

PROBLEMS OF BIG DATA ADOPTION IN THE HEALTHCARE INDUSTRIES

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ABSTRACT

Big data offers the knowledge required for healthcare providers to streamline customer service processes that customize healthcare and create best practices for communicating with clients or patients. A more detailed and customized experience can be offered to customers. But there are many challenges that healthcare organizations are facing. The research aims to study big data challenges in the healthcare sector. A literature review is performed to discover big data problems in healthcare. A questionnaire is utilized for the survey research in the hospitals. Target populations are the staff who are working in the hospitals. For analysis, exploratory factor analysis is being performed. All the challenges are grouped into five factors. All the parameters are satisfied for the study.

KEYWORDS

Big Data, Challenges, Healthcare, India, Management

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INTRODUCTION

The healthcare sector is among the most extensive and mature sectors globally, producing much value. The focus of healthcare management has shifted from disease-centred to patient-centred models worldwide. [1] The growth of the healthcare delivery model based on values and the patient-centred care movement is guided by a philosophy of educating healthcare supremacy and lowering costs. In healthcare organizations, the volume and demand for big data (BD) are gradually increasing. It is critical to monitor and evaluate massive amounts of

health data to provide effective patient-centred treatment. [2] Because of the variety and volume of data sources that have grown over the last two decades, outdated data processing implementations cannot analyse 'Big Data' (BD). New and creative BD tools and technologies are required to reach and exceed the potential of health data management.

Many healthcare organizations have made substantial efforts to combine vast data resources and advanced technology to address this constraint. Electronic health

records (EHRs) that use BD analytics for major disease assessments and epidemiological research performance can be considered breakthroughs in medical information management. [3] Despite attempts to develop successful BD systems, several health organizations have faced early failure since implementing these new systems. [3] BD is widely accepted to explain separate entities' management processes across sectors. Therefore, due to predictable and unpredictable obstacles, a substantial number of organizations had encountered early failures in the implementation of healthcare BD. Barriers to such programs may come from a number of sources, including organizations, physicians, patients, or governments. This study describes the challenges faced by the healthcare sectors in the adoption of BD in their systems.

LITERATURE REVIEW

1. BIG DATA

In recent years, the word "BD" has become increasingly common around the globe. Whether it concerns business or academia, almost every research field produces and analyzes BD for multiple purpose. [4] The BD definition includes velocity and variety in addition to volume. The rate at which data is collected is called velocity. It makes it accessible for further examination. The standard definition of BD has been these three V's. While other individuals have added many other Vs to this description, 'veracity' remains the most agreed 4th V. [5]

The most challenging job with regard to this massive volume of knowledge that can be structured and unorganized is its management.[6] Conventional programming is unmanageable for BD, so we need advanced applications and programming to utilize quick and financially savvy excellent quality, registering assets for such assignments. Artificial consciousness and present-day combination calculations should be used to sort out this gigantic measure of information. To utilize neural organizations and other AI procedures to accomplish robotized dynamics.

2. BIG DATA IN HEALTHCARE

BD is a low-cost, high-volume, high-speed, and high-velocity data processing system that improves insight, decision-making, and process automation. BD was used in several sectors to replace the conventional database framework to allow the appropriate management and analysis of extensive databases [7] Healthcare BD, also

referred to as medical BD, plays a vital role in many hospitals and medical clinics' decision-making processes. Medical institutions build knowledge assets with high volume, velocity, value, and variety. Practical approaches should be used to analyses this type of data to improve decision-making. Medical BD comes in various styles and shapes; they're usually unstructured and complex, so they need a sound management system to make the most of them [8], using conventional data processing techniques or software. The BD method of data mining will collect practical knowledge from massive databases of large sizes. [9] Also, data mining association rules help data mining, creating rules in deciding its association between various items.

3. CHALLENGES OF BIG DATA IN HEALTHCARE

BD undoubtedly brings tremendous benefits for medical institutions if implemented correctly in the healthcare context, but its implementation involves many challenges from various sides.

3.1. Expertise barriers (EB): The absence of technical information can prompt the associations' inability to actualize technological developments. Practically all organizations endeavor to procure a severe level of specialized specialization and a low degree of specialized adaptability simultaneously. [10] Many expected and unforeseen difficulties have deterred clinics from creating BD clinical innovation because of a severe absence of technical information.

3.2. Operation Barriers (OB): This identifies with the issue of overspecialization and protection from authoritative change, especially those identified with creation and activity instead of innovative work [11]. This sort of obstruction is looked at by numerous associations, particularly when they have profoundly full capacities, bringing about a sensation of hesitance to change their exercises to actualize some advancement. In this manner, concerning information creation and the executives, the fame of BD is developing.

3.3. Resource barrier (RB): The essential factor for guaranteeing the early achievement of advancement execution might be many abundances. [12] Additionally, clinical BD frameworks' performance is expensive because of the absence of information normalization, the sheer volume of information, and the weakness of gadget networks.

3.4. Regulation barriers (RUB): Guidelines can happen in different structures, and in any event, one such guideline applies to most enterprises. Rules for organizations have been arranged into four primary sorts: self-guideline of industry (codes of corporate leaders and morals), government guidelines, guidelines of asset imposing business models, and brand name guidelines.[13] Even though it is difficult to make clinical BD without the limitation of rules, the plan and utilization of clinical BD have not been plainly and effectively characterized.

3.5. Market Access Barriers (MAB): Barriers to advertise section commonly apply to all obstructions that limit innovations from arriving at open buyers. When the overall advancement industry is phenomenal, these obstructions become less applicable [14]. Before being dispatched, the FDA should examine each clinical item under exacting quality and security the board guidelines. The snag to showcase access exists because the FDA requires an impressive consumption in R&D capital and preliminary clinical time.[15]

RESEARCH METHODOLOGY

The sample was chosen from every layer through the simple random sampling strategy as it permits populace congruity from the subpopulation [16] A 7.0 Likert scale had been used to examine different reactions that reach from 'strongly agree' to 'firmly concur'. The polls were shipped off 461 respondents. However, just 308 respondents returned usable surveys, substantial for investigation. To avoid a typical strategy, the examination group's inclination has played it safe during the pre-information assortment stage.[17] To check whether the collected data is basined or performed a single factor Harman test. The first factor of the EFA explains 32.588% of the variance, which is below the 50% level of recommendation [18] Table I shows the percentage of the demographics of respondents.

TABLE 1: DEMOGRAPHICS OF THE RESPONDENTS

Characteristics	Percentage
Gender of the respondents	
Male respondents	63

Female respondents	37
Current Position of the respondents	
Doctors in the hospitals	42
IT manager in the hospitals	37
Medical Officers in the hospitals	21

DATA ANALYSIS

1. RELIABILITY AND VALIDITY

1.1. Cronbach's Alpha

Cronbach's alpha (α) was used to perform the reliability test for each factor. Over the suggested worth of 0.70, the upsides or dimensional scales should be. As shown in Table II, the values are more significant than 0.70 of the threshold levels. [19]

1.2 Composite Reliability

Composite reliability (CR) was additionally estimated for every one of the parts. It is assessed for inside consistency dependability given its capacity to give better outcomes. The builds' CR esteems > 0.7 demonstrates that the composite dependability measures are solid [20], as displayed in Table II.

2. EXPLORATORY FACTOR ANALYSIS (EFA)

KMO an incentive for the flow research is 0.857. The importance esteem is 0.000, which is under 0.05, i.e., the likelihood esteem level worthy. The extraction technique utilized was principal axis factoring. [21] For the parts, the level of all-out difference was explained by segment 1 (36.115%), segment 2 (10.342%), segment 3 (8.768%), segment 4 (8.486%), and segments 5 (6.110). The combined all-out difference clarified by each of the three elements is 69.730%.

The Rotated Component Matrix is significant for deciphering the after effects of the examination. Turn helps gather the things, and each gathering contains multiple items in any event, which improves the design. Subsequently, this is the point of the objective of turn. In this examination, we have accomplished this point. Eighteen fundamental factors were assembled under five individual parts, as displayed in Table II.

TABLE II: VALUES OF A, VALUES OF CR, VALUES OF ROTATED COMPONENT MATRIX

Variable	Indicators	a	CR	Rotated Component Matrix
OB	OB1	0.847	0.889	.784
	OB2			.846
	OB3			.873
	OB4			.762
MAB	MAB1	0.860	0.893	.845
	MAB2			.846
	MAB3			.829
	MAB4			.767
EB	EB1	0.830	0.886	.842
	EB2			.773
	EB3			.778
	EB4			.853
RUB	RUB1	0.840	0.902	.844
	RUB2			.953
	RUB3			.803
RB	RB1	0.713	0.838	.839
	RB2			.881
	RB3			.654

DISCUSSION

BD in healthcare helps manage the massive volume of information created, like collecting patient records, etc. [13] But on the other hand, they face many challenges in the hospitals' adoption process. As this technology is new to everyone, they have lacked resource people. From the literature, we identified five challenges the BD faces in the adoption process. The first was an expertise barrier that refers to a lack of experience handling big data software. Employees do not have proper training, showing change resistance to adopting this technology. So, the top administration needs to decide on the training and motivate its adoption.

The second is the operation barriers facing privacy and IT infrastructure employees and top management face [12] Many hospitals do not have the proper IT infrastructure for adopting this technology. The third barrier, the resource barrier, refers to the project's cost arrangement problems. [15] The fourth barrier is regulation barriers, as the organizations need to follow the government guidelines to adopt the latest technology. Modifications and regulations

of laws and policies in the healthcare sector create difficulties in applying medical BD technologies.[14] The fifth barrier, market access barriers, refers to problems the market faces and the competitor side. Healthcare BD has also raised numerous challenges in accepting and implementing medical institutions.

CONCLUSION

This research aims to find out the problems faced in the healthcare sector for the adoption process of BD. From the literature, five challenges were identified. For analysis, exploratory factor analysis is used, which helped group the variables into five groups. The finding of the study was also supported from another research. There are some limitations to the study, and also this can be extended further. We can extend this research and develop a structural equation model for the analysis. This research can be extended to some other sectors also.

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