Research on Library Data Management Reform

Discussion on McKinsey 7S System Thinking Model

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Abstract—**The arrival of the era of big data, making the "data" becomes a key point of library restructuring, but also making the digital library construction faced with big challenge. With the impact of big data technical, and the drive of user requirement, it achieves data library services paradigm transformation has become a trend. This article introduces the McKinsey 7S management model into the field of library data management and services, and analyzes it from seven aspects: strategy, structure, system, style, staff, skills, and Shared Values.The purpose is to raise the level of libraries in responding to the trend of data management changes, and to help the development of the library.**

Keywords-mckinsey 7S model; data library; data management revolution; data service

I. INTRODUCTION

McKinsey & Company was founded in the United States by James O'McKinsey in 1926, and he also ushered in a new era of modern management consulting. McKinsey & Company has now become the world's most famous management consulting company. The 7S model is a well-known management theory designed by McKinsey Management Consulting Company in the United States in the late 1970s. The 7S system thinking model believes that no organization can be a structural form, but consists of Strategy, Structure, System, Style, Staff, Skills, and Shared Values composed of Multi-dimensional system. Because the first letter of the English words of these 7 elements is S, it is called "7S model" for short. The specific structure is shown in "Fig. 1" [1].
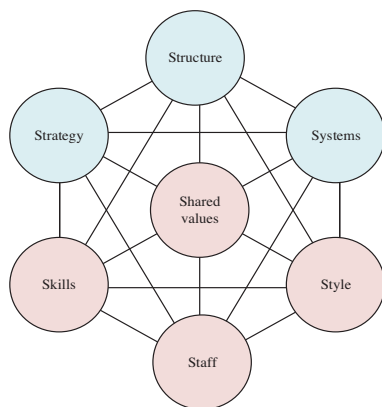

Figure 1. McKinsey 7S system thinking model

The 7-S model invented by McKinsey & Company is a well-known model for systematic thinking research. The model is based on the theory that for an organization to perform well, these seven elements must be coordinated and mutually reinforcing. Therefore, the model can be used to help determine what needs to be retuned to improve organizational performance [2]. In this model, the "Shared values" is the "soul" and "core" of the organization, which involves the value orientation of the entire organization; "strategy" is the overall organization's development goals, development strategies, and approaches according to the internal and external environment and existing resources. Planning is the concentrated expression of organizational philosophy; "structure" and "System" are the structural form and institutional design of the organization, and serve the overall "strategy" of the organization; "style", "Staff", and "Skills" refer to the organization's Leadership, management style, human resource allocation, skills and corresponding technical allocation. Among them, "strategy", "structure" and "System" are considered as "hardware elements" of organizational success, and "style", "Staff", "Skills" and "Shared Values" are considered as "software elements" of organizational success . Only when "hardware" and "software" are harmoniously unified and mutually promoted, can the organizational system release the best functions.

Since the 1980s, the McKinsey 7S model has been used by western developed countries' business departments and government agencies to analyze organizational changes and development, and has become an effective tool for diagnosing organizational problems, changing organizational mechanisms, and innovating organizational paradigms.

The model analysis method has also been applied in the areas of improving the leadership skills of library managers ; the construction of talent teams in universities; and scientific research management.

With the increase of library data in recent years, data librarians and paperless libraries have emerged accordingly. The management and in-depth mining of library data provide readers with deeper and more targeted services. It is the top priority of the library. In response to the era requirements for the further transformation of library functions, this article uses McKinsey 7S management model to comprehensively analyze the current situation of library data management. Provide some references for libraries to improve their data management capabilities.

II. Status of Library Data Management

A. Library Data

The library as a whole includes the following data:

1) Reader data. Under the new environment, the library has a large amount of rich reader data, such as readers' personal information data when registering for personal libraries and mobile libraries, readers' usage data when browsing library websites or searching and downloading digital resources, and readers' reference, or use the network trace data in library social media, etc. By mining and analyzing these data, you can grasp the characteristics of readers such as age, gender, education distribution, reading habits, resource requirements, information behavior, etc..

2) Librarian data. Librarians are the managers of library resources and the main providers of library services. Librarians are the core elements of library management. By mining the librarian data, you can get the librarian's age, gender, education, profession, expertise, personal hobbies and other information. The fate of library business is in the hands of librarians, and their overall quality has largely determined the level and quality of library knowledge management.

3) Collection and database data. The library has a large collection of paper resources and electronic database resources, which is the basis for the library to provide services.

4) The spatial data. Mainly refers to the physical service space, virtual service space data of the library, and the relative spatial data of various resource entities and virtual matches.

5) Service data. Mainly refers to various types of data resources related to library services, such as basic reading, consulting services, subject services, reading promotion, and information services.

6) Other data. Library website and related data, some libraries may also have access control system data, monitoring system data, etc. If it is various libraries and their related alliances, there can be more common knowledge and co-construction and sharing of data. If you want to go further, the library will also have a lot of data of various sizes and types.

B. Problems in Library Data Management

In the face of the above data, looking at the data management and services of the library, there are currently two ways of thinking, big data and small data. Based on the thinking of big data, it is mainly aimed at establishing various risk models for knowledge services and business construction, library user churn analysis and value analysis, helping libraries to build new knowledge service engines, analyzing possible resource failures by analyzing the status of resources, Help to establish a more intelligent networked information resource intelligent combination method, intelligent analysis of multi-dimensional big data, and intelligent auxiliary decision-making [3]. The thinking based on small data is mainly for user-oriented personalized services and personalized recommendations, including personalized subject services, mobile services, and maker

services. From the perspective of library data management and analysis applications, the current research mainly focuses on system platform construction, data support decision-making, reader services, and scientific data services. However, the current practice is relatively simple. Some research is still in its infancy, and there are still misunderstandings, which has led to the lack of attention to library data management and confusion in data management. At the same time, there are problems such as inconsistent standards and low standardization, which leads to weak data consistency and compatibility, data cannot be fully shared. And in the face of current data management changes, the library still has a series of problems such as personnel, technology, and equipment. In this situation, some libraries have undergone transformation and innovation. For example, the Nanyang Technological University Library in Singapore has established an digital repository (DR-NTU) and launched some data management services based on the data life cycle. There are still insufficient researches on the model, and the practice of library transformation is still in the exploration stage[4]. How the library needs to change, changes in those areas, and an in-depth study and discussion.

III. The Changes of Library Data Management under the McKinsey 7S Model

According to the differences between "software elements" and "hardware elements" in the McKinsey 7S model, the current situation of library data management can be divided into two parts: hardware reform and software reform.

A. Hardware Changes

1) Strategy change: data library

In recent years, digital libraries that use digital technology to process and store various books and documents have made positive contributions in bridging the information gap, accelerating information transfer, and promoting resource sharing. With the establishment of the local digital library project, the digital library has ushered in a period of rapid development. However, with the advent of the era of big data and the increasing emphasis on the value and application of data by the entire society, coupled with the upsurge of open access and artificial intelligence research in the publishing and information industries, the development of digital libraries is facing great challenge. The transformation of the data library service paradigm from the digital library in the information age to the data library service paradigm will be the end result driven by the current social needs and user needs. The arrival of the big data era has driven the transformation and development of digital libraries. Data library as the future form of digital library development, there must be research topics such as the formulation of interface standards, the design of data storage algorithms, and the improvement of data description models.

2) Structure change: post adjustment

Some university libraries with higher service levels and more reasonable talent structures can try to set up data supervision related positions, clarify their role positioning

and job responsibilities, and provide data supervision related services. When developing data supervision services, you can learn from the experience of data supervision service models from some college libraries, and subject librarians perform the duties of data supervision positions, or set up data supervision positions to introduce data supervision professionals (data service librarians, research data experts, etc.). To take full charge of data supervision related services [5]. It can also provide different data management services and flexibly set up data management positions according to user needs.

3) System change: data service management policy

Establish a comprehensive data collection and data service management policy.

Data collection needs to follow the principles of comprehensive, truthful, accurate and timely. Structured data can be obtained directly by various functional departments of the library, while some unstructured core data and edge data cannot be directly collected, and other tools or methods need to be used for collection [6].

Establish a data service management policy,clarify the content of library data services, post settings and service content of data librarians, and provide scientific data librarians with training, support, advice, and appropriate guidelines and guidance [7].

B. Software Changes

1) Values change: data services

With the increase of quantitative analysis research, scholars' demand for digital data has become more and more common. As far as university libraries are concerned, from simple descriptive statistics to large-scale data analysis, they are increasingly becoming indispensable resources for teachers and students to learn and research, and various types of data services are increasingly welcomed by users. Many companies seized this opportunity and began to market their data products, taking data acquisition as a value-added service. For example, Knovel is digitizing some fine-grained data and providing external reference services. Nature Publishing Group has also recently supported data with online articles as a value-added product for users. While merchants use data products to provide services, many foreign university libraries are also collecting digital data, and have launched data services for teachers and students of the school [8]. At the same time, as a library for the collection, utilization, processing, and service of social information and literature, scientific data services are also worthy of attention in the era of big data based on scientific research and data intensive as the main research paradigm. Research will also be a major component of future library services [8].

2) Style change: open data

The opening of library data is an inevitable trend of library development. Deutsche Digitale Bibliothek (DDB) officially released an application program interface (API) on November 4, 2013 to provide open data services to the public. It is the first time for a library to provide open sharing of digital resources in its collection in the form of an API. The metadata of the DDB is authorized to be published in the form of a Creative Commons without any rights. Any user can use this API to run a computer program in an unlimited manner. And users can use the resources of public digital libraries to develop new internet information services on websites or mobile phones, including making full use of resources such as "German Digital Cultural Heritage". The DDB plans to organize an innovative application competition for this purpose to encourage developers and the public to make full use of the digital network resources of the library [9].However, it should be noted that the privacy protection issues in library data opening need to be controlled from the institutional level (legal, open range, etc.), technical level (data release, data encryption, access control, etc.) and ideological level to cultivate good Data open and shared environment.

3) Staff change: data librarian

With the continuous development of digital research, scientific research has begun to shift to data-intensive research. More and more scientific research institutions are facing the challenge of rapid growth of scientific data, and scientific researchers are increasingly demanding for scientific data management and sharing services. Data supervision has become one of the hot issues that libraries pay attention to and research. With the development of data supervision services, the library's demand for scientific data supervision talents is increasingly urgent, and a new type of librarian post has emerged. Service content mainly includes data resource construction and management, data support services, data literacy education and training, data consulting and data management platform maintenance, etc.

4) Skills change: data mining

In the era of big data, digital editing and semantic processing of literature resources and reference books by libraries will be the main direction of library's future work. At the same time, according to the development of the data age, libraries must also adapt to changes in objects and purposes and use data Analyze and determine readers' borrowing preferences and classifications, and make personalized service plans and related promotion strategies. Due to the influence of big data, the main business direction of the library has also changed, and it has begun to shift to data mining and data analysis. The sharing and innovation of library data and the corresponding increase in time do not really address the expansion of collection resources and service improvement. The effective way is to combine data analysis and discover the laws, discover and tap the potential value. Only the full use of data can ensure the overall improvement of the comprehensive level of the library [10].

IV. SPECIFIC MEASURES FOR THE TRANSFORMATION OF LIBRARY DATA SERVICES

In view of the above seven changes in library data management, after the data management has been strengthened, the library's data services should also have corresponding reform measures.

1) Design a comprehensive and systematic education and training system

Libraries are one of the main bearers of scientific data literacy education, and many libraries have begun to educate

and train related personnel in scientific data management awareness, knowledge, and skills. However, the library urgently needs to design a systematic and comprehensive scientific data literacy education and training system to provide corresponding scientific data literacy education according to different levels of librarians and readers.

2) Building an interactive and integrated data service platform

The data service platform is a necessary tool for scientific data services. It provides researchers with functions such as data storage, management, sharing, and dissemination. It has the characteristics of convenience, integration, interaction, good scalability, and high security. Through comprehensive and real-time collection of accurate information data such as user information data, scientific research project data, and demand data, a precise user information database is constructed to help libraries grasp the precise user demand information in real time while screening target users and key users to achieve library and user services Accurate and seamless linking.

3) Adopt a management mechanism for coordinated development of multiple parties

The data service should start from the data flow and scientific research workflow, take the library as the lead, unite relevant departments and groups, and adopt a multi-party cooperation and coordinated development management mechanism. When building a data management platform, libraries should build a data management architecture, provide a strong network infrastructure, and actively cooperate with other departments to formulate a scientific and reasonable data storage and management plan.

4) Strengthening the construction of personnel teams and organizations

The construction of personnel team and organization is the basic guarantee for the library to carry out scientific research data services. The urgent task for libraries is to strengthen the construction of data service personnel and organizations, and to cultivate and create a team of data librarians with high professional quality and strong professional ability.

V. CONCLUSION

This article uses the McKinsey 7S management model to analyze the data management changes facing libraries, and proposes corresponding measures based on this, which provides a certain idea for the data management changes facing libraries. In the new form, libraries should change their management and service models as early as possible and attach importance to the cultivation of talents so that libraries can continue to "grow". However, due to the differences in technical conditions and skill levels of various libraries, specific and in-depth research is needed on specific analysis and application.At the same time, because the seven elements are dynamic and constantly changing, changes in one element will always have an impact on other elements. This requires continuous review in each area and necessary adjustments made in a timely manner.

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