

## Digital Collection Transformation At The Library of National Cheng Kung University Taiwan: An Evaluation



## Transformasi Koleksi Digital di Perpustakaan National Cheng Kung University Taiwan: Sebuah Evaluasi

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### Abstract

**Background:** This paper evaluates digital collections and investigates digital collection transformation at National Cheng Kung University's Central Library in Taiwan. The NCKU case study highlights some issues that must be addressed, such as analyzing user information, improving library capacity and skills, developing digital resources, funding IT infrastructure development, and long-term database development for E-learning. **Purpose:** The goal of this study is to assess the readiness of the library collection center's planning for digital transformation, from the user perspective, students in particular. **Method:** qualitative descriptive research method and supported by survey data conducted by NCKU. **Result:** The findings indicate that users are ready for the library collection center's digital transformation. However, the digital library collection center necessitates more careful planning, particularly in terms of socialization. **Conclusion:** Digital library's rich digital information and digital learning materials enable users to study and research at any time and from any location, in the format of lifelong learning and personalized learning. Libraries are considered the heart of any higher education institution and play a significant role.

**Keywords:** Digital, Library, Acceptance of Technology, Transformation

### Abstrak

**Latar Belakang:** Artikel ini mengevaluasi koleksi digital dan menyelidiki transformasi koleksi digital di Perpustakaan Pusat Universitas Nasional Cheng Kung di Taiwan. Studi kasus NCKU menyoroti beberapa masalah yang harus ditangani, seperti menganalisis informasi pengguna, meningkatkan kapasitas dan keterampilan perpustakaan, mengembangkan sumber daya digital, mendanai pengembangan infrastruktur TI, dan pengembangan basis data jangka panjang untuk E-learning. **Tujuan:** Untuk menilai kesiapan perencanaan koleksi perpustakaan untuk transformasi digital, baik dari perspektif pengguna terutama mahasiswa. **Metode:** Dengan menyebarkan survei ke berbagai sumber dan responden, penelitian ini menggunakan metode penelitian deskriptif kualitatif dan didukung oleh data survei yang dilakukan oleh NCKU. **Hasil:** Temuan menunjukkan bahwa pengguna siap untuk transformasi digital pusat koleksi perpustakaan. Pusat koleksi perpustakaan digital memerlukan perencanaan yang lebih matang, terutama dalam hal sosialisasi. **Kesimpulan:** Informasi digital perpustakaan digital yang kaya dan materi pembelajaran digital memungkinkan pengguna untuk belajar dan meneliti kapan saja dan dari lokasi mana pun, dalam format pembelajaran seumur hidup dan pembelajaran yang dipersonalisasi. Perpustakaan dianggap sebagai jantung dari setiap institusi pendidikan tinggi dan memainkan peran penting.

**Kata kunci:** Koleksi Digital; Perpustakaan; Penerimaan Teknologi; Transformasi

## **I. INTRODUCTION**

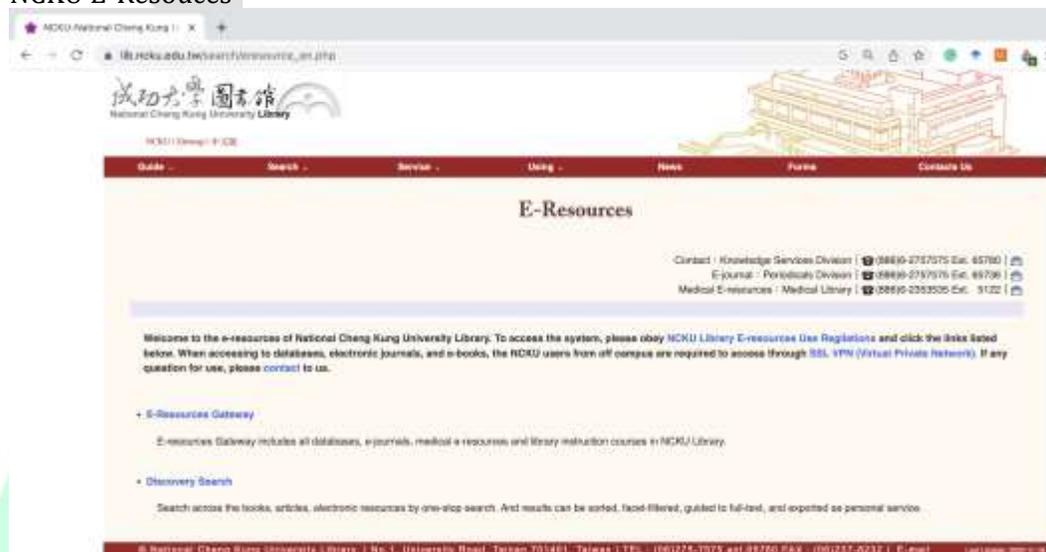
**Background.** National Cheng Kung University (NCKU) has developed a curriculum technology, supporting facilities, and infrastructure to access all-digital information. Technology has also been used in teaching and learning activities. Uploading lecture materials to academic sites, online teaching activities, and being absent from the system are some examples. Students and lecturers are accustomed to doing activities and lectures using NCKU's integrated system. Not only within the field of teaching, but each division has its own system for training support work. One of them is the NCKU library center. The library center, as a component that supports lectures, offers digital-based services and collections to the academic community. Library center web module-based digital service. Meanwhile, active users can download digital-based collections from the Library Center website. The Library Center owns a digital collection that includes books, theses, periodicals, and databases, with a preference for Mandarin books over English books.

**Problems.** As a result of the Industrial Revolution 4.0, the digital transformation trend. The global economy is expanding at a rapid pace. In 2017, a Microsoft-funded study found that 85 percent of In 2017, Asia Pacific organizations surveyed began their digital transformation journey (D'Agostino, Dunne, & Pieroni, 2012; Waldhauser, 2019). While the majority of this is still in the early stages of digital transformation, these organizations have seen significant gains in productivity, profit margin, cost reduction, customer loyalty, and revenue growth of up to 17% (Karr, Loh, & Wirjo, 2020; Sorescu & Schreier, 2019). By 2021, 60 percent of Asia Pacific will have GDP will be generated by digital products or services produced through digital transformation. Digital transformation will contribute 0.8 percent of the region's GDP, or \$1.16 trillion, over the same time period (Lukonga, 2020; Niode, 2019; Xiarewana & Civelek, 2020). The challenges, faced by National Cheng Kung University Library is concerning virtual libraries comprise: statistics accuracy, compatibility of hardware/software, reliability of Information, information security, honest use, the comfort of usage, desires technology, cost, garage life/shelf life, virtual reading, and garage gadgets ought to be omnipresent, conversion of traditionally published substances into virtual form, want of hardware and software (Kusuma, 2022). The Library of Congress listed many obstacles to creating a successful digital library, including finding resources, developing digital collections, managing digital libraries, and copyright and licensing.

**Previous Literature Review.** Many significant achievements in the field of digital transformation have been made in Taiwan in order to build a digital economy, digital community, and digital society (Jhang, 2020; McKee & Gerace, 2018; Nelson, 2020). The explosive growth of information and communication technology (ICT) accelerates the transition to a knowledge-based economy, has a profound impact on university training processes, and poses new challenges for universities, students, and faculty (Lin, 2020). The benefits and opportunities that digital university models bring to higher education institutions have confirmed their development in the higher education system. The unavoidable trend as digital transformation advances rapidly throughout the world in all fields, where education is a priority sector due to its direct relationship to human resource training. Furthermore, the COVID-19 pandemic has dragged on for a long time, affecting the university and encouraging them to accelerate the digital transformation process, remote

training, and online training (e-learning). In essence, the digital university development trend is a digital transformation process at various levels (see figure 1).

**Figure 1**  
NCKU E-Resources



Source: [https://www.lib.ncku.edu.tw/search/eresource\\_en.php](https://www.lib.ncku.edu.tw/search/eresource_en.php)

It presents some findings from previous research on user perceptions of the plan. These findings include some students' preferences for collections that can be accessed online, both on and off-campus (Lo, 2021). Furthermore, some lecturers prefer digital collections that are accessible from anywhere (Lassere & Whyte, 2021; Nurhayati, 2018). Despite the fact that most users prefer online access, there are some who prefer printed collections. Some users complain about switching to digital access textbooks because a large number of pages is difficult for the eyes (Pambayun, 2021; Lo, 2021; Tubulingane, 2021). Others have reported that they are unable to take notes in digital access textbooks, despite the fact that the app used to read it includes a sticky note (Adejo & Babatude, 2021; Heriyanto, 2020; Lo, 2021; Randles, Richardson, & Miller, 2021). With the crisis, digital collections have become an important part of today's college libraries. Many college libraries are now beginning to offer this collection format as a service as a means of adapting to changes in the behavior of users who use more online media. Despite the demands of rapid technological change, libraries continue to thrive (Rizal & Rodin, 2021; Zakaria & Dede, 2022). Higher education institutions must also consider the actual needs of their students. Many studies have been conducted to determine the needs and knowledge of users in the digital library collections (Villanueva & Shiri, 2021). Some findings of the research on the evaluation of digital libraries are taken into account by the user (Grammenis & Mourikis, 2020). These factors include good collection quality, metadata accuracy and consistency, face-to-face design of applications, systems, and technologies that are easy to understand, effects on user research and learning productivity, services, user engagement, and context (information ethics, copyright, and information sharing) (Lassere & Whyte, 2021; Lewis, 2019; Tubulingane, 2021).

**State of The Art.** Other studies reveal a need for user awareness of digital collections as well as the existence of socialization by the library constructing infrastructure (Nazir, 2015). The importance of information technology in providing digital collections in libraries cannot be overstated. According to the evaluation results, digital collections in libraries are inextricably linked to user acceptance of the technology itself. (Lund & Long, 2022; Villanueva & Shiri, 2021) discovered that technology acceptance is dependent on the user's ability to use digital collections and services in the library. Their findings also revealed that, while many users were indicated to have the ability, not all of them are confident in their ability to operate existing information technology facilities. Readers' attention is also a finding in his research (Grammenis & Mourikis, 2020; Lewis, 2019; Nazir, 2015; Rizal & Rodin, 2021). Many users are unconcerned about the digital collection in their library and are unaware of its existence (Randles et al., 2021). Considering the development of specific initiatives pertaining to the digitization of the library's collections, there is a need to assess its cultural background and context in order to aid both librarians and users (Heriyanto, 2020). This culture may emerge as a result of the collection's use evaluation. Indeed, digitalization opens up a wide range of new possibilities for evaluating document selection, as well as checking an editorial product that is constantly updated and particularly diverse in its new technological information. Therefore, this research will focus only for Digital Collection Transformation At The Library of National Cheng Kung University Taiwan.

**Purpose.** Based on the description above, the authors are interested in investigating the evaluation of users' which are students that use of the NCKU library center's electronic collection thus far. Aside from research. This research also seeks to identify the technology that enables digital transformation.

## **II. METHODS**

This study employs a qualitative research design. The overarching goal and central premise of this method of research are that utilized to comprehend how individuals perceive the world. Although there are numerous ways to qualitative research, most of them are adaptable and put a strong emphasis on preserving rich meaning when analyzing the data (Sarwono, 2006). This study employs secondary data from the library in its quantitative analysis. The secondary data in this research is the data that publish by a library on the official website. Then, The qualitative study employs in-depth interviews with several international masters and Ph.D. students. In this kind of interview, the interviewer is free to choose the formats and strategies for answering questions, as well as the autonomy to express his own viewpoint and objectives. The main goal of what is known as a focused interview is to limit the respondent to an argument or issue that he wishes to debate on. Such interviews are frequently undertaken in the process of developing hypotheses and constitute a larger category of shapeless interviews.

Qualitative research techniques are made to assist understand how a target audience behaves and thinks about a particular subject. Numerous qualitative research techniques, including in-depth interviews (Aveling *et, al*, 2015). The results from qualitative methods are more descriptive, and inferences may be made from the collected data relatively simply.

It was the social and behavioral sciences that first developed qualitative research techniques. Our environment is more complex now, making it challenging to comprehend

how people think and view the world. That is easier to grasp because qualitative research methodologies are more conversational and descriptive. Data analysis techniques through data collection, data reduction, data presentation, data analysis and triangulation, and drawing conclusions to test the validity of the data and find objective findings.

**III. RESULTS**

Results from the first phase of the study show that make substantial use of digital resources. Informational resources on the open Web as well as items in digital libraries are included in the concept of digital resources. However, a provenance-based analysis of resources reveals that the majority of visual content may be found on the public Web. For articles and books, students and professors use the college library websites, but they largely rely on Google sometimes. Even with the abundance of maps and images used in both classrooms, there is still little usage of digital libraries as learning aids. The majority of the visual materials that students use in class come from online sources.

**Table 1.**  
Evaluation of the NCKU Library Center's use of digital collections

No	Indicator	Percentage
<b>1</b>	The method used	
	a. Reading the printed collection	28%
	b. Borrow a printed collection	12%
	c. Access electronic collection	33%
	d. All three	21%
<b>2</b>	Frequency of using the digital collection	
	a. Every day	10%
	b. Once a week	30%
	c. Once a month	22%
	d. Once a year	17%
	e. Other	21%
<b>3</b>	Knowledge of digital collection	
	a. E-books	55%
	b. Electronic periodicals (journals, newspapers, and magazines)	38%
	c. Electronic thesis	22%
<b>4</b>	Use of digital collections	
	a. E-books	32%
	b. Electronic periodicals (journals, newspapers, and magazines)	57%
	c. Electronic thesis and thesis	11%

Source: Data from NCKU library survey, a process by the author (2020).

Based on the results of the survey above, it can be seen that international students, both master's and Ph.D., use access to electronic collection more often, which is 33%. Although the demand for access through digital is quite a lot, the frequency of digital collection usage is the most widely used, which is once a week, which is still as much as 30%. Knowledge of digital collections such as digital books is in great demand by students, as much as 55%, while journals, newspapers, and magazines are 38%, and the rest is the electronic thesis,

which is 22%. Meanwhile, the most widely used digital collections are journals, newspapers, and magazines as much as 57%, while e-books are still below it, which is only 32%.

Not only the results of the survey, several interviews were also conducted. Based on the results of interviews with several informants, some said that the appearance of the NCKU library's website was good because there were many features that could be used by both local and international students, and some informants said that the size of the university's library website was complete; However, there were also some informants who said that the appearance of the NCKU website was not good because in terms of coloring it still seemed stiff and pale, and boring, generally with more text than animation. However, most of the respondents said that the appearance of the NCKU website is still not attractive for those provided in English, as said by one of the informants:

*"In my opinion, the NCKU web library looks unattractive, the display presented looks ordinary without anything interesting, and the information that is often not up to date makes this website, not the main choice for international students to visit. People will be more interested if the first appearance (first impression) when opening the web is how it looks if display is made in full color and packaged as attractively as possible then people will be more interested in opening this web again because the first impression/sight seen by the eye will greatly affect the paradigm, somebody." (Nguyen, June 26<sup>th</sup>, 2022).*

Digital materials are underutilized and unexplored. Given the extensive use of visual materials in the classroom for both teaching and learning, this finding stands out in particular. Moreover, there are various parts to the digital library. Technology is needed in the digital library to connect the resources of many. Users are able to see the connections between the various digital libraries and information services. The goal is to make digital libraries and information services available to everyone. Also, digital library collections include digital artifacts that cannot be represented or distributed in printed formats, in addition to document substitutes.

## **DISCUSSION**

**An Evaluation of the NCKU Library Center's use of digital collections.** Digital transformation is a necessity that forces us to adopt new applications and challenges in our daily lives. Academic libraries are part of this procedure because they have proven to be pioneers in adopting and utilizing new developments in ICT and digital formats, as well as providing users with a full library service, which according to Renick (2019) is a fairly broad definition that includes library materials. The data that got from library website, the respondents' knowledge of various digital library center collections varies. Students can access digital collections, which are mostly used by international students in the form of journals and e-books. Some factors considered for student convenience in accessing digital collections at the NCKU library center include an electronic collection that is simple to use, simple internet access, also there is socialization once a month (NCKU Library Survey, 2020). According to Roes (2011), digital libraries are accepted as a supplement to electronic learning arrangements and are progressively becoming a part of the academic learning community. This is so because a wide range of interests related to digital libraries has been identified, including bringing information to users, enhancing search, collaboration, and sharing, and significantly lowering the issue of the digital divide.

There are no universally accepted definitions or approaches to library evaluation, strategies, or practices. Each evaluative approach provides potential information based on data collected specifically to a particular focus area within a library. Library evaluation activities can be complex, involving a variety of factors at various stages of the process. However, in general, library evaluation focuses on three key components which are 1) inputs are the resources that libraries invest in (e.g., money, staff, workstations, online commercial databases); 2) activities are the library services/resources that the inputs generate (e.g., licensed resource availability, story hours, training sessions); and 3) outputs are the quantity of assistance generated from library investments (e.g., number of workstations, number of databases licensed, print material purchased, number of training sessions) (Adejo & Babatude, 2021; Heriyanto, 2020; Lewis, 2019; Lund & Long, 2022; Rizal & Rodin, 2021; Tubulingane, 2021). According to the library center's reports, they have no trouble finding literature using digital collections. However, it is regrettable that the collection that uses English is still insufficient.

**Digital Transformation of Collections at the NCKU Library Center.** Since the early 1990s, digital technology has irreversibly altered print and audio-visual media consumption, drastically altered shopping and consumer habits, and reshaped the landscape of interpersonal communication (Grammenis & Mourikis, 2020). The way people consume the internet is constantly changing, according to an interviewee at NCKU's PhD student:

*"A well digital library platform ought to be capable of responding to the current digital consumption trends, providing the services which not only exemplifies but anticipate future the needs of our internet users." (Nur, June, 28<sup>th</sup>, 2022)*

According to students, their online service provides various types of online search, online account management, and access to electronic materials. However, some authorities identified online registration as a major flaw because most libraries still require users to visit the library in its entirety before the account is fully active, even for access to electronic content. Only 14 of the libraries surveyed currently offer complete online registration with no need for a physical visit. Digital information resources include digital documents and digital collections databases developed by NCKU (bibliographic database: over 70,000 records and full-text database: over 15,000 records) and databases ordered by projects or through Union Libraries (ScienceDirect Database, ProQuest Central Database, Ebrary Academic Complete, CD, floppy disk including 22,000 records on 13,000 discs). The NCKU endogenous sources Database currently has three components: electronic lectures and doctoral and master theses organized by specialty. When compared to the traditional section, the NCKU library's digital resources are sufficient in quantity and type.

Digitizing documents and creating digital collections is the best option for preserving rare original documents for the long-term (Grammenis & Mourikis, 2020). Since a digital library is essentially a repository of digital, structured information for easy access via a computer network or telecommunications network, the core of a digital library is a digital repository or digital collection (Nazir, 2015; Nurhayati, 2018; Zakaria & Dede, 2022). Taiwan, the country where most universities of science and technology, has always placed a premium on the quality of its education and scientific research, incorporating them as primary criteria in its operations. Departing from that goal and understanding the value of endogenous digital resources, the NCKU library has maintained a continuous digital collection of university endogenous resources for many years. NCKU has collaborated with

other universities to share Academic Resources to assist university staff, faculty, and students in making better use of other useful electronic resources. The eBook database makes use of the same ProQuest Central Common Database; NCKU is one of three university libraries that have free access to the Science Direct data base through the Ministry of Science and Technology. As said by Vu (2022) that:

*“According to my knowledge, NCKU has provided the best digital library services with many sources that can be accessed by students and NCKU is the top three campuses that can provide access to most journals in Taiwan”. (Interview with Vu, June 27<sup>th</sup>, 2022).*

The significance of sophisticated libraries in the Industry 4.0 era is the ability to meet users' information needs in basic digital and online information resources information services in a flexible manner (Adejo & Babatude, 2021; Lassere & Whyte, 2021). Following that, digital materials available on the internet can be used in educational applications, but they will not be presented in the same controlled environment as the ingredients in digital transformation. As a result, lecturers must introduce digital transformation information to focus on student activities and participation in the resource management (Grammenis & Mourikis, 2020; Nazir, 2015; Randles et al., 2021). Digital transformation hardly has a significant impact on how knowledge and creative processes are documented, collected, and shared, but it also changes and expands how they are produced (Müller, 2020).

Text is created, formatted, and structured using computers. Data generation, processing, and analysis software. The IT-based research infrastructure allows for the creation and application of new digital research methods. Have Electronic information allows for methods of processing, linking, and contextualizing that are not possible with traditional methods carrier of analog information (Ngoc, Cuong, Ngan, & Uyen, 2021; Rizal & Rodin, 2021; Villanueva & Shiri, 2021). The digital presentation of electronic media makes it available on a regional, national, and international scale. It is possible to create virtual collections based on the theme or material, which can be assembled and presented anywhere in the world, regardless of where the original is actually stored, using a standard data format for metadata and digital objects.

#### **IV. Conclusion**

The use of digital processes and tools to achieve strategic organizational goals is referred to as digital transformation in libraries. It is a complicated, multifaceted process that represents workplace changes that impact traditional library products, processes, and services. In this scenario, the Digital Library software enabled the creation of an online digital library. Digital library formation is regarded as succession and digital transformation based on traditional library development that is an unavoidable part of the digital society and the general development trend of nearby university libraries in the digital age. Digital library's rich digital information and digital learning materials enable users to study and research at any time and from any location, in the format of lifelong learning and personalized learning. Libraries are considered the heart of any higher education institution and play an especially important role. From the research conducted with case studies of the NCKU campus, they include campuses that are ready for digital transformation as seen from the survey data and interviews conducted by the author. The other hand, The NCKU case study highlights some issues that must be addressed, such as analyzing user information,

improving library capacity and skills, developing digital resources, funding IT infrastructure development, and long-term database development for E-learning. The research team also recognizes the need to conduct additional research, particularly on the quality of digital library services and the application of assessment models, in order to develop the university digital library system at NCKU in particular, and Taiwan in general.

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