

CONCEPTUAL FRAMEWORK TO INCREASE ELECTRONIC MEDICAL RECORD (EMR) ADOPTION IN INDIA

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By

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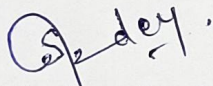
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This is to certify that dissertation titled **“Conceptual Framework to increase Electronic Medical Record (EMR) Adoption in India** is a record of the research work undertaken by **Dr. Sonali Pandey** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

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ABSTRACT

The present paper has proposed a framework to increase the adoption of Electronic Medical Records in India, more so in smaller hospitals. Basically, the challenge lies in resources and expertise. A significant number of EMR vendors are unable to serve and support a heterogeneous healthcare market. This framework bridges the gap through System Integrators—specialists who offer EMR adoption support, government programme onboarding, training, and technical assistance. This will be ensured through collaboration between EMR Vendors and System Integrators, thereby making the integration of the EMR with the existing infrastructure of hospitals smooth for them to participate in the Ayushman Bharat Digital Mission.

Stakeholder consultations brought out problems associated with product perception, value proposition for hospitals, reseller-related issues, staff turnover, inexperience in ABDM, data security concerns, costing and training apprehensions, integration issues, and limitations related to digital maturity. The most common concerns are thus centered around data security, costs, and training in ABDM.

This framework, therefore, must include robust data security measures, financial aid, and comprehensive training programs as a matter of course to ensure successful EMR adoption. Qualitative research involving interviews/field visits with key stakeholders should be done to understand the challenges and their receptiveness towards this framework. With the inclusion of System Integrators, this framework would provide special support to smaller hospitals, bringing about EMR adoption on a large scale while propelling the digital healthcare transformation in India.

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ABBREVIATIONS

Abbreviations	Meaning
ABDM	Ayushman Bharat Digital Mission
EMR	Electronic Medical Record
FHR	federated health record
HIP	Health Information Provider
HIU	Health Information User
HMIS	Health Information Management System
LIMS	Lab Information Management Systems
M1,M2,M3	Milestone1,2,3
PHR	Personal Health Record
SI	System Integrator

1. INTRODUCTION

The health industry has changed significantly since the introduction of EMR. It has transformed how personal medical records are maintained, accessed and used by healthcare providers all over the world which has helped to increase efficiency, reduce costs for patients and improve quality of care in several ways. The COVID-19 pandemic has emphasized and made apparent the need for accurate information stored in electronic health records that guide health professionals during emergencies. As medical systems look for ways to cut costs, minimize errors and improve patient outcomes, they have turned to adopting EHRs as an essential measure.

Digital health records arising from patient interactions with health service providers. In light of this, the healthcare practitioners generate these health records using specialist software, electronic medical records, health information management systems, or lab information management systems. Prescriptions, OP consultation notes, diagnostic reports, discharge summaries, and other documents are prepared as part of these health records. (1)

The Government of India launched the Ayushman Bharat Digital Mission in 2021 with the goal of developing such infrastructure necessary to give support to the Integrated Digital Health Infrastructure of the nation. ABDM is based on a federated health record. Patients can see their health record from any PHR application, aggregate it from multiple healthcare providers, and share their information. (1)

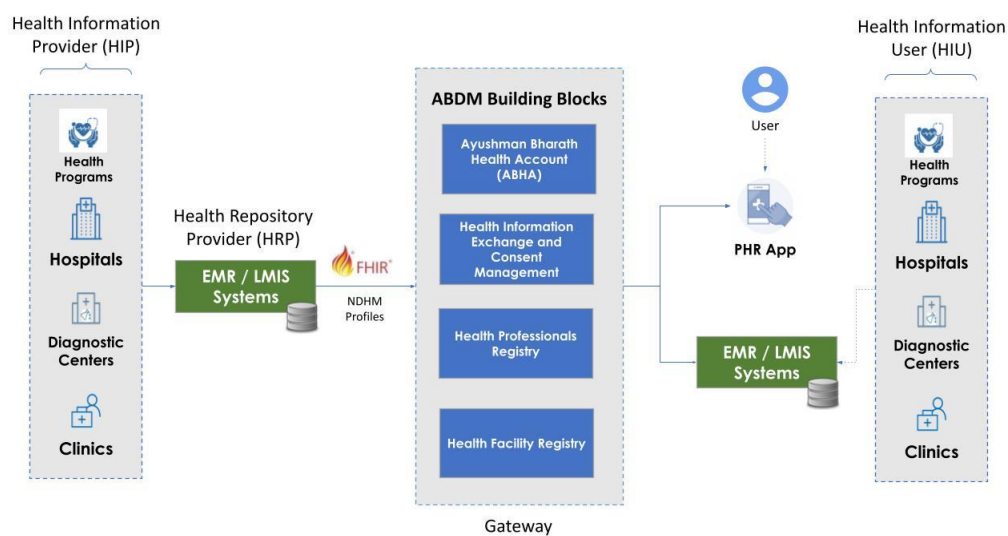


Figure 1: Different Entities involved in the FHR framework of ABDM

The ABDM FHR framework looks at the format of health records to ensure interoperability, storage of health records to ensure availability, and sharing of health records with consent. Every Health record contains information regarding who the patient is, which health professional did the treatment, and at which facility. ABDM will make it compulsory for every entity to register for a digital identifier and use the same while generating a health record/ linking of records under ABDM. (1)

In the dynamic landscape of healthcare in India, the implementation EMRs has emerged as a critical requirement for hospitals seeking to participate in the ABDM. However, the wide-scale adoption of EMRs remains a formidable challenge, impeding the progress of digitalization in the healthcare sector.

2. BACKGROUND

The comprehensive engagement of hospitals with the Ayushman Bharat Digital Mission (ABDM) necessitates a series of significant undertakings related to Electronic Medical Records (EMR) adoption. The path to successful integration includes not only the hospital's receptiveness towards the incorporation of EMRs but also the ability to identify and select an ABDM-certified EMR system that aligns with their specific requirements. Additionally, it involves the seamless assimilation of the chosen EMR into the existing hospital system, the efficacious training of staff for optimal EMR utilization, and the continuous monitoring of its usage. However, a significant number of Indian hospitals face challenges due to limited resources and expertise, impeding their ability to adopt EMRs and participate fully in the ABDM ecosystem. Most EMR product vendors in India are very small and don't have the go-to-market reach and resources needed to support a very diverse and distributed healthcare market in India. This inability to invest strongly further impedes the sale and deployment of EMR in the marketplace.

To tackle these challenges in EMR Adoption, a Conceptual Framework is proposed which visions to empower small to mid-sized organizations with deep expertise in IT systems, computer hardware, and software support, enabling them to drive transformative advancements in digital health. The Framework aims to bridge the gap between hospitals and EMR solutions through strategic partnerships with System Integrators. These System Integrators offer specialized services for EMR and core application adoption, ABDM onboarding, training, implementation support, and end-user assistance. Collaborating with the EMR vendors, the framework facilitates seamless integration of EMRs into hospitals' existing infrastructure and enables them to join the ABDM ecosystem.

Selected System Integrators will play a pivotal role in supporting the creation of a focused and economically viable proposed framework for facilitating the successful adoption of EMRs. Their comprehensive support will include development of appropriate commercial models, tailored training Frameworks, meticulous implementation assistance, and a steadfast commitment to ensuring consistent usage of core applications. By leveraging the expertise of these integrators, the framework plans to facilitate widespread EMR adoption, enabling hospitals to actively contribute to the ABDM initiative and advancing digital healthcare in India.

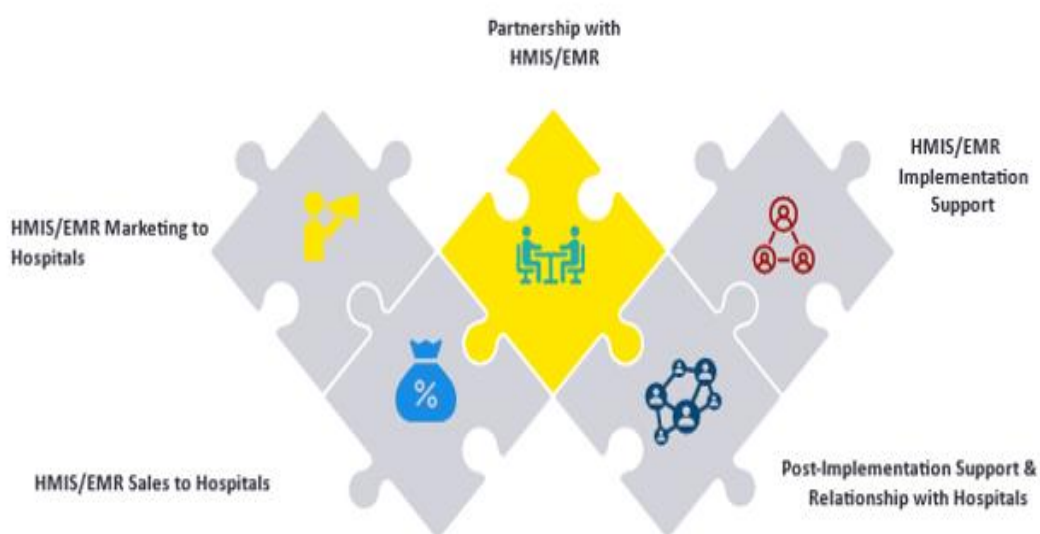


Figure 2: System Integrator-Digital Health Program Module

3. OBJECTIVES

- To understand the challenges in EMR Adoption and strategic objectives that encapsulate its mission to accelerate EMR adoption and fortify digital health infrastructure across Indian healthcare facilities.
- The objectives of the proposed framework are to assess the long-term sustainability of EMR adoption facilitated and to accelerate the integration of digital health solutions into India's healthcare ecosystem.

The Framework is expected to;

1. Establish linkages with ABDM-Certified EMRs: By creating live connections between hospitals and ABDM-certified EMR systems, the framework enhances access to strong digital health solutions.
2. Use Local System Integrators: Through collaboration with experienced local system integrators, the framework helps hospitals in choosing, implementing and integrating appropriate EMR solutions during their critical stages.
3. Advocate for Staff Training: To promote hands-on training, SIDH Framework carries out comprehensive on-site frameworks which emphasize on effective use of EMR systems and associated digital tools.
4. Simplify HPR/HFR Registration: In order to simplify Health Provider and Health Facility Registration processes, reduce administrative burdens significantly as well as fasten and widen the adoption of EMR within the ABDM ecosystem
5. Continuous IT Support: For technical help/troubleshooting/guidance, this Framework offers continuous IT support thereby allowing an uninterrupted operation and a consistent

4. REVIEW OF LITERATURE

The EMR adoption growth differs across continents thus a diverse and rapidly changing environment is influenced by various factors: policy paradigms, technological advances, socio-economic conditions and cultural norms.

Estonia has become a hub for the implementation of leading-edge digital health solutions such as Electronic Medical Records (EMRs). This nation has set an example for global healthcare innovation with the creation of extensive digital health infrastructure led by the Estonian e-Health Foundation. The X-Road Data Exchange Platform is one of these initiatives that enable secure and standardized information sharing among healthcare providers, thereby promoting a seamless flow of patient data within a collaborative ecosystem.

The Estonian Health Information System (EHIS) serves as a centralized platform, integrating various health-related databases and empowering both healthcare professionals and patients through initiatives like the e-Prescription system and the Patient Health Portal. Estonia's emphasis on citizen engagement, reinforced by robust legislation and data governance frameworks, ensures transparency, privacy, and adherence to regulatory standards, solidifying its position as a digital health pioneer.

The Health Information Technology for Economic and Clinical Health (HITECH) Act is one of the major drivers of EMR adoption that has led to tremendous progress in the United States. It offered strong incentives to health care providers that were still using paper-based documents to switch to electronic health systems. Epic Systems, Cerner, Allscripts and other leading EMR vendors have actively participated in this digital revolution. A study conducted by Adler-Milstein et al., reveals a remarkable surge in EMR adoption rates in the U.S., soaring from 42% in 2008 to an impressive 72% by 2011.(3)

In addition, UK has been promoting EMR use through Frameworks such as National Health Service (NHS) Digital Transformation. Currently, almost all general practices across England are using EMRs that emphasize centralized EMR systems and patient access.(4)

Australia's national eHealth strategy is centered on EMR adoption which aims at utilizing digital innovation to enhance healthcare outcomes. The plan focuses explicitly on

implementing a My Health Record system where individuals can securely store their own medical information electronically online.

Many practices in Australia are transitioning to electronic systems for better administrative efficiency and are encouraged through financial incentives and support Frameworks to do so with the aim of enhancing EMR adoption. (5)

While there is a certain level of variability in EMR adoption across Canada, some regions like British Columbia and Alberta have made significant strides towards fully implementing them while others among them being New Brunswick and Nova Scotia still lag. Some of these strategies include funding incentives that encourage healthcare practices to transition into electronic systems, standards-based interoperability assistance that enhances smooth data flow between different EMR systems and health care providers as well as sharing best practices resources among provinces.

However, many underdeveloped countries are still embracing early stages of adopting EMRs dealing with issues such as lack of technology infrastructure, inadequate funding, and manpower challenges. India is presently at an early stage compared to its counterparts globally but it has initiatives in place for encouraging the adoption of electronic medical records (EMRs) while also integrating digital healthcare technology into its health system.

The National Health Policy, 2017 highlights the significance of using technology to improve healthcare delivery including introducing EMRs. Furthermore, The Government of India rolled out the National Digital Health Mission, aimed at creating a digital health ecosystem in the country, which would therefore enable the adoption of electronic health records. (6)

Conversely, lack of awareness among healthcare providers and patients is one of the main obstacles hindering broad adoption of Electronic Medical Records (EMRs) in tier 2 and tier 3 cities. This gap can be filled by System Integrators (SIs) who become local champions. SIs also play a big role in overcoming challenges posed by distance because they offer key implementation, technical and training support that helps hospital staff use them effectively. By acting as intermediaries, SIs facilitate seamless incorporation of EMR systems into healthcare facilities across these disadvantaged areas.

Their on-the-ground presence ensures hands-on assistance, leading to a better understanding and acceptance of EMR technology among hospital staff.

This strategic involvement positions SIs as the bridge in overcoming barriers to adoption, contributing significantly to the increased utilization of EMRs across tier 2 and tier 3 cities.

Title of Literature	Place of Study	Objective	Findings
Case Study of an EMR system in large hospital in India: Challenges and Strategies for successful adoption.	India	The authors describe an interpretive case study in one of the large eye hospitals of India that adopted an EMR system. Few of the major challenges in the use and attempt to adopt the system by the hospital were relatively complex organizational climate differences, different sets of expectations from the system among stakeholders, and very difficulty rightly identifying the designing strategy.	Despite the potential benefits, adopting EMRs in developing countries is not without obstacles. These Challenges arise from conflicting stakeholder demands, user doubt and limited IT abilities. These barriers can be surmounted by effective communication, involving users and paper-like interfaces that are easy to use by people with no computer literacy. Moreover, social and financial incentives can encourage acceptance of these systems as well as raising awareness for more computer applications Frameworks.
Electronic Health Record Adoption In US	US	To analyse trends in hospital adoption	Commonly reported barriers included up-front and

Hospitals: Progress Continues, But Challenges Persist		of HER in the US, focusing on progress made, remaining challenges, and areas needing further attention	ongoing cost, physician's cooperation, and the complexness of meeting meaningful-use criteria. Nationwide hospital EHR adoption, is now within reach but will require a focus on small and rural. Strategy are needed for the financial challenges hospitals face in adopting EHR, especially now that penalties for nonadoption have begun
Technology' Acceptance Model: A case of electronic health record in Estonia	Estonia	This study aimed to identify the key factors that motivate Estonian healthcare professionals to use the EMR/HER and to understand the activities undertaken by Estonia to encourage use of EMR Adoption.	One of the factors engendering positive attitudes toward the Estonian EHR system was psychological ownership. It influenced attitude towards the system and the usage of the system, perceived ease of use. Case provides support for perceived usefulness to influence attitude and thus acceptance and usage levels in the Estonian EHR case.
The role of the EMR in developing countries for care delivery development: a systematic review	US	One of the factors that engendered positive attitudes toward the Estonian EHR system was	For several decades, the potential of an EMR system to actually revolutionize the practice of medical care by facilitating healthcare delivery and decision-making processes has been

		psychological ownership. It influenced the attitude towards the system and the usage of the system, perceived ease of use. Case provides support for perceived usefulness to influence attitude and thus acceptance and usage levels in the Estonian EHR case.	noted. Among the many advantages of an EMR system are its accurate medication lists, the accomplishments of legible notes and prescriptions, immediately available charts, among very many others. Despite various challenges in the developing world, ranging from human expertise to financial resources, quite a number of research works have always shown how feasible it would turn out to be in coming up with an EMR system design and implementation with support from developed nations.
EHRs: The Challenge of making Electronic Data usable and interoperable	US	For many decades, the potential of an EMR system to really change the practice of medical care has been identified, which involves facilitating healthcare delivery and decision-making processes. Among the numerous benefits	Meaningful use incentives did a great deal to increase the adoption rate of EHRs among physicians but brought negative consequences in terms of reduced efficiency, increased clerical burden, and increased professional burnout risk for the physicians themselves. The ONC estimated that accomplishing nationwide interoperability in the US health system would occur

		of an EMR system are accurate and exact medication lists, accomplishment of legible prescriptions, charts that are immediately present, among many more. Despite challenges facing the developing world, ranging from a lack of human expertise to financial resources, quite a number of research works have always shown how feasible it would turn out to be with support from developed nations in designing and implementing an EMR system that fits into this environment.	between 2021 and 2024 in its October 2015 report entitled "Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap". Despite the incentive payments that are possible, financial costs remain one of the biggest barriers standing in the way of EHR implementation.
Electronic medical record adoption progress in Canada	Canada	The researchers studied the rate at which physicians in Canada have	Canadian physicians remain at the stage of EMR adoption. Progression in the use of EMRs requires experienced

		adopted electronic medical records; provincial incentives; the benefits perceived from and barriers to, EMR adoption.	knowledgeable technical support during implementation, and financial support for the transcription of patient data from paper to electronic media. Interoperability of EMR offerings for hospitals, pharmacies and clinics is the rate-limiting step for attaining a unified EMR solution for Canada.
Overcoming Electronic Medical Record Adoption Challenges in Saudi Arabia	Saudi Arabia	This paper seeks to undertake a critical review of literature focusing on the challenges related to the This is the backdrop against which the present study is aimed at identifying, from one side, the key technical, financial, human, cultural, and policy-related challenges, and, from another side, pinpoints the most critical privacy and security issues which act as major barriers to the wide	This review finds that the effective integration of EMR systems in Saudi Arabia's healthcare requires a comprehensive strategy. This includes user-friendly EMR design, extensive training, strong privacy protection, and careful planning. The success of EMR implementation hinges on visionary leadership, collaboration among stakeholders, and adaptable approaches. By overcoming these challenges, Saudi Arabia can leverage EMR systems to significantly improve healthcare quality, efficiency, and achieve Vision 2030's healthcare goals.

		diffusion of an EMR infrastructure in the Saudi healthcare environment. Ambient is optimistic that this effort will aid policymakers, healthcare professionals, and stakeholders in taking this working strategy toward successful integration of EMRs and further modernizing KSA's healthcare delivery system in conjunction with Vision 2030.	
Perception of EMR Among Healthcare Professionals	US	This research explores the reasons behind this low level of usage of EMR, and investigates the potential effects of a particular information infrastructure on the level of patient satisfaction. Data	This research contributes to a revised model of the adoption of EMR by health professionals in organizations providing care to patients. This revised model generated from the research aims to provide focus areas for healthcare facilities that can be emphasized for better EMR adoption.

		was collected using online survey and personal interviews from eighteen health professionals.	
Success criteria for EMR implementations in low-resource settings: a systematic review	US	An electronic medical record system can facilitate clinical work by providing relevant information at the right time to the right people and efficiently using the available resources. Specifically, within low-resource settings, reliable data are also needed to support public health and local supporting organizations. This means that, from the literature available, success criteria regarding the implementation of EMRs in low-resource settings shall be identified	Critical success factors to the successful implementation of EMR are very reliable ways of handling and managing data, human resources and effective project management, and technical architecture and infrastructure.

		and collected and then summarized into recommendations in this systematic literature review.	
Challenges for adoption of smart healthcare strategies: An Indian perspective	India	The National Digital Health Blueprint lays out the implementation framework for the National Health Stack (NHS). This blueprint takes into account the global best practices in adoption of smart or digital technologies. However, a clear assessment of the challenges in adopting smart healthcare strategies, especially in the Indian context is critical to the success of the ABDM. This review aims to fill this knowledge gap.	Challenges in Adoption: - Privacy and security issues - Data governance - Interoperability issues - Standards for data representation - Poor data quality - Functional and non-functional system issues - Costs - Urban and rural divide of trained/skilled healthcare workforce and infrastructure - Governance Challenges - End User Challenges - Organisational challenges

Perspectives on digital Health Platform & its implementation at national level	India	A Case for National Adoption of the Digital Health Platform In contrast to the way in which the National Digital Health Mission has been designed and rolled out in India, the high blueprint of DHP and its common component overview are provided in the paper. This paper describes the method to achieve DHPs in a layered, comprehensive, and reusable way.	This paper describes a method to implement DHPs in a modular, thorough, and reusable way. Policies and technological behaviour, when clearly defined, may explain how to proceed with implementation of a DHP. Proper governance also results in a clear image of how to proceed. It is very possible to gradually embrace digital health services, which spares one headache regarding installation. Incentive programs go to the extent of causing problems with data quality. Most of the time, when the governments incentivize digital health, they run into a problem compromising with the quality of information. Owing to this, proper majors have to be taken up, whereby frameworks inscribed with IQ will have to be used and brought in place. For making sure that the data is used for the secondary objectives of healthcare, necessary majors need to be
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			taken up, which can be through schemes of certification, guidelines by MVP, IQ frameworks, etc., while encouraging widespread adoption.
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5. METHODOLOGY

The study will employ a qualitative approach which is focused on primary data collected through in-depth interviews and the interactions carried out during field visits with the three principal stakeholders- EMR Vendors, System Integrators (SI) and Private Hospitals.

1. EMR Vendors

1.1 Criteria defining the selection of EMR Vendors

In our pursuit to have an effective Electronic Medical Records (EMR) system, our selection methodology emphasizes vendors who demonstrate commitment to ABDM compliance and offer comprehensive coverage of all modules essential for a Minimal Viable Product (MVP). Through strategic partnerships with esteemed EMR Vendors, our objective is to seamlessly integrate EMR solution into existing healthcare infrastructure.

- **ABDM Compliance:** Prioritize vendors actively pursuing ABDM compliance, specifically aligning with M1, M2, and M3 milestones.
- **Extensive Module Coverage:** Verify that the chosen vendor covers every module included in our Minimum Viable Product, covering essential features for effective management of healthcare data.
- **Brand Value:** Partner with well-known industry players recognized for their expertise, commitment, and track record in delivering cutting-edge EMR solutions.

M1 Compliance	• ABHA No. with Address and Internal Array. Using Adhaar, Mobile and Driving License • Take and Check ABHA address, while on-boarding a patient.
M2 Compliance	• Assist Users in finding their health records in your system • Inform Users when a health record is created in your system or linked to an ABHA address • Revoking consent, deleting ABHA address and heartbeats for uptime • Share the health record on-demand after asking for the user's consent • Convert health record into interoperable format in FHIR
M3 Compliance	• Remote Access of Medical Records linked to an ABHA address • HRP to fetch linked records • Curate and Display fetched medical records

Table 1: Levels of ABDM Compliance

1.2 Vendor Selection Process

We reached out to over 40 Electronic Medical Record (EMR) vendors using a convenient sampling method that met the selection criteria requirements. This approach shows our commitment to a thorough and strategic process for choosing the right vendor for EMR adoption in India.

2. System Integrators

The proposed framework seeks to 'strengthen' organization with healthcare and IT skills so that they can cater to the Hospital segment in EMR adoption.

This is an Inclusive approach that calls for collaboration, innovation, and total support to the successful Adoption and Implementation of the EMR in healthcare facilities.

2.1 Criteria defining essential qualifications for system integrators:

The proper working of the framework will turn on the careful selection of that involves sophisticated and competent system integrators. The selection process includes an exhaustive set of criteria and a scoring matrix to ensure that the proposition SIs are competent to meet the requirements of the Framework. Following section provides the selection criteria and the corresponding scoring matrix.

The proposed framework would focus on market segment criteria that would bring out clear-cut qualification requirements of system integrators.

The crucial factors considered for selecting SIs are:

- Age of Company
- Line of Business
- Clientele
- Headquarters
- Number of Offices
- Number of employees
- Revenue of company

Criteria	Specifications	Description	Rating	Total Score
Age of Company	10 +	How old is the company	10	10
	5 to 10		5	
	<5		3	
Line of Business	IT & ITeS		10	10
	Consultancy services - Healthcare		8	
	Consultancy services - non-Healthcare		6	
	IT Infrastructure / Hardware		4	
	Others		2	
Clientele	Hospital Client	Include both pvt & govt hospital	15	15
	Other Healthcare Client		10	
	Non healthcare Client		5	
Operating Office	Within India within pilot cities		10	10
	Within India outside pilot cities		5	
	Outside India		0	

Number of Offices	More than 5		5	5
	3 to 5		3	
	Less than 3		1	
Number of Employees	>20	The total number of employees working on a full-time basis.	10	-
	10 to 20		5	
	Less than 10		3	
Revenue	>31	Minimum annual revenue of Rs.25 lakhs per year for last 2 years	10	-
	25 to 30		5	
	Less than 25 lakh		3	

Table 2 Detailed Selection Criteria for SI

2.2 SI Selection Approach

The SI Selection Approach is divided into 3 phases:

Phase I: SI Identification and Screening

Phase II: Webinar Planning and Onboarding of SI

Phase III: EMR and SI Collaboration and Pilot Site Execution

3. Hospitals

The Framework envisions to introduce digital solutions and transform the healthcare service delivery from paper to paperless. Through this initiative, hospitals can effectively contribute to the ABDM initiative, thereby propelling the advancement of digital healthcare across India.

Our strategic focus is directed towards the private hospital segment within Tier 2 and Tier 3 cities, with an emphasis on facilities having bed capacities ranging from 10 to 100 beds. The facilities are grouped into three categories:

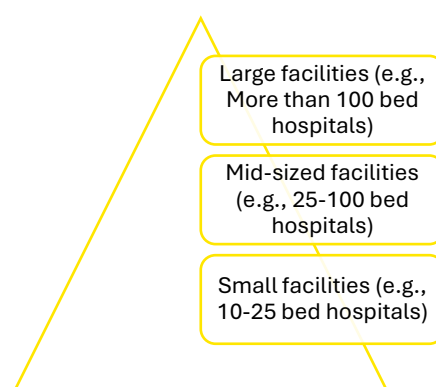


Figure 3:Facilities Classification

We have compiled a comprehensive list of hospitals located in the identified pilot sites, utilizing public data repositories.

A hospital screening matrix has been developed based on criteria such as bed strength, the presence of a hospital website, hospital chain affiliation, and availability of HFR ID to screen the hospitals effectively. The highest score allocated in the matrix is 4.6.

Criteria	Variable	Observation	Score	Total Score
Bed Strength	Number of beds	Less than 10 beds	0	
		More than 100 beds	0	
		10-50 beds	3	
		51-100 beds	5	
Availability of website	1.Presence of a website 2.User-friendliness 3.Basic information accessibility	No website	1	
		Basic website(hospital type, specialty type, services provided, contact details)	3	
		Advanced features (if the website allows OPD appointment bookings)	5	
Chain of hospitals	1.Number of hospitals in chain 2.Geographical spread	Single Hospital	1	
		2-4 hospitals	3	
		>4 hospitals	5	
Availability of HFR ID	Compliance and interoperability of the hospital with the national digital health ecosystem.	No	1	
		Yes	3	

Table 3: Hospital Screening Matrix

The hospitals are further grouped into four categories- Category A, B, C and D on the basis of their score.

The hospitals will be contacted in three phases based on their categorization.:

- In the first phase, hospitals in categories A and B will be contacted.
- In the second phase, hospitals in category C will be contacted.
- This will be followed by phase 3, during which hospitals in Category D will be contacted.

Pilot Sites	Category A	Category B	Category C	Category D
	>4	>2 and <4	>1 and <2	<1

Figure 4: Category Classification

6. KEY MARKET FOCUS & PHASIC IMPLEMENTATION STRATEGY

The Indian healthcare market consists of public health and private health entities. Public health services are managed by the Central Government/National Health Authority (NHA) and State Governments, while the private healthcare sector includes various segments, including large facilities (>250 beds).

The proposed framework acknowledges its primary focus is not on public health and very large private facilities, as they possess internal resources and access to EMR vendors. Instead, it targets specific private health segments in need of system integrators to support their digital health initiatives.

The Framework primarily focuses on the following private health segments:

1. Large facilities (100 to 250 beds): Interventions in this segment aim to optimize digital health infrastructure and processes to improve healthcare delivery.
2. Mid-sized facilities (25 to 100 beds): Support is provided to implement digital health solutions, enhancing healthcare delivery and patient care outcomes.
3. Small facilities (10 to 25 beds): Assistance is offered to adopt digital health technologies, improving patient care and operational efficiency.

Very small facilities (under 10 beds) and doctors' clinics require a different approach to EMR adoption and shall not be the primary focus of the framework.

By targeting system integration services for large, mid-sized, and small private healthcare facilities, the framework addresses specific needs in the Indian healthcare market.

1.1 Phasic Implementation Approach

The successful implementation of the proposed Framework requires a structured approach. The Framework will be carried out through the following stages and substages, carefully designed to define Framework objectives, onboard system integrators, facilitate go-live implementation, and ensure ongoing monitoring and support.

The structured approach serves as the backbone for the framework's execution.

Phase 1: Framework Definition:

- Objectives & Metrics: Overarching Framework objectives will be established to improve healthcare delivery and patient care, outlining key metrics to evaluate Framework success.
- Compensation Model: A comprehensive compensation model will be designed for system integrators, considering financial incentives and performance-based payments.
- System Integrator Profile: Industry Knowledge has to be leveraged in order to articulate a profile of system integrators. It will govern the qualifications and competencies, defining experience.
- Training & Certification: A robust training curriculum and assessment mechanism will be developed to certify the proficiency of system integrators.
- Site Selection: Criteria for site selection within targeted private health segments shall be proposed.

Phase 2: Onboarding or Preparation

- Qualification & Selection: Clear criteria for system integrator participation will be established to ensure effective implementation of digital health solutions.
- Training Content: Relevant and high quality training content pertaining to key topics will be developed to enable smooth learning.
- Marketing Toolkit: A modular marketing toolkit will be delivered for system integrators to drive the framework.
- Pilot Sites: We will pick a representative set of pilot sites in terms of geographical spread and readiness for digital solution. We expect to select about 3-4 pilot sites across-country.

Phase 3: Onboarding/Go Live

- SI Partner Selection: System integrator partners shall be selected through a transparent process.
- Training: Contextualized training Frameworks shall be dispensed to the selected system integrators.
- Stakeholder Engagement: System integrators shall liaison with Integration Support. This would be made available to all the certified EMR/HMIS firms that would, in turn, make integration seamless.

- **Marketing Support:** Marketing toolkits will be shared with system integrators who will actively spread the word on the benefits accruing from the framework.
- **Workshops:** These shall be conducted with local hospitals, System Integrators, and EMR/HMIS companies in order to help understand and spread the adoption of digital health solutions.

Phase 4: Framework Monitoring & Support

- **Regular Meetings:** Regular meetings with system integrator partners to track progress, troubleshoot issues, and provide guidance.
- **Progress Review:** Regular reviews with certified EMR/HMIS companies will ensure smooth integration and resolve potential challenges.
- **Monitoring & Reporting:** Monthly reviews will facilitate tracking of key metrics and overall Framework performance.
- **Feedback Collection:** Feedback from all stakeholders will be gathered for Framework refinement and optimization.

7. Results

The methodology for capturing the stakeholder consultation output is depicted in the figure below:



Figure 5: Approach for documenting the stakeholder consultation

7.1 EMR Stakeholder Consultation

As of now, 18 vendors expressed keen interest in pursuing this framework, signifying a substantial resonance with our objectives and goals.

Ongoing discussions with the interested EMR Vendors focused on delving into the intricacies of their commercial models, marking the next crucial phase in the project.

The following are some of the important findings that emerged from the consultations with EMR stakeholders:

Issues preventing the adoption of EMR solutions are:

1. Product Perception: Building adequate understanding of the product in hospitals is believed to be a pre-requisite for its successful adoption. Cases of doctors falling out product offerings due to complexities such as resistance in adopting new technology due to habits, skepticism or fear of errors which underscore the need for competent communication and education with respect to the benefits and the use of Electronic Medical Record solutions. Explanation and simplification of the features and the benefits of the system are highly instrumental in influencing a positive product perception among the healthcare practitioners, thus enhancing the likelihood of complete diffusion.

2. Value Proposition and Tech-Savviness: A concise value proposition is tricky to pin down for hospitals, especially that focuses on revenue optimization. Cases during the implementation process have been complicated by problems caused by the tech-savviness of users. Moreover, low internet connectivity is an additional hindrance that greatly impacts the successful implementation of Electronic challenges of EMR (Electronic

Medical Records) systems. In this regard, the answer to such problems needs to be strategically worked out by expressing its tangible benefits for hospitals, with focused measures on increasing user proficiency and reducing connectivity problems for smooth adaptation.

3. Reseller Challenges and Integration Problems: Various challenges are found with the reseller model, such as lack of understanding of healthcare software. Besides, integration problems arise with the integration of many software systems including HMIS, Electronic Medical Records, and Inventory Management, acting as significant challenges. Addressing such challenges requires a strategic re-think of the reseller framework, including improved training Frameworks and support to enhance the knowledge of healthcare software complexities.

4. Adoption Challenges and Staff Turnover: The initial 3 to 6 months prove to be a very critical period for the successful adoption of Electronic EMR solutions, which staff turnover introduces the need for recurrent training efforts. On the other hand, staff in health are dynamic, and hence keeping proficiency with the new system uniform is challenging. Moreover, additional challenges in change management are seen opposing hospitals with legacy HMIS. Change Management has to be strategized in view of staff turnover by creation of continuous training Frameworks for Integrating EMR solution. Promoting a culture of Resilience and implementing change management strategies, such as positioning EMRs as a strategic initiative that aligns with the mission and vision of the hospital. This is tailored to the unique context of hospitals having existing HMIS. This proactive stance is an important way to maximize the long-term success of the EMR adoption.

5. Cost Concerns and Capital Investment: There is some reluctance shown by hospitals to adopt EMR, solutions, they are mostly afraid of the huge initial investment that the adoption of EMR would require. Such apprehensions need to be attended to carefully with transparency, where exact benefits and cost efficiencies in the long term are communicated clearly to the customers. Besides, flexible financial models and clear ROI projections can facilitate mitigating such concerns and will create a better environment for hospitals to decide on EMR adoption.

7.2. System Integrators Consultation

Key Implications and Learnings:

- 1. Lack of Consensus on ABDM Adoption:** Many Hospitals and SI's have no experience on working with ABDM Compliant products.
Suggestion: The hospitals and SI's will be provided ABDM training and workshops to help them getting acquainted with the ABDM compliant EMR software.
- 2. Common Challenges:** There are some challenges specifically faced by the SIs/Resellers which include navigating through decision-making procedures within the hospital with respect to integrating the EMR with the existing software and provision of re-training of the staff.
Suggestion: Design and developing a customized integration plan for the hospitals and setup support mechanisms in case of any issues faced during the working of the EMR software. Training Frameworks will be provided for both SIs and Hospitals.
- 3. Concerns about Capital Expenditure (Capex):** SIs have mentioned that hospitals have expressed apprehensions regarding the financial commitment required for the adoption and implementation of the essential systems.
Suggestion: Designing and developing a commercial model and conducting regular meetings to understand and resolve the queries and provide support in adoption and implementing EMR system. Providing financial Incentives like continuing DHIS Scheme to the provider community (hospital facilities) on utilization of the EMR Systems can also be useful and can encourage the adoption of EMR in the hospitals in India.
- 4. Experience:** Some resellers have no networks in the hospital domain but have shown interest in learning more about the Framework and expand their network in hospital domain.
- 5. Roles of System Integrators:** System Integrators can fulfil various roles within the hospitals which include generating leads for hospitals, providing implementation support, and delivering training to hospital staff. Their expertise can also extend to Third Party Administrators (TPA) such as PMJAY and CGHS by:
 - Assisting in the TPA operations, encompassing claims processing, beneficiary management, and data analytics.
 - Provide comprehensive training and support to TPA staff, enabling them to effectively utilize technology platforms.

7.3 Hospitals Consultation

We have reached out to 53 hospitals via telephonic calls and emails, and we have engaged in consultations with a total of 16 hospitals. Through these consultations, we have gathered key insights that formed our approach to address the unique needs and challenges prevalent in this healthcare landscape.

Key Insights & Challenges:

1. **Data privacy and security concerns:** Significant reasons as to why some organizations are still apprehensive about using the EMR systems.

Fear of exposure of information concerning the patients. With such concerns, the need to have well-established security measures would enhance confidence in using Electronic Medical Records.

Financial planning and training frameworks are essential in overcoming the barriers against EMRs and to ensure smooth transition.

2. **Costing and Training Apprehensions:**

Cost investment issues of EMR adoption and associated training likely to impact on costing decisions and Manpower preparedness.

3. **Integration Issues with Other Existing Modules:**

Integration Issues with present modules of the hospital causing loss of efficiency and breaks in work flow. Adequate financial planning must be provided for by relevant frameworks to address such challenges for a seamless transition.

4. **Extra Manpower and Cost Allocation:**

Unsafe conditions for hospital resources for the deployment of added manpower and management of related costs during EMR implementation.

Effective workforce planning strategy would ensure to have a successful deployment and sustainability of the EMR.

5. **Digital Maturity and Cost of Training:** Low digital maturity and high cost of training are significant challenges to EMR adoption.

Regular Trainings Frameworks to be provided. Establish culture that is digital-ready are henceforth required to make the hospital prepared for new EMR.

6. **Government Mandate on adoption of EMR in Pvt. Hospitals:**

Challenges in compliance and resource alignment for ABDM

Empanelled EMR adoption, a government mandate can fuel ABDM Empanelled EMR adoption. Clarity in regulatory guidelines along with requisite support can

facilitate compliance with mandated requirements for ABDM Empanelled EMR by private segment hospitals.

Overall Apprehensions: Hospitals worry about data security, costs, and training for ABDM. To ensure success, the government should address these concerns with strong security, financial aid, and comprehensive training programs. This will build trust and lead to wider adoption of electronic medical records.

8. Conclusion

Though the adoption of EMR begins to pick up pace in India definitely through various government initiatives, it surely remains at a very nascent stage, especially in tier 2 and 3 cities. Much unawareness exists between health providers and patients. Proposed framework ensures bridging system Integrators and EMR Vendors to work collaboratively to increase adoption in Hospitals.

The system integrators will bring along EMR adoption expertise, government program onboarding, training, and technical support. The framework would thus collaborate with the EMR vendors for ease of integration into the existing infrastructure of any hospital and for them to be participants in the Ayushman Bharat Digital Mission ecosystem. This will be subject to qualitative research studies through in-depth interviews and field visits among key stakeholders, viz. EMR Vendors, System Integrators, and Hospitals, for assessing challenges and their receptiveness to the proposed framework. These results from the stakeholder consultations viewing sat for a strategic implementation approach and paved the way for a more comprehensive understanding of EMR adoption in India.

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10. Annexure

Questionnaire for EMR Vendors

Below are the questions which need to be answered by EMR to build a commercially viable model for the proposed framework and also to understand the challenges.

S.No.	Questions	Responses
1	What is the cost of EMR?	
a.	Customization cost of EMR	
b.	Any other maintenance cost	
c.	Any fee per transaction	
d.	What kind of infrastructure (hardware, server, etc.) would be required	
e.	What would be the cost of infrastructure	
f.	Requisite HR and its cost (if any) during implementation	
g.	Any annual/monthly subscription fee	
h.	How many free transactions included in the cost of EMR	
i.	What kind of margin/fee/incentive envisaged for Service Integrators (SI)	
j.	Any input on the kind of Value-Added Service that may be provided with EMR by SI's	
2	What are the different modules provided in the EMR, additional cost for additional modules.	
3	How much time it will take to implement solution with modules like Registration, laboratory, e-prescription and discharge summary, in a hospital which is	
a.	10 – 50 bedded	
b.	50 – 100 bedded	
c.	100-200 bedded	
4	What is technical stack for the solution	
5	What measures have been taken to ensure maximum adoption of this solution in a hospital	