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DIGITAL INNOVATION CHALLENGES: THE CASE OF AN ACADEMIC LIBRARY

Completed Research Paper

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Abstract

The push to accelerate digitalization, particularly in educational organizations like academic libraries, highlights the innovation potential. Our study shows that achieving innovation requires understanding unprecedented complexity and tensions that cannot be overlooked. We present three identified phases: (1) emergence of digital practices; (2) enforced experimentation with digital initiatives; and (3) advancing with digital resources, that depict an organization's digital innovation journey. Through the case of an academic library, we capture the depths of complexities and tensions in the three phases, where we identify two crucial aspects—work practices and co-dependence – that undergo digital innovation across these three phases. Our findings offer new insights into the complexity and tension-filled nature of digital innovation, particularly pertaining to academic libraries. Despite such challenges, these organizations undergo a transformative digital innovation process, worthy of investigating in future endeavours.

Keywords: Digital Innovation, Academic Library, Digital Transformation, Challenges.

1 Introduction

The evolution of digital technologies and their affordances have fostered unparalleled innovations, distinct from the traditional innovations of the industrial era (Lyytinen, 2021). Digital innovation has become a primary focus for almost all organizations and sectors, solidifying itself as a dominant discourse in both academia and practice. Digital innovation is defined as “the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology” (Nambisan et al. 2017, p.224). The integration of digital technologies and innovations stemming from their capabilities, has resulted in shifts in offerings and subsequent work practices (Parviainen et al., 2017). These implications are predominantly salient in the information-intensive organizations, where work practices are closely intertwined to a myriad of digital technologies. This sector is particularly susceptible to these effects due to the fundamental nature of its core value proposition: information, which inherently possesses a capacity to be entirely digital (Yoo et al., 2010). Moreover, digital innovation does not occur in isolation, but rather progresses interdependently on multi actor ecosystem, particularly highlighted by Nambisan et al. (2017) and Yoo et al. (2010).

This paper draws on a case of an Academic Library as an illustrative example of an information-intensive organization and its digital innovation journey efforts. Academic libraries have been significantly affected by digitalization (Jawi and Izhar, 2016; Adetayo, 2023). They play a pivotal role in supporting the mission of universities they are part of (Saunders, 2015), including their digital transformation efforts (Sandhu, 2018). The role of libraries is to support teachers, researchers, and students in their tasks by providing access to relevant resources (Gabbay and Shoham, 2019). The importance of digital operations of academic libraries became evident during the COVID-19 pandemic,

where access to digital resources was an imperative for the steady continuation of educational and research activities.

Digital innovation of libraries is not a recent phenomenon but has a longstanding history. Yet, recent innovations signify a radical change in the offerings, the way value is created, delivered, and ultimately consumed. To a great extent, this closely reflects the changes in the higher education systems and broader ecosystem in which academic libraries reside. Digitization which is the transformation of analog information to digital (Yoo et al., 2010) is the cornerstone of these changes, often defined by the liminality of trajectory shifts (Henfridsson and Yoo, 2014). Nevertheless, digital innovation surpasses the process of digitization of content (books and research papers). Digitization of content (books and research papers, among others) has given rise to new forms of delivery, distribution, and consumption. It has also affected the identity of a library (Indrak and Pokorna, 2021). Digital innovation of academic libraries has been gradual and to this day lacks a complete shift to digital. Majority of libraries are still reliant on print resources and capabilities, often described as being rigid to change (Lembinen, 2021).

The aim of the paper is to delve into the process of digital innovation in practice, drawing upon a Swedish academic library. It specifically aims to examine how digital innovation unfolded and how the challenges were encountered in the process. Two research questions guide this study. First, *how has the process of digital innovation unfolded in the context of Academic Libraries?*; second, *what are the challenges that Academic Libraries face in digital innovation?*

In what follows, the paper first presents an overview of the literature on digital innovation and later on positing it in the context of academic libraries. Next, we elaborate the methodology employed in the study. Afterwards, the findings highlight key insights from the collected data. The paper concludes by discussing the findings in relation to the existing literature and suggestions for future research.

2 Literature Review

2.1 Digital innovation

Recent developments in digital technologies have altered the operational landscape of organizations, reshaping how they create and capture value (Yoo et al. 2010). Digital innovation is shifting the creation, use, and offering of products and services, causing disruptions in traditional markets. By affecting nearly all sectors, digital innovation has become a central area of interest among both information systems scholars and practitioners (Urbinati et al. 2022). In a broad sense, digital innovation refers to the utilization of digital technologies in the process of innovating products, services, and business models (Nambisan et al. 2017). The literature on digital innovation provides abundant definitions of digital innovation. Some scholars focus on conceptualizing digital innovation as an outcome and some others as a process, despite the fluid boundary between the digital innovation as a process or outcome. For instance, Fichman et al. (2014, p.330) assumes an outcome-oriented approach defining digital innovation as a “product, process, or business model that is perceived as new requires some significant changes on the part of adopters and is embodied in or enabled by IT”. On the other hand, Nambisan et al. (2017, p.224) provide a process-oriented definition, characterizing digital innovation as the “creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology”. In the scope of this paper, we conceptualize digital innovation “as the co-creation of novel offerings through the recombination of digital and/or physical components” (Hukal and Henfridsson, 2017, p.361). Despite various definitions, a common thread is that digital technologies serve as enablers of these innovations.

Digital innovation is distinct from traditional innovation embodying a new innovation logic (Lyytinen, 2022) and consequently introducing new actor constellations, structures, practice, values, and beliefs (Hining et al. 2018). Operating along a multi-layered innovation trajectory, it induces changes in the material, cognitive, and organizational design layers (Svan and Henfridsson, 2012). Consequently, digital innovation challenges existing dominant logic, organizational goals, boundaries and activities (Holmstrom, 2022). The disruptive impact of digital innovation is attributed to the unique properties of

digital technologies used in the process of innovation. Notable attributes include editability (Kallinikos et al., 2013), data homogeneity (Yoo et al. 2010), self-referentiality (Yoo et al. 2010). These unique features inherent in digital technologies give rise to two highly intertwined processes crucial to digital innovation: digitization and digitalization (Hukal and Henfridsson, 2017). Digitization denotes the technical process of conversion of analog resources into a digital format (Yoo et al. 2010). This process spawns creation of novel offerings, where information e.g. books, film, music, transaction are represented in bits. These digital entities are referred to as digital objects (Faulkner and Runde, 2019) and resources. On the other hand, digitalization represents the socio-technical impact arising from the adoption and utilization of digital technologies (Yoo et al. 2010). For a detailed elaboration of the “digital x” concepts refer to Baiyere et al. (2023) and Saarikko et al. (2020) who provide an eloquent description and highlight differences between these concepts. Collectively, these features and processes provide large degree of flexibility, rendering digital innovation inherently dynamic, distributed, with no clear innovation agency (Nambisan et al. 2017). Digital innovation is interdependent and distributed in a sense that it unfolds in an emergent ecosystem consisting of heterogeneous actors from different organizations, who simultaneously govern their role and position in this ecosystem (Nambisan et al. 2017; Yoo et al., 2010). This does not only entail cooperation, but also a struggle for control and domination. This form of innovation entails a broader scope of change which extends beyond the boundaries of a single organization, blurring industry boundaries and giving rise to new market dynamics (Yoo et al. 2010).

Despite the widespread proliferation of digital technologies and the abundant innovation opportunities they render, digital innovation is inherently complex, associated with paradoxes and tensions (Svahn et al. 2017). Organizations, particularly incumbents, struggle to fully harvest the potential of digital innovation, and there are numerous examples of companies who have encountered setbacks in this endeavor. Due to the inherently new logic described above, digital innovations fall outside past experiences and practices, necessitating novel ways of organizing, work practices, new capabilities and new business models. In many cases, incumbents find themselves compelled to maintain existing non-digital practices alongside digital ones, hence introducing multidimensional complexity and tensions (Svahn et al. 2017; Kurti et al. 2021). Despite these challenges, one thing remains certain in today’s landscape: organizations across all sectors must embark on this journey in order to remain relevant, create value for customers and capture value in the evolving markets.

2.2 Digital innovation in the context of academic libraries

Academic libraries are an important institution, whose primary role is to provide support to the universities they are part of (Saunders, 2016; Lembinen, 2021). The two pillars of support include teaching and research, hence satisfying the needs of researchers, students, teachers. In providing the needed support, academic libraries engage in various activities such as acquisition and provision of print and digital materials, instructional support in information literacy, access to needed materials physically and through computerized library systems (Shoham and Klain-Gabbay, 2019). As other information intensive environments, libraries have not been immune to digitalization. Technological advancements have affected nearly all aspects of the libraries (Lembinen, 2021). This pressure forced academic libraries to innovate, often within tight budgets (Jawi and Izhar, 2016). When it comes to innovation and transformation, academic libraries are described to be quite rigid (Lembinen, 2021). Their degree of innovation is argued to be incremental, within the established dominant logic (Lembinen, 2021), implying co-existence of established work practices alongside the new digital enabled approaches (Jawi and Izhar, 2016). This way of organizing is termed a “hybrid library” (Indrak and Pokorna, 202; Kempf, 2023). Lembinen (2021) argues that academic libraries are similar to incumbent businesses, who are much invested in their traditional ways of working and operating. They operate with highly institutionalized practices who have been unchanged for years. In cases when they embark in innovation, academic libraries either “innovate too early, too late, give up too soon or hang on too long” (Lembinen, 2021 p. 921-922). It is important to emphasize that the impact of digitalization in academic libraries is not solely on the digitization of its collection, e.g. books, journals etc., but rather on the overall purpose and identity of an academic library (Indrak and Pokorna, 2021). This impact on identity is not least

expressed in the view that the” importance of the library as a physical place has decreased, while its social significance has increased” (Shoham and Klain-Gabbay, 2019 p.3) or “the traditional library building as an institution based on a physical space and focused on its collection is a thing of the past” (Kempf, 2023 p.235).

Academic libraries operate in increasingly digitalized contexts. They compete with a wide array of digital technologies which provide quick access to free information (Indrak and Pokorna, 2021). In addition, they are part of an increasingly dynamic and competitive ecosystem consisting of modern higher education institutions, publishers and suppliers, as well as the changing behavior of users, who simultaneously influence each other. Universities have adopted new modes of teaching, distance education on the side of the traditional campus, some moving fully to distance through MOOCs, which was further exacerbated by the pandemic. In addition, academic libraries are highly influenced by the changes and transformation of the publishing industry (Laifi and Josserand, 2016), which is another sector in turmoil as a result of digitalization. All these transformations as a result of adoption and pervasiveness of digital technologies have resulted in “paradigm change in scholarly publishing and knowledge dissemination” (Saarti and Tuominen, 2020, p.97). Users have adopted different behaviours and hence have developed different expectations. They expect quick access to full free materials regardless of time and space (Shoham and Gabbay, 2019). Academic libraries no longer have the monopoly as a gatekeeper to access and distribution of information (Saarti and Tuominen, 2021). Academic social networking sites (e.g. ResearchGate, Academia, LinkedIn) enable researchers to perform this task bypassing libraries.

Digital innovation of academic libraries was further exacerbated by the pandemic COVID-19, that forced academic libraries into full-scale digital operations, utilizing digital platforms for communication, collaboration and service provision at best possible way (Temiz and Salelkar, 2020). At the same time, academic libraries focused on providing clear information and instructions on their respective websites. Several studies (e.g. Baxter et al. 2021; Temiz and Salelkar, 2020) investigated the impact of the COVID-19 in the digital innovation of academic libraries in different countries, who imposed different pandemic measures. Although COVID-19 was a catalyst for digital innovation, these authors argue that libraries are still a long way from digital transformation given that many services still depend on librarians.

Introduction of mainstream technologies such as Generative Artificial Intelligence (GAI) is expected to have a profound impact on academic libraries. However, it is worth mentioning that this is not a new undertaking for academic libraries. Some libraries have introduced chatbots to provide better and efficient services (Adetayo, 2023). This way they create value for users, who want access 24 hours a day, without visiting libraries and also librarians who would focus on other types of work. Their application was mainly in providing support to reference services. Some libraries are scaling up their AI efforts. For example, according to Salian (2023), the National Library of Sweden is harnessing the potential of AI for Swedish language publications, which would support researchers with hyper-specialized datasets.

Recently, ChatGPT, released by OpenAI, is spawning significant transformations in the domain of education, especially higher education (Kajtazi et al., 2023). It has become the fastest growing with a user base over 100 million (Chen, 2023). This inevitably affects and has consequences for academic libraries. Although we could not identify scholarly work on the utilization of ChatGPT in libraries, some authors such as Adetayo (2023) and Chen (2023) discuss the potential impact of ChatGPT in libraries. Chen (2023) compares the traditional chatbots and ChatGPT and argues that the latter is significantly more powerful and has an immense potential to offer. Thus, libraries must consider it seriously. Its potential varies from simpler to more complicated tasks. It can be a virtual assistant to reference services, collection development, cataloging, provide users with suggestions on literature, provide academic libraries with suggested materials to be acquired (Chen, 2023). At the same time they must be treated with caution due to inaccuracies and different ethical challenges, which should be critically addressed by librarians. Generally, all this proliferation of digital technologies, digital resources and subsequent digitalization gives rise to new practices which challenge the existing services, skills and competences

of academic librarians (Shoham and Gabbay, 2019). Indrák and Pokorná (2021) argue that in light of digital transformation and information overload, the role of librarians should be redefined. They must be information curators, the source and decision maker in determining what is accurate information as well as guides in digital information literacy.

3 Research Approach

3.1 Research setting

Drawing on the interpretive paradigm, we conducted a study of an Academic Library (herein anonymously UL). An important rationale behind the choice is that Academic Libraries and UL particularly, represent an illustrious example of an information intensive organization that has been highly affected by digitalization. The information intensive context is helpful in understanding the immense impact of digitalization, due to the potential of information to be fully digitized (Yoo et al. 2010). This impact is vivid in all aspects of the organizational operations and activities such as information provision, organizing, and delivery. Information services and customer relations are provided more efficiently and effectively in terms of time, place, cost, speed of dissemination, etc. Due to these changes, the case also manifests digital innovation efforts which span accros multi years as well as challenges associated with the digital innovation of an incumbent sector. In addition, UL is part of a dynamic ecosystem, where multiple actors mutually influence each other, further emphasizing the impact of digitalization. UL is a part of a public university which has over 30000 students and provides in campus and distance education. The mission of the library is to provide support to education, research, and collaboration with the university. The services that UL provides range from books, scientific articles, dissertations, films, music, databases etc., in print and digital. Further, its goal is to maintain and promote collaboration at the national level of libraries. UL has over 65 employees, plus 15 students who are engaged in different activities. Activities of UL are divided into two main sections: *Learning Support* and *Media and Scholarly Publication* and groups for *Infrastructure* and *Learning Environment*. In this study we focus on the Section of Media and Scholarly Publication. The rationale is that functions and activities of this section are closely related to the aim of this study. As a result of digitization, the material collection that this section deals with has been rapidly shifting from print to digital, which has resulted in altering work practices, and in most cases adding new digital practices alongside existing ones, while at the same time showing co-dependence on a multi actor ecosystem, where libraries are heavily dependent upon. The section of Media and Scholarly Publication focuses on ensuring and providing a physical and digital access to collection of resources. This is done through purchasing, inter-library loans and various forms of subscriptions and licenses. Other activities involve ensuring the simple and smooth accessibility to collections in the library, databases and website, through metadata. In addition, the section also offers support related to scientific publications, bibliometrics, open access publishing, and publication support. Although in the organizational structure these three sections are divided, librarians often are involved in several duties in other sections. This is more obvious in the media resources and metadata.

3.2 Data collection

Data is collected from interviews and other organizational documents. The first author of this study conducted a total of 13 interviews. The first 12 interviews took place during 2015-2016, and the last one in 2022. The purpose of the follow-up interview in 2022, was to get insights from the library director on the digital developments since the last data collection in 2016. Participants included people from various hierarchical parts of the library such as top management (Library director), middle management (Head of the section of Media and Scholarly Publication) and librarians from all functions of the Media and Scholarly Publication section explained above. Interviews were semi-structured, with open-ended, explorative questions focused on capturing participants' perception of the digital innovation process of the UL, occurred changes, and their view on challenges and opportunities during the process as well as the future of the UL. Interviews lasted approximately 40 min, and they were recorded and transcribed

verbatim. In addition to interviews, different organizational documents were reviewed such as the strategy, mission and vision of UL, media plans, information from the website, and powerpoint presentations provided by participants.

The data analysis was performed by both authors and the process evolved in three stages. The first stage focused on the process of familiarizing with data, by reading the transcripts thoroughly, with the intention to identify phrases or keywords related to digital innovation efforts and challenges that UL encountered. In the analysis we remained open to the data, hence no theoretical concepts were imposed, while acknowledging the researchers' nuanced theoretical views. In the second stage, a case narrative approach was undertaken by presenting a basic temporal presentation of the digital innovation of UL characterized by three main phases in this trajectory. In the third stage, data was imported to Nvivo where we followed a bottom-up coding procedure, by starting to analyze the interviewees' responses from an open coding perspective. While we developed the open codes, several themes started to emerge naturally from the data, leading us to recognize key findings in understanding the complexities of digital innovation, which we present below.

4 Findings

Analysis identified three main phases of digital innovation trajectory in the context of UL, which we explain in the next section. We adopt the notion of innovation trajectory as "the direction and future path of human activity intended to develop new products and services" (Henfridsson and Yoo, 2013, p. 932).

4.1 Emergence of digital practice

As the first phase we identify the period in the late 90s, where the acquisition of physical books began to be conducted via the use of the Internet. This event marked the first departure from the traditional acquisition process, where the digital dimension was introduced, bringing a significant shift in how UL interacted with obtaining the requested material, and how its users acquired the printed materials. In the older days, or analog era, UL had agreements with local bookshops, geographically located close to UL, where the library would order the books. There were two such bookshops, and depending on the procurement, UL either ordered from one or the other and this changed depending on the bid they placed. These bookshops would then place orders and deliver books to UL. However, the bookshops could provide only Swedish titles. For the English books, UL had agreements with some agents, where the order was made via fax and the books would arrive with shipping services. This was described by participants to be a long process from the order to the delivery of books. One of the participants explained:

So, it took a lot of time. After that we received the books. Now an ordinary book is here in 1-2 days and e-books immediately. So that is a very big change (Librarian 1).

Utilization of digital technologies, Internet specifically, smoothed the process, since the orders were conducted online but still the delivery of books was done through mail. Nevertheless, senior participants who experienced the process claimed that the Internet simplified the transaction process and removed some middlemen, in this case, local bookshops. Librarian 1, further stated:

[...]later on, you did it yourself, you know from anyone like Bokus or Adlibris, you just ordered online [...] that was the first change. Later on, we started to buy also electronic books.

The last sentence in this quote marks the shift to the next phase in the digital innovation trajectory.

4.2 Enforced experimentation with digital initiatives

The period of time when UL began to be engaged with digital resources (e.g. journals and books) is identified as the second phase. This shift, meant that the collection of materials was no longer only

physical, but also digital. UL and their users started to naturally immerse themselves into acquiring digital materials, by the means of digital resources or “e-resources” as our participants refer to them.

This phase began around the year 2000, with the provision of e-journals first, to continue later with other resources. In the same period, the bulk of print journals at UL was large, around 12000-15000. This number has been gradually reduced, to only 100 of them now still in the print format, with the rest available only digitally. Digital books however were introduced later. According to the interviewed participants, this shift mainly stemmed from the pressure from the researchers rather than an endogenous initiative of UL, necessitating their adaptation. The move to digital would also result in cost optimization both in terms of money and time. This was explained by one participant:

I think it was mostly researchers who pushed us to change from paper to electronic because it was much...I mean for the library it was expensive and the researchers were located in different buildings ... and it was taking time to go to the library and read or copy the paper version. Or we had to send it through internal post to them and when we moved to electronic they could reach it from the office or home. So that was successful but expensive. It is still expensive (Librarian 1)

Experienced librarians who were interviewed emphasized that this phase proceeded relatively smoothly. Nevertheless, certain ambiguities arose during that period, primarily on the user side. As participants explained, users mistakenly believed that online access implied free availability of materials. They were not aware that UL paid for the subscription. This phase entailed extensive training and experimentation efforts, mainly on technical aspects and development of digital competence. This was mainly in-house training and learning, which involved some people, not all. Librarian 1 who was engaged in this process argued the following:

In the first years we did a lot of this ourselves, we had an interface URL etc. and we worked a lot so the end user can see it. That was new technological skills [...] I worked a lot with it.

As participants of the study argued, the digitization of resources brought about more profound changes, which are elaborated next.

4.3 Advancing with digital resources and services

While in the process of acquiring digital materials, a last noticeable shift into the digital innovation trajectory and the third ongoing phase, was the acquisition of e- resources in larger quantities, e.g. through database subscriptions, where users’ direct accessibility to that abundance transformed the way how UL interacted with e-resources, as well as how their users interacted with UL. The third phase can also be recognized as the most innovative and transformative, where the relationship between users and the resources were mediated by digital communication forms, such as library chats, where the face-to-face interactions with UL staff were no longer required, although the UL staff think otherwise today. Generally, the transition to digital resources has spawned significant changes and complexity in the way UL operates, not least acknowledging advancements with digitalization, yet holding onto the valuable parts that shaped their identity.

This emergence of a new logic was evident also in the media plan developed in 2012, which stated the intentions and vision of the UL management towards digitalization of the Library. This involved the move to e-resources and when possible replacing print with digital. This vision as articulated in the organizational document (Library Vision and Strategy) focused on fostering a “creative learning environment with innovative and relevant services to create, disseminate and preserve knowledge”. The university has a significant number of distance students and UL needs to make sure that to the possible extent these students who are distributed around the world have access to the course literature same as campus students. To ensure that, UL has to engage in purchasing e-books, especially course books. These can be individual titles as well as subscriptions to a collection of e-books. In relation to this, one participant states:

I think it is a good idea and especially for us [...] we have a lot of distance students [...] they can reach it at their homes. Now we have to send by post and they have to send it back to us. We do this for distance students. There are a lot of packages everyday, and that takes time and it costs money. So it is much easier if you have it online on your computer at home (Librarian 2).

Digital innovation in UL was perceived by the participants to progress slowly, especially until 2016. Despite the significant efforts towards digitalization, UL faced several challenges, which have a key role in slowing down the process.

One of the challenges that participants of this study perceived as crucial is the e-book market. That was mentioned to be a key reason why the whole digital innovation journey is hard and lengthy. UL operates as a mediator between users, who are researchers and students and suppliers of the resources. All the participants mentioned that they are dependent and restricted by publishers in terms of availability and costs of digital resources. This challenge pertained mainly to e-books and not so much to journals, until recent years. In relation to this, one participant argued:

Sometimes the e-book is a fantastic invention [...] if we could buy every textbook as an e-book for our students, it would be great. And for all students and all courses [...] the library could say to them "Here is our offer to our students, take it or leave it". But it's not the reality. We are far, far from there (Librarian 9)

In terms of the availability, a particular emphasis and concern raised by almost all participants was on the Swedish market of e-books. This market is argued to be very immature and the number of e-books in Swedish language is very limited. UL relies a lot on Swedish titles, and around 50% of their textbooks are in Swedish. This dependence on a market which is rather immature has an impact on the digital innovation efforts of the UL. The head of the section stated:

The change to more digital e-media is too slow [...] one part of it is that we use a lot of material in Swedish, for example the Swedish e-book market is not there yet. Or the volumes we want.

The Swedish market is dominated by a few major suppliers. The participants argued that suppliers are not ready and are afraid of losing money. A similar sentiment was echoed in the latest interview in 2022, suggesting that there has been no change in this regard, despite the expansive growth of digital resources. The Library director argued the following:

There are still obstacles with the ebook market [...] we have difficulties with studentlitteratur which publishes course books for students. They don't want to sell ebooks to libraries and they have such a big part of the market in Sweden. So it's really difficult, so we haven't moved forward with Swedish digital books [...] but we have grown within e-book.

As shared by the director, it is not that Swedish publishers do not produce e-books, however driven by commercial logic, they want to sell directly to students, instead of academic libraries. In addition, according to the participant, publishers and teachers also do not contribute to open science developing open books, a practice followed by many countries nowadays. Another challenge related to e-books that the participants perceived as crucial, is the complexity around them. Different vendors employ different business models. All these different business models create complexities and ambiguity related to e-books and e-book market in general, and UL has to navigate among these complexities and make informed decisions based on costs vs benefits. On the contrary, participants did not perceive any obstacles or ambiguities in the digital journal market. E-books come as single copies or in collections. Whereas single e-book titles are not considered to be as complex, the collections are perceived to be inherently difficult and transformative. There are noted differences between them, in terms of usage and ownership. Publishers and suppliers set the conditions over ways of usage of e-books. There are several methods on how this is determined. One method is Patron Driven Acquisition (PDA). This method emerged a few years ago, refers to a provision of access to a large collection, but library does not pay until someone has used it. When the resource is first used, then it is a loan for the UL and then they have to pay. Next usage of the same book results in purchase. The librarian involved in this process explained:

We can limit the price, also. A book couldn't cost more than, let's say \$150. We can decide a little bit more compared to these subscriptions. [...] 2 years ago, our PDA-collection, I think it was about 25 000 titles. [...] we don't own these titles, but when you, as a researcher or as a student look at these titles, the first time you use these titles you will find them in our catalog. Then we pay as a loan for this title, to the supplier. The first use is to compare with a loan. And then it cost us, let's say 25% of the book price. Next time this title will be used by you or by another patron, it will end up as a purchase. And then we pay 100% of the price, of course. So all together, we have paid 125% to buy this book. But not all will be used, so we only pay for the used books. And we can choose if we only want to pay for different loans or if we want to buy. And when we want to buy the titles (Librarian 9)

This method gives more control to UL to make decisions about purchase of books. At the same time, it is very opaque to the users. They are not aware if the library owns the book or not. But generally, according to UL, PDA collections end up being more used. Although this usage is mostly 20% of all titles, according to UL it is much better compared to huge collections. Another usage method is credit based. This was explained by the participant to be mirroring the usage of print books. In this method, suppliers provide a number of credits for one year. When the book is used in a day equals to one credit. When the credits expire, the same book cannot be used anymore within these 12 months. Then, a new book order must be made. This was argued to be similar to the demand and purchase of print books as well. In addition, the collection of titles leaves the publisher with full control of e-book titles, meaning that they can add some titles and also remove some titles from the collection. This is particularly important to notice, because it shows that while work practices shift in the process, the dependence on external actors becomes even more vital to keep the livelihood of the digital services that the library is capable to offer. This marks a move from ownership to access. This is perceived to be an issue to some participants. For example, Librarian 9, an experienced librarian working with acquisition argued the following:

We don't own them. That is the problem. I don't like that. It could be some add-ups I guess. For me it is not a solution [...] the basic for me is individual titles. If you have money and to be honest, we don't have money this year, so we shouldn't and I didn't want to, have subscribed to this very huge collection. And what is the difference if you measure the usage, if you have this big collection, let us say we have 100 000 titles and we haven't chosen one of these titles ourselves, then if you count the usage, I guess that about 8-10% of all these titles have a usage during a year. Not more than, at maximum 10%.

Management argues that this is a trend which they should all embrace, especially now in the era of open science, where everything is open and not owned by anyone, but by everyone. And that, according to the participant, will change the profession, while most are not fully aware of that yet. In relation to the ownership of e-books, even when UL owns the single title e-book, the conditions of usage are still determined by suppliers and/or publishers. Participants explained that e-books typically could be restricted to 1-3 simultaneous user access, whereas multiple user access is not often available, or it is much more expensive. On such dependence, one librarian argued the following:

If we buy a textbook as an e-book of course we prefer a multiuser license even if it is 100% more expensive than a single user. Sometimes we can choose it, but mostly it is the publisher that decides. So it is a bit complicated (Librarian 9).

Besides the availability and complexities with e-books, participants highlighted the costs related to e-books. This indeed is closely related to the digital business models of publishers and suppliers. This form of co-dependence puts pressure on the library to make decisions on whether to purchase them and in which format (print or digital). Because often, if the e-book is very expensive UL may decide to go for the print format. As participants explained, around 2003-2004, 40% of the budget went for e-resources, whereas nowadays it is more than 80%. However, the challenge with budget is not only related to e-books, but in general to maintaining and managing the mixed collection of print and digital materials.

An interesting finding emerging from the analysis, is that in the beginning of this phase there was an ongoing narrative revolving around the differences between print and digital, both in terms of resources

and also work practices. This debate seemed to contribute to the overall organizational discourse on digital innovation process. Whereas there was a push towards digital innovation, mainly from the management, there was also a pull force within the organization. The Library director said:

So we are kind of in a middle of all these arguments about print and digital. I think it is too slow and we don't show all the benefits of digitalized materials.

Participants referred to the features of e-resources, both in terms of opportunities and also hindrances. This is important to notice, because it shows that participants were aware about the affordances of digital resources. For example, in terms of the opportunities inferences were made about the potential of the digital resources to be accessed regardless of time and space and availability to a wide range of users. This enables users a large degree of flexibility compared to print ones, which limit users with an access to library setting. Librarian 1 explains:

I think that you can use the material whenever you want, you don't need to go to the library.

In the same vein, another participant acknowledged the potential of e-books, in the format of e.g. annotations and comments:

It is nice in e-books, you can write in it, underline and there is a lot of things. It doesn't take so much space so you can have more places for students (Librarian 5)

In addition, unlike print materials, digital resources provide an increased possibility of tracking and assessing usage. That way librarians can monitor the accessibility and effective usage, hence allowing them to make more informed decisions regarding future subscriptions and a more efficient budget allocation. At the same time digital resources, especially e-books hinder certain practices, which are at the core of the library. Such a practice is interlibrary loan, which is a common activity that academic libraries practice, identified as a key challenge by one of our participants:

[...] then they are very expensive, some of them are hard to get and it's more to think about. Should I buy the cheaper printed book or should I buy the expensive e-book and how many users? It's more decisions than before. More options. And then you can't choose, "I just borrow it from another library" because you can't borrow these books (Librarian 6).

In the organization there seemed to be a difference of perspectives in relation to this. Some view the work practices related to print and digital as the same, others argue for major differences between them. and for some, the core remains the same.

Well it could be very interesting, it is just a couple of years ago that we tried to put together the cataloguing of the print part and making the e-resources available. [...] but you do it in different ways but it is really the same. It is about making documents and other materials searchable.[...] cataloging the physical book and working with e-resources, because it is different practice, but if you think what it really is about, as I see it is really the same (Librarian 4).

This note on differences revealed a change in work practices and the role of librarians. Besides physical resources, they need to handle a wide array of digital resources and they also need to have an active role in supporting users to navigate and use digital resources. In the beginning this has not been easy. In interviews, reference was made to librarians preferring to work with print materials. That is a result of tradition as well as the complexity that e-resources, particularly e-books entail. In relation to this a participant commented:

Quite a lot of staff here thinks it is easier with print materials because then you have a book, it is here, it is physical and you can give to student but with the e-book you don't know (because you have many options) whether one can access it or two, three or it is multiple access at the same time, there are many choices to make Or if we have a package is it pda and how does that work, how does that affect student when they want to access the books. So I think many of the staff here thinks it is easier with print books. And they would rather buy five or ten copies of print book because they think it is easier (Librarian 8).

This led to an unintended informal division of the team, even labeling the one working with e-resources as the “e-resource team” made of few librarians. Despite the new organizational structure, where the work is not divided, the groups seem to be divided. This division is informal and not something the organizational management intends nor wishes. Also, some of the participants mentioned this as an issue and problematic, which affects collaboration. For example, a participant mentioned the following:

...but that is something we want to change here, because those people who were working with print materials they are working just with the print materials. So they focus on only print materials. And then we have a few people working with e-resources, so we don't have much like mixed, not so many of us work with both. So it is divided (Librarian 8).

There are some steps that the management has undertaken to remedy this issue. For example, they aimed to merge the jobs people do in each unit, where people who are involved in interlibrary loans and activation of e-resources will buy books and vice versa.

In recent years, UL got heavily engaged in digitalizing the majority of their services and complementing them with instructional videos/films. A participant mentioned that they have become more digital in ways they support researchers in their publications and open journal systems. One ongoing avenue that they are working with is digitalizing the first meeting with users, even in their physical space. This finding emerged as a result of a study conducted by UL in 2022, which logged every query directed to the library, from several channels such as front desk, chats, email etc. The study revealed that there were 77 ways of contacting the library. As the library director stated:

[...] ideas about how she wants to change, or the group that she works [...] how they want to change the first line meeting with the library. She used the word IKEA concept, like it should be when you come to IKEA and there's a lot of self services and people nooo. So that's the kind of resistance I can see but I don't think it has to do with the fact that they resist digitalization. I think it has to do with protecting the identity.

Despite becoming more mature in digital innovation, and not resisting it anymore, the last sentence of the quote, as well as sentiment from other interviews reveals the importance of identity for librarians. For example, the reaction to the suggestions of removing face-to face contact according to the library director is about identity, not against digitalization.

They put digitalization and personal meetings as two opposite things. So I don't think there's any resistance to digitalization per se, because they can see that we benefit a lot and we can do a lot of routines, and we can reach a lot of information. But there's a protection. it's important that there are two people standing at the front desk [...] the library staff gets some very positive comments “oh thank you very much for your help” even if it's very little . I would say that it's more that kind of resistance than doing things in new ways with digital support (Library director).

Identity related claims were evident in the majority of interviews. These references centered around the perceived identity of UL and librarians, emphasizing the conventional image of a library with bookshelves filled with books. The management’s approach to this has been in conveying the message that their core is to support and serve users with relevant sources, regardless of the symbolism that physical books convey and regardless whether they own the material or just provide access. The core has not changed.

Nevertheless, some others argue that the role of UL, academic libraries, and librarians has changed. As one participant explained, the symbolism of library building now is just for students only, even though they access the literature digitally. Abundant and ubiquitous information forces them to rethink their role and user behaviour. To support users in the digital services they also need to be digitally skilled and also employ IT staff as a part of the library. Reference to Google was made in interviews. For example one of the participants stated the following:

[...] Everywhere you can find information, we really need to think about what our roles are and we spend a lot of money on our discovery systems that we call one search. It is expensive and we work and

work to get it like Google like, because we know everyone wants to have that sort of way to seek information. We need to really explore our users' behaviors a lot more. We need to be experts as Google (Librarian 4)

A similar claim was made by another participant who stated the following:

Now it is much more, in one way Library is open 24 hours because you can see in statistics that people are visiting and looking in databases in 2:00 in the morning. You don't physically go to the library. It is a very popular meeting place and working place but for reaching and accessing you perhaps do it at home instead. So it has changed a lot. It is more social and meeting place and lot of group studies and perhaps something like I go to the library and I study then go home (Librarian 1)

Innovating through digitalization is often viewed as fast-forward, but challenges, such as resistance do persist also in the UL context. Whereas the whole discourse and narrative on e-books has diminished in the organization, participants claimed that researchers hesitate to use e-books. Their first choice is always print and this affects the UL, since in their strategy e-book is a default. This behavior of users slightly changed during COVID-19 pandemic, where access to e-resources was highly beneficial.

In addition, the view that the library must preserve its identity is not evident only among staff, but also external context. As the library director explained: *I mean when books not are not so visible because they're digital, I think that kind of reaction is more from the outside - oh don't you have more books than this. Like we had visitors last Thursday they were coming and I showed them around ohh they're not more books than this, is this really a library. So I don't think it's among staff as much as visitors', users' concept of what the library is. [...] then some colleagues and some users talk about libraries and how they should be protected from this [...] it's very common that they use people with special needs, elderly people who can't handle cell phones or whatever as if they are speaking for them, they are speaking for themselves of course. So we have that both among users and among staff but I wouldn't say that is a big part.*

5 Discussion

The push for accelerating digitalization within organizations, including educational organizations like academic libraries, underlines how digital technology creates opportunities for innovation. In our study, we show that this can be achieved through the introduction of new practices, which are often challenging and lengthy in process, but are essential tasks to reach digital innovation. These challenges can be conceptually referred to as an organizational state of transitioning processes, defined by liminality (Henfridsson and Yoo, 2014).

Our study reveals two crucial aspects—namely, work practices and co-dependence—that undergo digital innovation trajectory marked by three phases. Early in our findings, we identify these three crucial phases, showing that the transition of work practices from physical to digital resources and services does not occur without side-effects. We therefore observed that the shift from physical to digital resources and services not only heavily affects changes in work practices, but along the way makes co-dependence more apparent and highlights its increased significance in what an organization is able to offer to its digital users, often limited by co-dependence on other actors in the ecosystem.

With our findings, we present new evidence that supports in understanding how digital innovation of organizations, particularly in academic libraries, entails unprecedented complexities and tensions in the process. Despite such challenges, these organizations navigate a digital innovation process that ultimately leads to transformation, notably observed cascading through the three identified phases. Table 1 presents a matrix that highlights two aspects: work practices and co-dependence evolving across a trajectory marked by three phases: first phase— emergence of digital practice; second phase – enforced experimentation with digital initiatives; and third phase – advancing with digital resources and services. Important to notice is that while the identification of these three phases along a digital innovation trajectory presents an evolutionary transformation of a library to a digital library, to this day, traditional work practices remain important, although the proportion of such practices influencing the current work

practices with a digital mindset, is less visible. In light of this finding, we recognize that tradition is deeply rooted in the identity of the library, where work practices, such as offering desk services to users (e.g. greeting the user and thanking the user), remain essential, even if such services can be fully replaceable with digital support. We approach the first research question by closely examining the process of digital innovation that unfolded in the context of an academic library. Throughout the three phases presented in Table 1 below, it is reasonable to argue that digital innovation process in the context of a library is a result of multidimensional complexities and tensions in this process (Kurti et al. 2021).

Phases	Work Practices	Co-Dependence
Emergence of Digital Practice	Initial Dominant Logic	<i>Acquisition of resources</i>
Enforced Experimentation with Digital Initiatives	Learning and Adaptation	Acquisition and access of (digital) resources
Advancing with Digital Resources and Services	Emergence of New Dominant Logic	Complexities related to the affordances of digital resources

Table 1. Digital innovation process

Work practices and co-dependence weigh equally and prevent traditional libraries from emerging as fully digital libraries, making digital innovation challenging, but also lengthy. Moreover, the case of UL shows a storyline that allowed our participants to reflect on the introduction of the digital concept since the 90s (the occurrence of the first phase) to recognizing a wider shift from the first phase towards the second, in early 2000s (the second phase), up to the 10s and the current status (the third and the current phase). These phases allow us to acknowledge that digital innovation is challenging and lengthy, while recognizing that the evolution of these phases towards digital innovation is dependent on complexities and tensions. These comprehensive reflections address our second research question, by presenting the details below.

While the first phase can be viewed as essential in digital innovation, through the emergence of digital practices, our findings show that tradition, identity, and their dominant logic were driven by rigid boundaries, particularly in how they conducted acquisition. In opposite, working through fluid boundaries towards a seamless digital transformation process is only an ideal. The second phase, however, led to new digital opportunities, often enforcing such organizations to engage in learning and experimenting with digital services, often driven by user demands. Their learning and adaptation in a new digital landscape led to gain new work practices for acquiring and accessing digital resources. The third and the current phase, in contrast to the first and the second phase, led to the emergence of a new dominant logic. Advancing with digital resources and services rather than against them, is seen as fundamental. Indeed, digital innovation of UL, which marks the new dominant logic, was not characterized by a transition from physical/analogue state to a fully digital organization. Instead, it was a continuous merger or blend of both, non-digital and digital practices, that often was achieved with frictions and cohesiveness, equally. Advancing with digital resources also led to the identification and multiplication of challenges, where co-dependence on other actors e.g. publishing agencies and users, have the potential to deprive organizations' agency, particularly in their ability to take their own decisions, make seamless adaptation into the digital landscape, and make intentional choices. This finding confirms that there is not a sole innovation agency, but digital innovation occurs in an interdependent emergent multi actor ecosystem (Nambisan et al. 2017; Yoo et al., 2010). However, findings indicate that there are yet some more powerful actors who dominate and determine the rules of the game in the ecosystem. Co-dependence in this regard shows that in digital landscapes, libraries are heavily dependent on how e.g. publishing agencies decide on digital collection accessibility and restrictions, at the same time. Therefore, digital innovation trajectory of UL is shaped by publishing companies and their business models. Digitization spawned new business models for publishers. They

take advantage of the affordances of digitization, to reconfigure their offering and value proposition, often bundling them into large collections. The case of Netflix, for instance, is an analogy that draws parallel to this. In Netflix, users often find new titles for shows or movies, while the old ones continually disappear. A similar approach was embraced by publishers who decide on collections and their terms of use, on which UL has little control. Simultaneously, users who initially propelled the first innovation phase, were subject to their dominant logic which indicates prevailing preference for print materials.

Ongoing digitalization influenced organizational work practices, while simultaneously, the existing institutionalized work practices shaped the digital innovation efforts. This was very much reflected in participants distinguishing differences between print and digital, which in the beginning of the third phase represented a structural barrier to innovation. These challenges mostly pertained to managing both print and digital resources, since they imply different work practices, diversified roles, and new competences. To navigate in this complex landscape, in the beginning of the third phase, UL created new organizational structures, with the aim of avoiding the distinguishing differences between print and digital oriented work practices. Nevertheless, informally the old structure, which suggests a form of “structural ambidexterity” (O’Reilly and Tushman, 1996) or a “structural hybrid” (Greenwood et al. 2011) strategy prevailed, despite management’s vision and strategy. Instead, management was keen on a “blended hybrids” strategy, where the organization would blend rather than compete with their work practices (Greenwood et al. 2011).

In respect to work practices, digital competence along with developing technological proficiency is of uttermost importance. While digital practices continuously evolve within organizations, acquiring digital competence is not an easy process. Not all employees are familiar or comfortable with acquiring new digital competence along the rapid pace of digital transformation. This lack of familiarity can hinder employees’ ability to support users effectively, while modern technology can be an integral part of the work of library users, such as researchers and students. Our findings revealed that one such challenge is the fact that libraries might end up advancing with digital resources and services without realizing the complexities that emerge with them. Having 77 communication channels for users, shows that digital transformation is not only challenging and lengthy, but rather chaotic too. UL understands the chaos and acknowledges the need to reduce such communication channels to 1 channel, a rather daunting task to achieve.

While in the case of academic libraries like UL, financial resources are identified as one of the challenges, our findings reveal that digital competence cannot be achieved without employees’ engagement in ongoing training and professional development to keep up with evolving technologies and best practices in e.g. cataloguing and managing digital resources, including communication with users.

Skog et al (2018) argue that digital transformation is driven by digital innovations, as a result of ongoing digital innovation of products, services and business models. In line with previous work (Lembinen, 2021) UL embarked on digital service innovation, hence paving the path towards digital transformation. During the three phases of innovation, UL shifted from an IT-driven transformation towards digital transformation (Baiyere et al. 2023). In line with arguments by Baiyere et al. (2013) the first two stages were vivid examples of IT driven transformation, where digital technology was utilized in supporting existing services, whereas in the third phase, digital technologies redefined value proposition and triggered initial sparks toward new identity, which is expected to accelerate as a result of the upcoming immersion of GAI - dependent chatbots, like ChatGPT.

6 Conclusion

This study shows how the process of digital innovation evolves in an academic library and provides insights into challenges encountered in this process. Drawing on interviews as the main data source, findings reveal that digital innovation is incremental, unfolding in a trajectory through three main phases: (1) emergence of digital practices; (2) enforced experimentation with digital initiatives; and, (3) advancing with digital resources and services. In addition, the study provides evidence on the multidimensional complexity and tensions inherent in digital innovation, especially emerging from the

combination of digital and traditional practices, illustrating the complex interplay of work practices and co-dependencies shaping the digital innovation process. This study contributes to understanding the intricate dynamics of digital innovation in information-intensive organizations.

While our study provides unique insights, it is not devoid of limitations. One such limitation is that the results draw from a single case that often limits generalizability. However, it allows for rich insights, nuancing the understandings of our specific context, while our intention was not on yielding statistical generalizability. Our study opens up windows as a rich source of information, which can help future research to investigate broader and cross-contextual implications.

Furthermore, we advocate for institutional logics as a potential and fruitful theoretical framework for future studies. In this avenue, we suggest two different paths. First, aligned with the institutional logics framework, our study indicates salience of different institutional logics such as those related to the profession, community and, market. A recommended suggestion for further research is to explore how the interplay between the identified different institutional logics affects digital innovation of academic libraries. Second, in light of recent research developments of institutional logics in information systems (Faik et al., 2020; Schildt, 2022), another suggestion is to consider digitalization in academic libraries as a new institutional logic for deeper insights (Schildt, 2022).

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