

**BIG DATA AND ARTIFICIAL INTELLIGENCE AS MECHANISMS
FOR INTELLIGENT ASSESSMENT:
A SOCIOLOGICAL STUDY ON ENHANCING SERVICE QUALITY IN
LIBRARY INSTITUTIONS**

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Abstract:

This research paper seeks to examine the growing role of big data and artificial intelligence (AI) technologies in establishing what is increasingly referred to as *intelligent evaluation* of the performance of library institutions, particularly within the context of the rapid digital transformations reshaping the information and knowledge sector. As information environments become increasingly complex, conventional evaluation approaches are no longer sufficient for accurately monitoring service quality or assessing their actual impact, thereby creating a pressing need for advanced analytical tools capable of leveraging real-time data.

The research uses a sociological approach which analyzes the technical aspects of the transition while studying how it reshaped library institutions through organizational changes and professional connection alterations and value generation systems. The research shows how artificial intelligence (AI) systems detect user activities to build customized experiences which predict user information needs that improve system performance and decision-making accuracy.

The research shows that intelligent evaluation goes beyond being a technological progress because it creates a complete change in how library institutions operate. The system creates new connections between knowledge and authority while it uses data-based governance systems to develop fresh approaches. The process of transformation brings multiple obstacles which include ethical dilemmas and data security issues and the need for trained personnel. The process needs methods which will enhance quality through methods that defend professional values.

Keywords: Big Data, Artificial Intelligence (AI), Intelligent Evaluation, Library Institutions, Service Quality.

Introduction:

The knowledge society has witnessed major changes in library institutions because their operational nature and social functions have experienced deep qualitative shifts. The preservation and organization of information resources no longer serves as their main function because they now play strategic roles in creating knowledge value and improving user service quality. The evaluation systems face increasing challenges because their current performance evaluation systems fail to assess library service effects in modern digital environments which keep getting more complex and change quickly (McClure, 1987, p. 45).

Big data has become a vital strategic asset which allows organizations to analyze user actions while they track service access patterns to create better performance measurement systems. According to Viktor Mayer-Schönberger big data creates value through its ability to discover concealed patterns which help us find data patterns that remained hidden before (Cukier, 2013, p. 06). Rob Kitchin explains that big data demands organizations to create new knowledge production systems which need different approaches for their decision-making systems (Kitchin, 2014, p. 01).

The development of AI technologies has brought about a new evaluation system which uses algorithmic systems to perform its work so it now operates as intelligent evaluation through predictive analytics and machine learning systems. Russell and Norvig present AI as their main tool which lets them create systems that perform data-based complex decision-making (Norvig, 2021, p. 02).

Brynjolfsson and McAfee show that these technologies establish new methods for institutional work performance through their growing use of algorithmic data analysis systems (McAfee, 2014, p. 12).

The process of change needs to move beyond its technological aspects because it requires more than just technological elements to bring about this change. The system generates deep sociological effects because it transforms how library organizations operate while creating essential problems about who controls knowledge and how algorithms operate and how professional duties change. The network society depends on information as its core power system which enables social structure transformations according to Manuel Castells (Castells, 2010, p. 21).

Michel Foucault shows that power systems maintain control through knowledge systems which have become more obvious in our current digital era (Foucault, 1980, p. 27).

The transition toward smart evaluation within library institutions needs evaluation as an operational shift instead of a technological advancement. The institutions have undergone a fundamental change in their operational systems which now affects how they interact with their users and how they create value. The current transformation requires analytical sociological methods to understand its multiple aspects through multiple perspectives.

Study Problem:

Based on this perspective, the following central research question may be formulated:

How does the integration of big data and AI technologies contribute to establishing smart evaluation systems for assessing the performance of library institutions, and what sociological transformations does this process impose on service quality and organizational structures within these institutions?

Sub-research Questions:

- How can big data facilitate the development of more accurate and in-depth indicators for evaluating the performance of library services?
- What role do AI technologies play in improving the quality of library services and enhancing the effectiveness of decision-making processes?
- What are the most significant sociological and organizational transformations associated with the adoption of smart evaluation systems within library institutions?

Methodology and Analytical Approaches of the Study:

The research uses an analytical sociological framework to study how big data and AI systems have changed the way libraries assess their performance through evaluation systems. The research expands its focus past technical aspects to study how this transformation affects social relationships and organizational structures.

The research employs a descriptive-analytical approach to study how big data and AI systems function in libraries for smart evaluation systems which impact service delivery quality. The research method allows for effective study of intricate modern digital transformation systems (Creswell, 2014, p. 155).

The research applies interpretive sociological methods to study how organizations change their structures and work systems while professionals adapt their relationships in institutions using technology to control knowledge and power systems. The research method follows sociological methods which study how people assign meaning to modern social trends (Weber, 1978, p. 04).

1. Theoretical Framework of the Study

This study is based on a theoretical framework that considers the transformations that have been generated through the integration of big data and artificial intelligence into the evaluation of the performances of library institutions. Max Weber's theory of rationalization of modern societies can be applied to these transformations, as library institutions are increasingly turning to intelligent systems and algorithms as tools for making decisions within their institutions (Weber, 1978, p. 85).

In addition to Weber's theory, the transformations within library institutions can also be interpreted through the lens of Manuel Castells' theory of network societies. Castells argues that information is the source of power in the digital age, and that data flows are the new infrastructure of society. As a result, big data has become a decisive factor in the transformations of the evaluation mechanisms within these institutions (Castells, 2010, p. 21).

Furthermore, Michel Foucault's theory of power and knowledge can provide insight into the less visible transformations within library institutions. Data is not just a

resource, but a source of power within library institutions, especially in light of the growing reliance upon algorithms to analyze the performances of the libraries and regulate the professionals within those institutions (Foucault, 1980, p. 27).

The literature on the digital revolution also indicates that big data is playing a central role in the transformations of the knowledge production within library institutions. Rob Kitchin discusses the digital data revolution as changing the way that institutions think and make decisions (Kitchin, 2014, p. 01).

Similarly, Viktor Mayer-Schönberger argues that big data allows for the discovery of patterns in data and behavioral tendencies. These transformations allow for the development of intelligent evaluation systems that improve the quality of the services provided by library institutions (Cukier, 2013, p. 06).

By integrating these theoretical perspectives, the study can understand the intelligent evaluation of library institutions as more than just a technological transformation. It is a sociological transformation that alters the structural foundations of these institutions, their work patterns, and their professional relationships within the context of a digital society that is driven by knowledge and data.

1.1 Conceptual Framework of the Study

Defining the concepts that will be discussed in the study is one of the preliminary steps in constructing a scientific study. Concepts provide analytical tools for understanding social phenomena and discussing the different dimensions of those phenomena. Defining the concepts also provides an indication of the research that will be conducted within the study and how the research relates to the theoretical framework. In the present study, the concepts to be defined relate to the digital transformation of library institutions, specifically concepts related to big data, artificial intelligence, and intelligent evaluation (Azzi, 2018, p. 65).

According to Manuel Castells, the transformations that exist within the contemporary world are associated with the development of a new form of social organization that is based upon information and data as central resources for value creation and power (Castells, 2010, p. 21). Understanding these concepts within their sociological context will allow for a better understanding of how these transformations have impacted library institutions, particularly in relation to their performance evaluation and quality assessments.

1.1.1 Concept of Big Data

Big data refers to sets of data that are massive and heterogenous, and that require more resources than the conventional data processing tools and systems can provide. Big data is often discussed in relation to the “3Vs”: volume, velocity, and variety of the sets of data. The significance of big data is in its ability to generate new forms of knowledge through the analysis of data that is otherwise hidden within those sets of data (Cukier, 2013, p. 06).

Big data has transformed the way in which knowledge is produced within society. Knowledge is no longer produced through reflection alone; it is produced through

continuous data flows. Rob Kitchin discusses these changes within knowledge and data production (Kitchin, 2014, p. 01).

Within the Arab world, Mohammed Abdel Hamid has discussed how digital data has become a fundamental pillar of knowledge management within today's institutions (Hamid, 2017, p. 112).

Big data is more than just a technological tool. It represents an epistemological structure that impacts the decision making and performance evaluation of library institutions.

1.1.2 Concept of Artificial Intelligence:

Artificial intelligence is the use of computational systems to simulate the cognitive abilities of humans. These computational systems can learn, analyze, and make decisions, making artificial intelligence an effective tool for processing data and transforming that data into information (Norvig, 2021, p. 02).

Artificial intelligence has become an agent of change within society. Shoshana Zuboff discusses how artificial intelligence is used to change the behavior of individuals within the digital economy (Zuboff, 2019, p. 08).

Azzi discusses how intelligent technologies have changed the way in which individuals interact with others in society, and how authority has shifted from human beings to these technologies (Azzi, 2018, p. 73).

Artificial intelligence is more than just a technological tool. It is a sociological actor that has changed the relationships between individuals within library institutions.

1.1.3 Concept of Intelligent Evaluation:

Intelligent evaluation is the use of big data and artificial intelligence technologies to evaluate the performance of an institution. The evaluation moves from being descriptive in nature to being predictive in nature, based upon the analysis of data in real-time (Organisation for Economic Co-operation and Development (OECD), 2015, p. 25).

Evaluation is used to change the behavior of individuals within an institution. Michel Foucault discusses the relationship between knowledge and power in relation to evaluation (Foucault, 1980, p. 27).

Mohamed El-Hadi discusses how intelligent evaluation requires the reconstruction of quality standards within institutions to be consistent with the requirements of the digital environment (El-Hadi, 2015, p. 89).

Intelligent evaluation is a transformation of the mechanisms for evaluating the performance of individuals within an institution, as it integrates both the technological and sociological dimensions of evaluation.

1.1.4 The Nature of Library Institutions:

Library institutions are those institutions that are responsible for the collection of knowledge and the provision of that knowledge to society. These institutions can include university libraries, national libraries, or specialized information centers. These institutions have been transformed as a result of the digital transformation of society (Saponaro, 2012, p. 12).

Émile Durkheim discusses the nature of institutions, and how each institution is responsible for fulfilling a specific function within society that contributes to the cohesion of that society (Durkheim, 1997, p. 45).

Hassan Emad Makawi discusses the role of information institutions in the production of knowledge within society (Mekkawi, 2009, p. 54).

Library institutions are more than just repositories for knowledge. They are actors within the production of knowledge, and within the evaluation of that knowledge within society, and particularly within the digital environment in which information is produced and disseminated at increasingly rapid rates.

1.2 From Traditional Evaluation to Smart Evaluation: An Epistemological and Sociological Transformation in the Logic of Performance Measurement

Throughout their historical development, library institutions have experienced fundamental transformations in their performance evaluation mechanisms. Initially, these institutions relied on traditional measurement models characterized by quantitative and functional orientations, focusing primarily on direct indicators such as collection size, number of users, and circulation rates. This approach reflected a technical understanding of performance in which the role of the institution was largely confined to the efficient provision and management of resources, with limited consideration given to the complex interactive and cognitive dimensions governing the relationship between users and information.

However, this paradigm soon revealed its limitations, particularly in light of digital transformations that reshaped the nature of informational practices. Users were no longer perceived merely as recipients of information but emerged as active participants in the production and circulation of knowledge. In this context, Charles R. McClure argues that traditional library evaluation models are no longer capable of reflecting the actual value of services because they focus on outputs rather than impact (McClure, 1987, p. 45).

With the emergence of the digital environment, what may be described as an *epistemological transformation* occurred in the logic of evaluation. The objective shifted from merely measuring what had been accomplished toward understanding how it was accomplished, analyzing the contexts that generated it, and anticipating its future implications. This transformation aligns with Rob Kitchin's conception of the "data revolution," which extends beyond the mere expansion of data volume to encompass a profound shift in the processes of knowledge production, whereby data itself becomes a source of interpretation rather than simply material for analysis (Kitchin, 2014, p. 01).

From a sociological standpoint, this transformation may be interpreted through Max Weber's concept of *rationalization*, according to which modern organizations increasingly adopt more precise and objective instruments for decision-making based on calculation and measurement (Weber, 1978, p. 85). Nevertheless, within its digital context, rationalization is no longer exclusively human-centered; instead, it has evolved into a form of *algorithmic rationalization*, relying on intelligent systems capable of analyzing data and making complex decisions autonomously.

This transformation may also be interpreted through Manuel Castells' analysis of the network society, in which information and its flows become the fundamental determinants of the structure of social organization. Within this framework, data emerges as a central instrument for evaluating performance and redefining its trajectories (Castells, 2010, p. 21).

Accordingly, the transition from traditional evaluation to intelligent evaluation represents far more than a technical modernization of measurement tools. It reflects a profound transformation in the very logic of understanding itself. Evaluation is no longer conceived as a retrospective and descriptive process; rather, it evolves into a predictive and analytical mechanism grounded in anticipation, real-time performance reconstruction, and continuous optimization. Consequently, intelligent evaluation should be understood not merely as a measurement tool, but as a mechanism for knowledge production and for restructuring organizational action within library institutions.

1.3 Big Data as a Mechanism for Reshaping the Quality of Library Services

The concept of big data constitutes one of the most significant structural transformations affecting the information domain in recent decades. Data management is no longer limited to storage functions or conventional statistical processing; instead, it has become intrinsically linked to the ability of institutions to extract meaningful insights from vast, complex, and continuously flowing datasets generated in real time. This transformation has not only altered technological tools but has also redefined the very concept of "library service." Library services have shifted from standardized and uniform models toward dynamic, personalized, and predictive service frameworks.

Within this context, Viktor Mayer-Schönberger argues that the real value of big data lies not merely in its volume, but in its ability to reveal hidden patterns that remain undetectable through traditional analytical methods, thereby enabling a transition from a logic of causality to one of correlation in the interpretation of phenomena (Cukier, 2013, p. 06). This shift reflects a profound transformation in the nature of knowledge itself, whereby data becomes a source for generating understanding rather than merely serving as raw material.

From a sociological perspective, it may be argued that big data has fundamentally reconfigured the relationship between institutions and users. The user is no longer regarded as a passive recipient of services; rather, they become a "data entity" whose behaviors are continuously monitored, analyzed, and interpreted. This perspective aligns with Rob Kitchin's argument that the data revolution has reconstructed modes of thinking and decision-making within modern institutions, to the extent that administrative decisions increasingly rely on real-time analytics rather than conventional estimative approaches (Kitchin, 2014, p. 01).

It is also important to note that the contemporary network society is founded upon continuous informational flows, through which institutions are transformed into environments dedicated to data processing and knowledge production rather than merely preserving information (Azzi, 2018, p. 65). This transformation reflects a shift

in the function of libraries from institutions of preservation to institutions of analysis, guidance, and knowledge generation.

Nevertheless, this transformation carries a significant sociological dimension manifested in the redistribution of knowledge within institutions. Data increasingly emerges as a new source of power, while professional competence is redefined according to the capacity to engage with intelligent systems and analyze data-driven environments, rather than being determined solely by traditional expertise.

1.4 AI and the Reengineering of Evaluative Decision-Making within Library Institutions

AI represents the most advanced stage in the trajectory of digital transformation within library institutions. Its role is no longer confined to data processing; rather, it has expanded to include generating recommendations and making semi-autonomous decisions based on machine learning algorithms. This transformation has turned evaluation into an “intelligent” process that interacts with data in real time, instead of remaining a static and retrospective procedure.

Russell and Norvig argue that AI is founded upon the development of systems capable of simulating human cognition through learning, reasoning, and decision-making processes, thereby positioning these systems as central actors within contemporary work environments (Norvig, 2021, p. 02). Such developments open new possibilities for what may be described as “cognitive automation” within institutional settings.

Similarly, Brynjolfsson and McAfee contend that AI is reshaping economies and institutions by transforming data into actionable decisions, reducing margins of error while enhancing operational efficiency (McAfee, 2014, p. 12). Nevertheless, this transformation is not without challenges, particularly concerning the diminishing role of human agency in decision-making processes.

From a sociological perspective, this transformation can be interpreted through Michel Foucault’s conceptualization of power and knowledge, whereby algorithms emerge as a new form of soft power. Rather than exercising direct coercion, such mechanisms influence behavior through data analysis and the orientation of choices (Foucault, 1980, p. 27). In this context, the institution evolves into a space where forms of “digital surveillance” operate in subtle and often invisible ways.

Accordingly, AI should not be understood merely as a technological instrument; rather, it reconfigures the organizational structure of institutions and redefines the concept of professional decision-making, as decisions increasingly become distributed between human actors and intelligent systems within a complex hybrid relationship.

1.5 Sociological Transformations in Organizational Structures and Professional Relations within Library Institutions under Intelligent Evaluation Systems

The integration of intelligent evaluation systems into library institutions constitutes a profound structural transformation in the nature of internal organization and the mechanisms governing professional practice. Performance is no longer assessed according to fixed and conventional standards; instead, it has become subject to a

dynamic and evolving logic driven by continuous data flows and algorithmic analysis in real time. This transformation cannot be reduced to its technological dimension alone; rather, it extends to reshape the social structure of the institution itself in terms of role distribution, power configurations, and mechanisms of internal coordination.

Within this context, library institutions can no longer be regarded as merely traditional administrative entities. They have evolved into open informational systems that continuously interact with data generated by users and digital platforms. This transformation reflects what Manuel Castells described regarding the nature of the network society, where information flows constitute the fundamental structure around which social and organizational relations are reconstructed ([Castells, 2010, p. 21](#)). Within this emerging paradigm, organizational functioning is no longer based solely on hierarchical structures, but increasingly on the capacity to control, interpret, and utilize data.

More specifically, one may observe the emergence of what can be termed the “reengineering of professional relationships,” whereby the nature of library work shifts from conventional operational tasks toward analytical and interpretive functions associated with interaction with intelligent systems. This transition leads to a redefinition of professional competence. Employees are no longer evaluated exclusively on the basis of administrative expertise; rather, their effectiveness increasingly depends on their ability to engage with digital systems and understand their algorithmic logic.

In this regard, Michel Foucault’s conception of power and knowledge becomes particularly relevant, as digital knowledge ceases to be merely a technical resource and instead becomes a mechanism for the production of power within institutional environments ([Foucault, 1980, p. 27](#)). Through continuous performance tracking and behavioral analysis, intelligent evaluation systems do not merely measure professional activity; they actively reshape and direct it, generating a form of persistent “digital discipline.”

Furthermore, a new model of professional relations emerges based on comprehensive digital transparency, whereby every professional action becomes measurable, traceable, and analytically interpretable. This situation reconfigures the relationship between management and employees, transforming it from a model of traditional supervision into one characterized by precise and continuous algorithmic monitoring.

From another perspective, this transformation imposes new psychological and professional challenges on employees. Workers increasingly operate under the pressure of continuous data-driven evaluation, leading to a redefinition of professional autonomy within institutional settings. Instead of professional practice being grounded in individual initiative, it becomes progressively regulated by algorithmic logic and real-time performance indicators.

Accordingly, intelligent evaluation does not merely alter assessment tools and measurement procedures; rather, it reconstructs the social architecture of library

institutions and establishes a new organizational model in which data function as the primary intermediary governing professional relations and decision-making processes.

1.6 Ethical, Epistemological, and Anthropological Challenges of Intelligent Evaluation in Library Institutions

The potential for development which intelligent evaluation possesses creates multiple complicated problems when libraries try to use it because these problems extend past technical aspects into deep moral and knowledge-based and human-related issues. The growing dependence on big data and AI systems requires people to investigate the process of data creation together with their ownership rights and their operational use in institutional decision systems and evaluation methods. Shoshana Zuboff explains that the surveillance economy which depends on data extraction operations does more than gather data because it aims to create a human resource which it analyzes through prediction and control systems that establish a new human-technology bond (Zuboff, 2019, p. 08). The system generates essential questions about library privacy boundaries because digital system operations require complete monitoring and data analysis.

Cathy O'Neil studies algorithms from a critical perspective to show that these systems which appear neutral actually contain built-in biases which generate new social inequalities that affect institutional operations (O'Neil, 2016, p. 03). Intelligent evaluation contains human-made decisions which manifest through mathematical systems and computer-based operations so it does not operate with complete impartiality.

The framework contains a natural problem which makes it difficult to determine the source of knowledge that intelligent evaluation produces. Traditional models depended on human analysis and mental processing to handle knowledge but modern systems now use algorithms which create results through statistical data patterns. The transformation leads to an essential inquiry about human comprehension because it remains unclear whether algorithmic results represent actual knowledge or if they function as statistical models which forecast data relationships.

Rob Kitchin analyzes knowledge transformations in the data era through his research which shows that scientific validation now depends on scientists' ability to process large data sets during immediate data collection (Kitchin, 2014, p. 01). The development of new technologies threatens to push sociological interpretation out of the picture because researchers will focus on technical analysis methods instead.

The anthropological view shows that intelligent evaluation creates new ways for people to interact with their organizations. The assessment process at work requires employees to stay under continuous monitoring which produces an ongoing digital existence at their workplace. The staff members experience growing mental and intellectual stress because they constantly feel surveillance and tracking and they must prove their performance.

The organizational transformation creates major problems because algorithm-based systems decide to promote workers who show particular professional conduct but this action creates new social inequalities which affect multiple organizational levels.

Mohamed El-Hadi presents that digital transformation requires an ethical framework based on human values to achieve strategic goals through technological progress while protecting the human aspects of institutional operations (El-Hadi, 2015, p. 89).

The evaluation process through intelligent systems functions as a civilizational shift which transforms human connections with knowledge and institutions while creating essential questions about future library operations because of data and algorithmic system growth.

1.7 Digital Governance and Quality Management under Smart Evaluation within Library Institutions

One of the major transformations brought about by the integration of intelligent technologies within library institutions is the concept of digital governance. Administrative management within these institutions is based upon digital systems that focus upon transparency and the monitoring of performance of these institutions. This represents a shift from traditional management models towards data-driven governance.

Digital governance within library institutions has led to changes in the decision-making processes of these institutions. Through the integration of smart evaluation systems, it is possible to monitor the performance of these institutions in real time and make changes to enhance the quality of their services. Such an approach is in line with the reasoning of the Organisation for Economic Co-operation and Development (OECD) regarding the importance of data in the governance of public institutions. (Organisation for Economic Co-operation and Development (OECD), 2015, p. 25).

Digital governance is also closely associated with the concept of *organizational transparency*, whereby every activity within the institution becomes measurable and traceable. While this enhances performance quality and institutional efficiency, it simultaneously raises critical concerns regarding the boundaries of professional privacy and the autonomy of actors operating within the institution.

In this regard, Weber argues that organizational rationalization in modern institutions is founded upon precise regulation and standardized procedures. However, this logic has today assumed a more advanced form through digital systems that operate according to what may be termed *algorithmic rationalization* (Weber, 1978, p. 85). Consequently, digital governance may be understood as a contemporary extension of bureaucratic principles, albeit in a more technologically sophisticated and complex form.

Accordingly, integrating digital governance into smart evaluation frameworks is not aimed solely at improving the quality of library services. Rather, it fundamentally reshapes the philosophy of management itself, transforming the institution into a data-centered environment structured around transparency, evidence-based decision-making, and continuous intelligent monitoring.

1.8 Digital Transformation and the Redefinition of User Experience within Library Institutions

The digital environment brought User Experience (UX) as its most important development which transformed the operations of library institutions during its implementation. The process of service quality assessment now requires more than just having information available and receiving it quickly. Users now define digital system value through their interactions with these systems and they want simple interfaces and personalized service options which match their individual preferences. The library has evolved from its basic function as an information storage facility to become an intelligent service system which focuses on user needs.

Big data and AI function as essential tools in this environment which helps organizations understand user behavior and preference patterns to create better targeted services. Service design and development now treat users as their central focus instead of viewing them as simple service recipients. The perspective matches Viktor Mayer-Schönberger's analysis of data evolution which shows how information now enables human activities to become subject to analysis and prediction ([Cukier, 2013, p. 06](#)).

The social change demonstrates how people now approach their connections with various organizations through a sociological lens. User experience exists as a continuous process which connects human users to digital systems through more than just basic information retrieval functions. The interpretation approach draws from Manuel Castells' network society theory which explains how social connections now function through information-based systems instead of conventional social institutions ([Castells, 2010, p. 21](#)).

The change requires library institutions to evaluate their current quality assessment methods. The evaluation of quality demands more than technical performance because it needs to measure user contentment and their active involvement in digital platforms. User experience serves as the main evaluation factor which institutions use to determine their performance levels.

However, this orientation also raises important sociological concerns, most notably the potential “commodification of experience,” whereby user behavior is transformed into data subject to administrative or commercial analysis. Such developments generate critical questions regarding privacy, data ethics, and the limits of excessive service personalization.

Within this framework, user experience in library institutions may be understood as a space in which technology intersects with social behavior, where intelligent evaluation functions not merely as an instrument for performance measurement, but as a mechanism for reshaping the relationship between individuals, information, and the institution itself.

Conclusion

The findings of this study indicate that the transition toward intelligent evaluation within library institutions is not merely a technological improvement in evaluation tools or a modernization of management practices within the libraries. Instead, it represents a

significant structural change in the institutions themselves as a result of the digital transformation. Library institutions are transitioning from using evaluation models that rely upon traditional forms of measurement to using models that incorporate big data and artificial intelligence. Evaluation within the libraries has transitioned from using a “retrospective descriptive measurement” approach to a “real-time interactive and predictive analysis” approach. As a result, evaluation is performed within the libraries continuously as part of the evaluation process itself.

This change within the library institutions has changed the concept of quality within those institutions. The libraries no longer use a concept of quality that is based upon fixed criteria such as outputs or user satisfaction. Instead, quality within the libraries is based upon the concept of service quality, which is defined according to the libraries’ ability to adapt to changing conditions and to use data to generate knowledge. This change in the librarians’ concept of quality represents a change in the institutions from reactive to proactive models of functioning.

The change within the library institutions has also led to a change in their organizational structures. The libraries no longer rely upon human actors to perform evaluations within the institutions. Instead, evaluations are performed by a combination of humans and intelligent algorithms that have led to changes in the distribution of power within the libraries. Certain functions have shifted to AI systems rather than human actors within the institutions. This change indicates the emergence of a new form of “digital rationalization” in the libraries that goes beyond traditional bureaucratic rationality.

The change in the organizational structures of the library institutions has also changed the relationships between professionals within those institutions. The libraries no longer rely upon human actors to perform evaluations within the institutions. Instead, evaluations are performed by a combination of humans and intelligent algorithms that have led to changes in the distribution of power within the libraries. Certain functions have shifted to AI systems rather than human actors within the institutions. This change indicates the emergence of a new form of “digital rationalization” in the libraries that goes beyond traditional bureaucratic rationality.

These changes within the library institutions have also led to changes in the sociological and ethical implications of those institutions. For instance, the libraries now have implications for the reproduction of power within the digital spaces of the libraries, the limits of algorithmic justice, and issues of bias within intelligent evaluation systems. The increasing reliance of the libraries upon algorithms raises questions regarding their operational logic and the data that they use in their evaluations. These implications relate to the notion of privacy within the library institutions, the boundaries of digital surveillance, and the implications of those concepts for the autonomy of the actors within those institutions.

Thus, the use of intelligent evaluation within the library institutions does not indicate a change from a traditional to a digital model of functioning in the library institutions. Instead, it indicates a change in the library institutions that relates to the

broader changes within civilization as a whole and in the relationship between knowledge and technology within the library institutions. The library institutions are no longer limited in their functions to the storage of knowledge. Instead, they are dynamic institutions that function according to data flows within the digital age, which indicates their place within the network society of the modern age.

Accordingly, the present study arrives at a set of key findings that reflect the structural transformation in the nature of evaluation within library institutions under the integration of big data and artificial intelligence. These findings may be presented and analyzed as follows:

- Insufficiency of Traditional Evaluation Approaches in Understanding Actual Performance within Library Institutions in the Digital Context: It was found that traditional evaluation models based on quantitative indicators such as the number of library users, circulation of books, or descriptive statistics are insufficient to capture the performance of current library institutions. Performance within digital libraries is dynamic and changes with the interactions of users with the digital systems, making it impossible for traditional evaluation models to understand the actual quality of the services. This represents a crisis in the methodology of traditional evaluation tools which are no longer appropriate for the digital environment in which library institutions exist today.
- Big Data as a Strategic Resource for Reconfiguring the Quality of Library Services: Big data is not just an informational resource for library institutions; it is a strategic resource that allows these institutions to reconfigure the quality of the services they provide. By analyzing big data regarding the behavior of library users, institutions can design services that are personalized to these users and more precise in the information that they provide, as opposed to the traditional services that were provided to all users equally. This change reflects a shift in how library institutions function, moving from a service-based institution to a data-based one.
- AI as a New Actor in Reshaping Decision-Making Processes:: AI is being integrated into the evaluation processes of library institutions, and this integration has transformed the decision-making processes within these institutions. Rather than making decisions based on the input of human participants in the institution, decisions are made through the interaction of humans and AI systems. These systems can analyze data and make decisions or recommendations for the institution based on the information that they examine. Thus, AI has become an active participant in the decision-making processes of these institutions.
- Reconfiguration of Professional Relationships within Institutions on a Digital Basis: The evaluation processes within library institutions have reconfigured the professional relationships within these institutions. Rather than relationships being based on the traditional administrative structures of the institution, they are now based on digital performance indicators and data logic. This has resulted in the creation of a new organizational model for the institution based on digital performance and digital accountability, where all professional activities are accounted for and analyzed in real-

time. This change has significantly altered the nature of the professional interactions within the institution.

- **The Emergence of Ethical Challenges Related to Neutrality, Privacy, and Algorithmic Fairness:** The use of artificial intelligence in library institutions has given rise to various ethical issues. For instance, concerns regarding the neutrality of AI algorithms in performing library tasks, the privacy of library staff and users, and the ethical considerations required in implementing smart evaluation processes. Additionally, AI may introduce biases into library decisions, create a lack of transparency in digital decisions, and raise concerns regarding the tracking of library users and staff. These challenges necessitate the establishment of ethical controls over smart evaluation processes.
- **Digital Governance as a Fundamental Requirement for Ensuring the Effectiveness of Smart Evaluation and Performance Quality:** Digital governance refers to the structural component of library institutions that regulates the use of digital data and AI in performing evaluation processes. This component manages the data, AI algorithms, and the transparency of decisions made by library institutions. Hence, for smart evaluation processes to be successful, there must be a well-established digital governance practice within each library institution.

Study Recommendations

In light of the findings obtained, and considering the profound transformations generated by smart evaluation within library institutions, the following recommendations are proposed through an analytical perspective that incorporates the sociological, organizational, and technological dimensions of these transformations:

- **Developing Modern Evaluation Strategies Based on Big Data Rather than Traditional Indicators:** The study proposes the development of modern evaluation strategies based on big data for library institutions instead of relying on traditional performance evaluation indicators. The use of big data in performance evaluation will enable library institutions to gain a more realistic and accurate understanding of their performance based upon the digital transformations that have impacted library institutions and their users. This will allow library institutions to better understand the needs of their users and to develop strategies that will help them to better meet those needs in the future.
- **Strengthening the Training of Personnel in Library Institutions in the Fields of AI and Data Analytics:** The study suggests that library personnel should be trained in the use of AI and data analytics to enable them to effectively use intelligent evaluation systems within their institutions. AI and data analytics can help library personnel to better understand their performance evaluation systems, and to make changes to their institutions that will enhance those evaluations. Without training in these areas, however, library personnel may not be able to use these systems effectively, potentially limiting the benefits that could be gained from intelligent performance evaluations.
- **Integrating Clear Ethical Frameworks to Regulate the Use of Algorithms in Evaluation Processes:** The study recognizes the need for ethical frameworks to be integrated into the use of intelligent evaluation systems in library institutions. Such frameworks will

help to ensure that the privacy of both users and library personnel is protected in the use of these evaluation systems. Additionally, the integration of ethical frameworks into intelligent performance evaluations will help to build trust between library institutions and their users, as well as to minimize the risks of digital inequalities being reproduced within the evaluation systems.

- **Developing Digital Governance Policies to Ensure Transparency and Reduce Algorithmic Bias:** The study suggests that digital governance policies should be developed for library institutions to regulate the use of AI and big data in their performance evaluation systems. Such policies will help to ensure that the decisions made by these intelligent evaluation systems are transparent, and that any potential algorithmic biases are minimized. Overall, these digital governance policies will help to ensure that the performance evaluation systems of library institutions are fair and trustworthy for their users.
- **Promoting Sociological Research on the Impact of Digitalization on the Organizational Structures of Library Institutions:** The study recommends the promotion of sociological research into the impact of digitalization on the organizational structures of library institutions. As digital transformations have significantly altered the structures and functions of library institutions, it is important to understand these impacts from a sociological perspective. Sociological research into these issues will enable library institutions to gain a deeper understanding of how digital transformations have impacted their organizational structures.
- **Enhancing User Experience as a Primary Indicator of Quality Rather Than a Secondary Element:** The study recommends the enhancement of the user experience in library institutions as the primary indicator of quality, rather than as a secondary element in their performance evaluation systems. As library institutions have undergone digital transformations, understanding the needs and behaviors of library users has become essential to their performance evaluations. As such, enhancing the user experience will allow library institutions to better adapt to digital transformations, and to provide more intelligent and effective services to their users.

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