demand. This calls for a new management innovation cored "Business Process Reengineering".

#### **2.2 The rapid development of information technology provides BPR with substantial conditions**

The innovation of management ideas is based on new technology possibility. The rapid development of information technology provides substantial conditions and advantageous technology support. It not only enlarges the space for process reengineering, but carries forward the realization of process management and the organizational reform as well. Just through utilizing information technology creatively and organizational management in accompany does process reengineering bring corporations a great improvement of performance.

#### **2.3 The realistic significance of BPR**

There are several elements which help to strengthen the competitive power for corporations, such as organizational structure, staff, technology, etc. Business process is only part of them. However, it covers a great deal: logistics, money flow, information flow, etc. In this way, we take business process as the life line of the whole corporation. Only by regarding and managing business

process as a systemic engineering can we strengthen the accommodation and competitive power of corporations, settle the problems and help to realize the continuous development of corporations.

### 3. The theoretical basis of Business Process Reengineering

As a management idea, process reengineering grows from piles of management ideas and technology methods. It is a combination of administration thinking and information technology. However, people have always ignored its intimate affiliation with division theory of economics.

#### 3.1 The deepening of division of labor is the practical basis of Business Process

Business process comes into being and develops with the deepening of division of labor. As the demand gets bigger and bigger, the market extent and throughputs increase. The division of labor comes into being in order to promote the efficiency and meet the great market demand. The process is full of information delivers and exchanges. In correspondence with books borrowing activity in library, under various technology circumstances, the continuous progress of information technology influences the division of labor and process development.

#### 3.2 The progress of information technology pushes on the corresponding changes of division of labor and business process

Because of the changeable economic environment and increasing amount of information, the division of labor in corporations varies. To ensure the efficient operation and effective fulfillment of the task, it is demandable for corporations to further the division of organizations and functions, which will surely lead the process to change and reform constantly. The progress of information technology provides powerful ways and means for process reengineering. With the support of advanced information technology, the regulated division and correspondent organizational management can cut the costs, elevate the resource setup efficiency, and win credits for corporations.

### 4. The research on books borrowing process of library

Adam Smith's theory of division of labor tells that the division of labor is limited by the extent of the market and throughputs, and appropriate division of labor helps to meet the demand of market. Under the condition of new technology, the division would not remain the same, and a timely and appropriate process should be created after a drastic reengineering, instead of any imitation or technical improvement of former process.

We will take books borrowing as an example to

analyze its division of labor, studying the information technology's impact on throughputs, division of labor, and process, and also the relations between these three factors under new technology circumstances.

First, we can summarize the general steps of books borrowing and division of labor through the analysis of the following case.

#### 4.1 The books borrowing process between two persons

In the mutual communications, one person may raise the idea of borrowing the needed books after the other one's introduction. It is clear that the lender supplies the information of books, and the borrower catches it. This tache needs a positive participation and cooperation of the two sides. Then, the borrower raises the demand for book to the lender, waiting for the response. This is always done orally. After consideration, the lender admits the borrower's request, picks the book and hands it to the borrower, which ends the books carrying process. At this moment, the lender has memorized all the information in mind, or a receipt for a loan can also be used. When the borrower returns the book to the lender, the lender deletes the information in mind, or expires the receipt.

From the above depiction, we are able to divide the whole course of books borrowing into seven steps generally: (Chart 1)

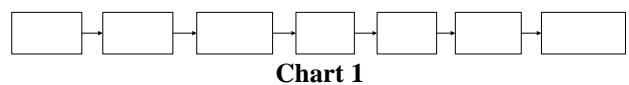


Chart 1

Here is a figure of the books borrowing process between two persons. (chart 2)

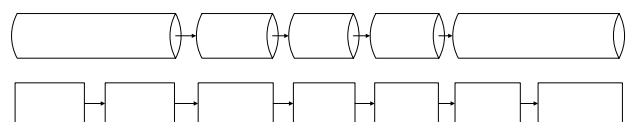


Chart 2

From the above chart, we can see that the whole process is shared by the borrower and lender. On account of the small quantity of books- throughputs and participants, there's no need to divide any sectors, and the division of labor and the process here are rather simple. In the following, let's take the case of library as an example, and analyze how the division of labor and the business process change when the throughputs grow bigger.

#### 4.2 The books borrowing process of library

As for the books borrowing process of library, due to the variety of sizes, storages, throughputs, etc, the organizational structure and division of labor of different libraries vary, and the corresponding books borrowing process is being adapted and improved. In the following, we'll make an analysis of the corresponding adaptation of division and process as the throughputs are getting bigger and bigger.

#### 4.2.1 The analysis on the books borrowing process of Beijing Jiaotong University's Library

Beijing Jiaotong University's Library covers an area of 12065 square meters, and has a collection of over one million books, including over 3500 types of publications home and abroad, and forty thousand internal documents , special type literature and non-book documents. It has a faculty of 70 persons, who serve the ten thousand readers of the whole university. Due to the reality, the library has a division of Office, Acquisition and Cataloging department, Circulation department, Reading department, Information consultation department, and Literature research department. How do these departments come into being and cooperate to serve the readers?

As a university library , the collection of it is so rich that it's impossible for one or only several persons to fulfill the task of collecting and cataloging all the materials. So , Acquisition and Cataloging department, with now a faculty of 12 ,is set up, which is one of the fundamental sectors, and also the headstream of the library's operation. Here, the Acquisition and Cataloging department, which acts as the information supplier, selects and catalogs the materials, makes sorted record cards or inputs the information into the computer ( computer local net based on Dancheng DT-1000). The readers can search for the needed book's information through either the cards or the local net.

When the readers get the information of the books, they will go to the Circulation department for the books. The service manner of this department is open-shelf. The Circulation department of Beijing Jiaotong University's Library is made up of open-shelf hall, where the readers can select the books ,and service counter, where the borrow-and-return procedures are carried out.

The borrower gets to the entrance of the open-shelf hall and hands the library card to the librarian for the replacing board, which in fact means raising the demand for borrowing books. After the validation of identity, the librarian admits the reader's entrance into the hall. The library has a collection of more than one million ,and the throughputs of readers everyday are up to 700 persons. So , it's impossible for the librarians to carry books for each reader. In this case, within the effective supervision, the borrowers are permitted to fetch the books by themselves in the hall. At the entrance, after the librarians scan the information into the library cards, the borrowers can then leave with the books. And when the readers return the books, a similar scan on the card will be made to affirm the return.

The above process can be illustrated by the following chart. (Chart 3 )

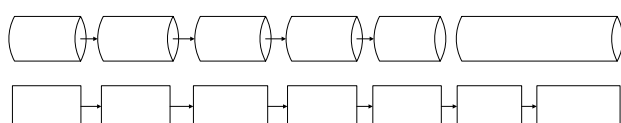


Chart 3

Compared with the activity between two persons, here at the library, as the increase of the readers and books, the division of labor between borrower and lender has been adjusted: the task of "books carrying" is passed over to the borrower within the effective supervision, which has offered more efficiency and convenience. At the same time , in order to meet the big demand of the readers on campus and deal with the complicated information more efficiently, it's necessary for the library, as the borrower, to specify the division of labor, which means to set up some specialized sectors as Acquisition and cataloging department for "information supply" , and Circulation department for "request admission", "books hand-over " and "books return".

#### 4.2.2 The analysis and comparison on the books borrowing process of National Library of China

As to different amounts of throughputs, how do the division of labor and process of National Library of China differ from those of Beijing Jiaotong University's Library? Let's make an analysis of the two reforms of its books borrowing process.

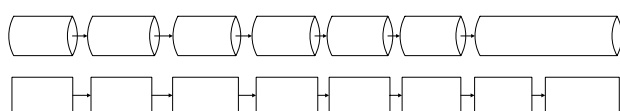
##### 4.2.2.1 The comparison of the two books borrowing processes of National Library

The Library has the total floor area of 170,000 square meters, ranking first in the national libraries in Asia, and fourth in those of the world. It is a comprehensive research library, a national repository of the home publications, a national bibliographic center, a national center of library information networks, and the library research and development center. The Library serves for central legislature, government, key research institutions, academy, education, business and the general public. The Library has a rich collection of 22,400,000 volumes, ranking fifth in the libraries of the world. In the collection there are 270,000 volumes of rare books; 1,600,000 volumes of general ancient books; 35,000 pieces of the scripted turtle shells and animal bones. The Library opens to the public 365 day a year and its on-line services are available 24 hours a day via its linkage with various multimedia networks and on Internet. It offers a reception of 7000-8000 everyday, and the daily books throughputs are up to over ten thousand. Due to the huge size, also the rich collection and large throughputs, for better management, the library furthered its division into more specialized sectors, including both of the main operation sectors, such as Acquisition & Cataloging Department, Stack Management & Reading Service Dept, Rare Book Department, Information Service Center, etc, and management sectors, such as human resource section, finance section, office, international section, security sections, etc.

Similar to the Beijing Jiaotong University's library, Acquisition & Cataloging Department acts as the information supplier. With the improvement and popularity of information technology, the Library has introduced computer into daily work. The faculty of

Acquisition & Cataloging Department input the information on books into computer, and store it in the database to show the states of the books. And the reader can enter the local net and search for the information about the books. Then, the reader fills in the book sheet and hands it to the librarian to raise the demand for the books. The librarian inputs the information into the online database to notify the faculty who work in the place where the books are stored. As the collection of books is so rich and the throughputs are so big, for the safety of books, the readers are forbidden to enter the open-shelf hall themselves to fetch books, because it's beyond effective supervision and control of the Library. At the same time, it's impossible for the librarians at the counter to fetch books for each of the readers because of the limitation of faculty number and working intensity. To solve this problem, a special sector was set up to carry books. The faculty where the books are stored receive the demand from the counter through online database, and send the demanded books through mechanic convey belt to the counter. In this way, the working efficiency is promoted and the valuable time and human resource is saved, and the security of books is guaranteed.

The above process can be illustrated by the following chart. (Chart 4)



**Chart 4**

From the above we can see that this process differs from that of Beijing Jiaotong University's Library in two main points. First, on account of the large market size and the immense throughputs, the library furthered its division of labor, and established a specialized sector for books carrying, which ensured the safety of books and elevate the efficiency. Second, a sector for "passing message" was set up to connect the "request admission" sector and "books hand-over" sector. It is noted here that the process took advantage of the automation technique (two examples: mechanic convey belt for books carrying, local net for passing information). All these help to save time and resources, and meet the demand of readers better.

However, these measures are only some kind of automation on the original system, going by the former division style and process mode. It's only an improvement on the traditional process, saving some time by technical skills. Overlooking the crucial principles in process management, it cannot help to realize the integral qualitative flit.

With the development of information technology and wider popularity of internet, the National Library introduced the updated technological outcome to the foreign language books borrowing process by utilizing a software system from Israel. Through a thorough redesign of process, it leads to more rational and effective division and process, which embody high profits and high return.

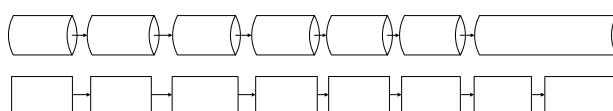
The following is the depiction of the foreign language

books borrowing process.

With the support of information technology, the faculty of Acquisition & Cataloging Department dispose and offer the information of books by making ferret system on internet. The readers can log in the Library's website anytime and anywhere to search for the needed books information. All that a reader needs to do is clicking the names of the books, making a reservation "request" and clicking "confirmation".

In this way, the moment the readers confirm the information of books, the demand request has been submitted to the Library. Then, the readers get to the counter for the prepared books which are conveyed by the mechanic convey belt, and after the validation of identity, the readers may get away with the books.

The above process can be illustrated by the following chart. (Chart 5)



**Chart 5**

Compared with the former books borrowing process, the information supplier is still Acquisition & Cataloging Department. But here, it has put all the information of books on the internet database for the readers to share anytime or anywhere with the support of information service sector. "Request for borrowing" and "request permission" can be finished in seconds by the readers themselves anywhere after the "information seek", instead of getting to library's counter in person for the faculty's help. When the readers' request for books is submitted on internet, it immediately reaches the "books carrying" sector, where the faculty can easily keep up with the readers' demand through online database, with no need for the information convey by the faculty at counter. This saves time and human resource effectively, and helps to avoid the possibility of error. "Books carrying" here is taken on by the lender. Since the first four steps have been finished by the borrower on internet, so, when the borrower comes to the counter, the faculty have already got the book ready for the borrower, which is also on account of the relative small number and high value of the foreign books. When the record is made by computer, the borrower may leave with the books. On return, the record is deleted by computer, which saves time and offers convenience.

Through the above analysis and comparison, we may see that, with the continual increase of throughputs, the efficiency of the Library's past division and process has been far behind the development of Library and failed to meet the demand of readers, which has caused a waste on resources.

With the support of advanced technology, in order to fulfill the task effectively and ensure the high efficient operation of the activity, the functions between the readers and the Library, also the division of the Library's internal sectors have all been continually adjusted: the activity

shared only by several persons formerly has been organized by further specialized posts and divisions; the task that belongs to either of the lender or the borrower has been creatively transferred to the other side, taking great advantage of information technology; meanwhile, according to the reality, certain procedures have been either combined or deleted, and the process has been redesigned to make use of the resources to the most degree.

How does the foreign language books borrowing process of the National Library of China realize a successful reengineering? In my point of view, it is mainly focused on the following four principles:

Firstly, to “have those who use the output of the process perform the process”. With the development of Library and the increase of the books collection, throughouts of the readers and books, the former service condition cannot meet the increasing demand, and a simple augment of faculty will not solve the problem virtually. With the support of information technology, the readers can log in at the National Library’s website and reserve the interested books. As the people who use the output, they themselves perform the process of “information seek”, “request for borrowing” and “request admission” in a very short time, which simplifies the process, saves time and offers much convenience to the readers. As for the Library, it saves human resource, saves the working space for faculty and waiting space prepared for the readers, and the frictions between original working interfaces (the readers and the faculty, the faculty themselves, the administrators and the staff) can be more effectively avoided, which results in cutting down the management costs and winning the credits as immaterial assets. The most importantly, the working efficiency is promoted, and the resource setup efficiency is optimized.

Secondly, to “treat geographically dispersed resources as though they were centralized”. The Library has the total floor area of 170,000 square meters, with 19 floors above ground and 3 floors under ground. The Library has 38 reading rooms, and a rich collection of 22,400,000 volumes, ranking fifth in the libraries of the world. With such a huge collection in such a huge area, it’s not easy for both the internal management and the external service. With the help of database, tele-net and information distribution management system, all the information of books collection was put into database, and embodied in the instant tele-net and information distribution management system. For both readers and librarians, they can get the detailed information and states of books easily and precisely. It not only keeps the scale benefit of the library, but also offers flexible and exact service for the customers.

Thirdly, to “subsume information-processing work into the real work that produces the information”. There are mainly two ways today to solve the problems of delay or error during the information convey: one is to improve the speed and quality of information convey with the popularity of computer and internet; the other is to optimize the linking ways between the information

production and convey by reengineering the process. The National Library of China just combines these two ways into the books borrowing process reengineering, and not only saves time and resource, but also ensures the exactness and opportuneness of information.

When the readers finish making the reservation for books, the library admits their requests meanwhile. In this way, as the information producer, the readers process the information the moment it is produced. It not only avoids the possible delay or mistake during the convey of message, but also improves the efficiency and convenience. Processing the information where it is produced means service in time, and the process efficiency is greatly improved, which certainly satisfies the customers. At the same time, to ensure the reliability and authenticity of the information, a set of measures are carried out, such as validation of identity, penalty on the readers who delay or fail to fetch the reserved books.

Fourthly, to “capture information once and at the source”. This is embodied in the following three cases:

First, the management of documents. In the past, the information about books was managed by the Acquisition & Cataloging Department in paper, and the faculty in other sectors had to ask them for information. The information was disposed by many times according to different needs, which wasted a great deal of time and energy, not ensuring the veracity of information. At the utilization of online database and internet technology, the information about books is input into the online database at one time and being adjusted according to the reality, showing the updated and truest states of books. In this way, both the borrowers far away and the faculty inside the library can acquire the needed information and take advantage of it.

Another one is the utilization in the books hand-over and return. In the past, the information of books borrowing and return was captured many times by the readers and the librarians, which caused many man-made mistakes and a waste of time. In the new process, when the borrower succeeds in submitting the request on line, the personal record has been input into the database. When the borrower comes to fetch or return the books, the librarian may output the borrower’s record from the database immediately, and handles it easily. This simplified process not only saves time and resource, but also ensures the veracity of information.

The third case is the convey of books information. In the past, the librarian input the information on the book sheet which had been filled out by the borrower himself into the computer to notify the “books carrying” department. In this way, the information was disposed twice, which easily caused mistakes and wasted time and costs. The obvious reason is that it didn’t obey the principle of “capture information once and at the source”. While today, the manner of “request convey” has greatly changed. When the borrower submits the reservation request on line, the faculty at “books carrying” department immediately know about the information about the needed books, and send them to the counter by

the convey belt in no time, with no need for the counter to notify them. This not only reduces the errors, but also promotes the efficiency and cuts the costs. And the most above all is that it really offers convenience for the borrowers to log in for books any time and anywhere.

#### 4.2.2.2 The existing problems that need to be improved

Although the process reengineering here is effective, there are still some problems in practice:

For example, there's a blind point of internet ferret on books state. Because the actual software system can only memorize whether the books are carried out of the library, not whether they are on the shelves, ignoring the case that the books may be taken to the reading room by the readers. This brings on the incoincidence of states caused by the off-shelf browse. So, it always happens that the readers get to the library for the reserved books, but the books are not prepared. Then, is it possible for us to find out the storage of books for outward borrowing the moment we submit the reservation information on internet by strengthening of technology?

Another example is the problem caused by the lack of logistics for books. It's quite convenient and time-saving for the readers to log in the Library's ferret system and reserve the needed books anytime and anywhere, but the point is that the readers have to get to the Library in person for the books, which really adds a lot of inconvenience of books hand-over. This has raised another problem on the perfection of books borrowing process: Is it necessary to supplement a tache of "books borrowing logistics" which matches with the "online books reservation"?

In my point of view, only by rigorous scientific demonstration in consideration with the feasibility in technology and economy, the applicability in environments, and the matchness of the actual resources, can these kinds of problems be settled step by step.

## 5. Conclusion

From the above all we can see that, in economics, the Adam Smith's theory of division of labor illustrates the affiliation between division of labor and the extent of

market, emphasizes that division brings efficiency, but ignores the importance of technology development in the changes of process as powerful tools and manners, and its driving force on the division and process change; in management, the information technology and administration ideas are creatively utilized, and the idea of process management, organization and human, also the impacts of information technology on organization are focused on, but the decisive significance of market extent and throughouts on division of labor and process is ignored. The author here, by this simple example of books borrowing, attempts to explain this administration issue by the combination of administration and economics knowledge. It means a great deal not only to corporations, but also to any organizations' division of labor and business process.

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