

DIGITAL HEALTH REQUIREMENTS FOR PHARMA INDUSTRY

Dissertation Submitted to



The IIHMR University, Jaipur

For the partial fulfillment for the award of the
Degree of Master of Business Administration
(MBA)

in

Pharmaceutical Management
by

SAURAV SINGH

Under the Supervision and Guidance of

Mr. Rahul Sharma
Assistant professor
School of pharmaceutical Management

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled “**Digital Health Requirements For Pharma Industry**” and submitted by **Saurav Singh** Enrollment No. **IIHMR-U/02/2020-22/0267** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

(Signature)

Name of the student: SAURAV SINGH

CERTIFICATE

This is to certify that dissertation titled **Digital Health Requirements for Pharma Industry** is a record of the research work undertaken by SAURAV SINGH in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and his approach to the research study has been sincere, scientific, and analytical.

Faculty Guide
IIHMR University, Jaipur
Date

School Dean
IIHMR University, Jaipur
Date

Abstract

Title: - Digital Health Requirements for Pharma Industry.

Background: -

Over the past few decades, the global pharmaceutical industry has advanced and strengthened its digital infrastructure. Pharmaceutical companies are putting a lot of effort into keeping up with the quick changes brought on by digital technologies. The same technological advancements that have upended the media, retail, and banking industries are starting to do the same for the healthcare sector. These include mobile communications, the cloud, advanced analytics, AI, ML, big data, and the Internet of Things. Pharma executives are experimenting with a number of digital projects because they are aware of their disruptive potential. However, because they are unaware of what digital success will entail in five years, many people are finding it difficult to decide which initiatives to scale up and how to do so.

Research Question: -

To find workable Strategies to improve patient centricity, digital transformation of pharmaceuticals, creating the digital pharma company, drivers and potential threats for digital health in pharma industry, competition analysis, national digital health strategies.

Objectives: -

Research, analyze, and evaluate the impact of digital health in the pharma industry, and create a detailed report on digital health requirements for pharma industry across major geographies such as NA, India, Australia, & Europe.

Methodology: -

This study is based on secondary data collected through desk review using study conducted by various websites and reports across the globe to identify and suggest solutions for improve patient satisfaction and drug development processes. Data had been taken after thoroughly examine the different company's websites from different regions like North America, Asia, and Europe to understand the market well.

Results: -

Digitalization is a top goal for the many companies. 77% of respondents believe that digital innovation is a competitive difference for their company. The results show that most of companies are using AI and ML to process the data for drug development and E-Prescriptions. Many companies have started using digital technologies & devices for the clinical trials for faster clinical researchers. To improve the supply chain of pharma industry firms are using IOT and Radio frequency identification tools. In drug production

sector manufactures are using the predictive analysis with the help of ML to predict demand of the products.

Conclusion: -

The adoption of cutting-edge digital technologies like artificial intelligence (AI), cloud computing, the Internet of Things (IoT), and machine learning into the operations of biopharmaceutical companies has historically been slow. The COVID-19 epidemic, however, forced companies to emphasise digital innovation and incorporate it into every aspect of their business operations. Years-long road maps for digital transformation were abruptly implemented in a matter of months, leading to dramatic changes in how firms run. The industry is at a crossroads where businesses may either take advantage of the chance and increase their investments in digital innovation by leapfrogging digital innovation, or they can choose to slow down and accept digital mediocrity.

Keywords: -

“Drug Development”, “Artificial intelligence”, “Machine Learning”, “Decentralized Clinical Trials”

Acknowledgement

I'd want to thank my Guide, Mr. Rahul Sharma. He has taught me more than I could ever give him credit for as my teacher and mentor. He has demonstrated what a good researcher (and person) should be through his actions.

I'm grateful to everyone with whom I've had the pleasure of collaborating on this and other projects. Each member of my Dissertation Committee has given me invaluable personal and professional advice and has taught me a lot about scientific research and life in general.

Most notably, I want to express my gratitude to Manish Agarwal & Ajay S Sir for supporting me, who never cease to inspire me.

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Abbreviation: -

AI – Artificial Intelligence
ML – Machine Learning
IT – Information Technology
NLP - Natural Language Processing
IoT - Internet of Things
HTS - High-Throughput Screening
ADR - Adverse Drug Response
DCT – Decentralized Clinical Trials
SMB – Small & Midsize Business

Introduction

A wide, multidisciplinary notion called "digital health" or "digital healthcare" comprises ideas from the point where technology and healthcare converge. Software, technology, and services are all part of digital health, which applies digital transformation to the healthcare industry.

Deloitte Insights claims that the promise of more consumer-focused, preventive care depends on more than simply technologies and solutions; it also emphasises the importance of "radically interoperable data, artificial intelligence (AI), and open, secure platforms."

Pharmaceutical companies are under more pressure than ever to prove the efficacy of their products outside of randomized controlled trials in order to maintain market access and premium pricing. Payers and institutions are more focused on lowering costs while enhancing patient outcomes. Technology-enabled solutions, which contain not only medicines but also sensors that gather and analyses data to track a patient's condition between visits to healthcare professionals, are becoming more important in this context for meeting the interests of both parties. These technologies provide data for pharmaceutical companies to support the efficacy of their treatments while also assisting payers and governments in achieving desired treatment adherence and outcomes.. (Review, 2020)

exercise equipment that was available, including Fitbit, Apple Watch, other devices, and IOT. As they cover an increasing portion of the costs, patients are also becoming more interested in evaluating various healthcare products and services. The success of a pharmaceutical company's business strategy in the digital age may depend on its ability to

interact with patients as they perform these assessments. (pharmatech, n.d.)

Pharmaceutical companies have long had total control over the creation and distribution of information about their products. Traditional authority has been undermined by digital technology, which has led to the development of numerous new, independent communication mediums. Patients can share and discuss their experiences in online forums, of medications. To continue to be the primary supreme authority for the efficacy of their medications, pharmaceutical corporations will need to develop the skills to foresee or respond rapidly to these new sources of data. (mckinsey, n.d.)

Aim

To study, analyze, and evaluate the impact of digital health in the pharma industry, and to identify new digital health requirements for pharma industry.

Objectives

- To identify the digital requirements for pharma industry.

Review of Literature

Title	Authors	Salient Features
The Road to Digital success in Pharma	David Champagne Amy Hung Olivier Leclerc 2015	We've determined four places where digitization will most likely benefit pharma businesses. The fields employ digital innovation to customise goods and services, include doctors and patients, increase the data-drivenness of product evidence and choices, and quicken business operations. Each business must assess how the digital changes are likely to effect its operations in order to gain this value, and then choose its own route in response. Understanding what digital success looks like can help pharma firms innovate and commercialise their products

		better, which will lead to better patient care.. (Review, 2020)
Biopharma digital transformation: Gain an edge with leapfrog digital innovation	Adam Israel Wendell Miranda Todd Konersmann Aditya Kudumala 2021	Coordination between IT, business, and innovation partners is required to weave digital innovation into the fabric of the organization. This needs a business model based on the chosen innovation archetype(s). Many successful firms have built operational structures in which dedicated digital innovation resources are in a center of excellence between business and IT. This has aided in the translation of corporate goals into technological requirements, as well as the flexible management of investment portfolios and speedy collaboration with external partners. To assure appropriate funding for digital innovation while simultaneously reinventing old IT budgeting methods, organizations may need to make crucial trade-offs on business goals. (Review, 2020)
Digital Transformation in the Pharmaceutical Industry From Drug Discovery to Pharmaceutical Manufacturing	Igor Kruglyak 2021	People have been searching for chemicals that can treat ailments and infections since very long. Plant-derived extracts and animal cells were once utilized to treat illness, and their discovery was based on empirical evidence. Digital technology, on the other hand, has drastically altered the Internet of Things (IoT) help pharmaceutical companies improve their workflows by automating formerly manual procedures and significantly speeding up drug discovery.

Methodology

Research Design: -

Study design	Analytical study, Descriptive study (e-pharmacy)
Data collection method	From various platforms of Tata Elxsi
Data analysis plan	Summary Table, charts, and pie-charts
Data used	Secondary data
Software used	Microsoft Excel, Research libraries of Tata Elxsi.
Study duration	3 months (25 March-23 June 2022)
Limitation	Limited access to the data

Source of Data: -

Consulting Reports
Google Scholar
Government Publications
Articles provided by TATA ELXSI

SETTING: -

Tata Elxsi

Research Approach: -

This research is based on secondary data gathered through a desk analysis of studies conducted by various websites and reports around the world to discover and recommend strategies for improving patient satisfaction and medication development processes. Data was gathered following a thorough examination of many company websites from various locations, including North America, Asia, and Europe, to have a thorough understanding of the market.

Results & Discussion

Digital Trends in Pharmaceutical industry

E-Pharmacy:

In remote places, an E-pharmacy is a benefit because it is efficient and responsible. It delivers simple and economical drugs to people houses with just one click, as well as providing information about the medicinal remedies' knowledge to the buyer.--, Netmeds Marketplace Ltd (Reliance Retail), Practo Technologies Private Limited, Lybrate, Inc., Docprime Technologies Private Limited, Care On Go, mChemist Global Pvt. Ltd, Medsonway Solutions Pvt Ltd, are some examples. (pharmatech, n.d.)

Patient Assistance programs: -

Through employment health insurance, Medicaid, or Medicare, a large number of Americans are partially protected from the exorbitant expense of prescription medications. However, even individuals with insurance may be burdened by coverage gaps and formulary limitations. Additionally, those without proper prescription drug coverage or health insurance must pay for their own prescriptions.

Patient assistance programmes (PAPs), which are typically funded by drug companies, are marketed as a "safety net" for those in the United States who lack health insurance or have inadequate coverage. These initiatives' objective is to give patients financial support so they can obtain medications for little or no cost.

Patient centricity is at the core of Patient Assistance Programs



Impact of Patient Assistance Program on Community

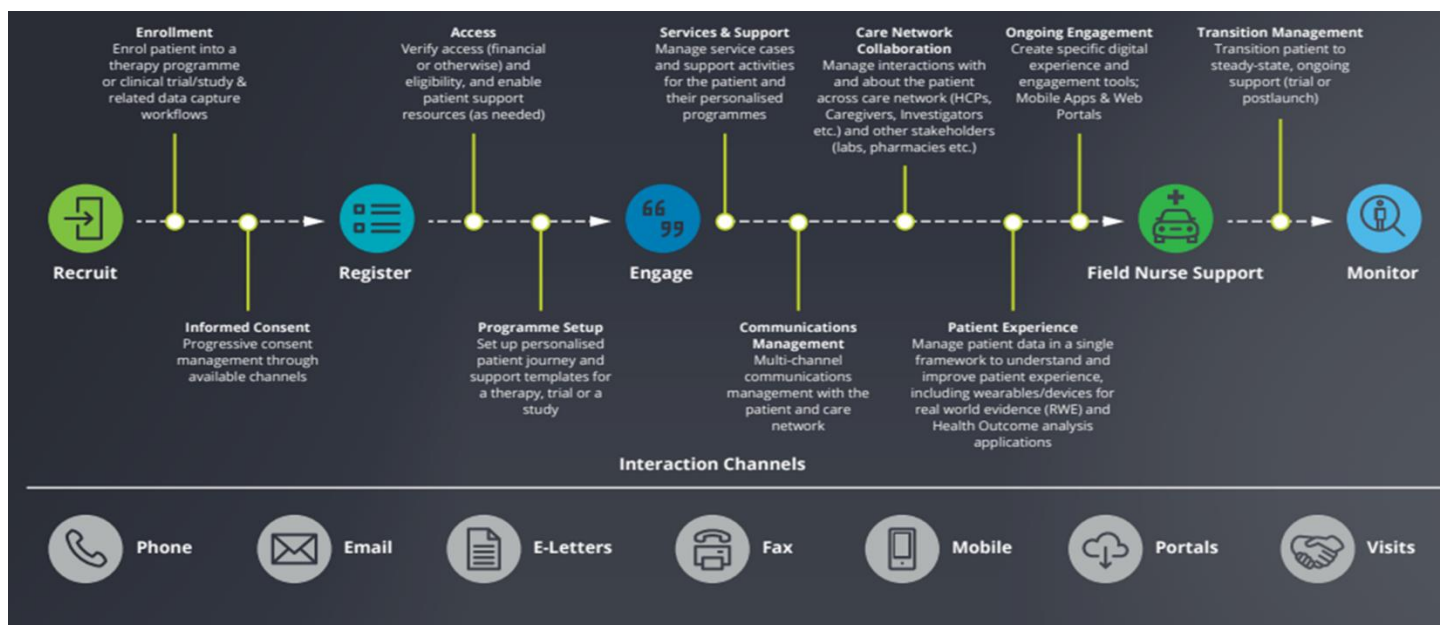
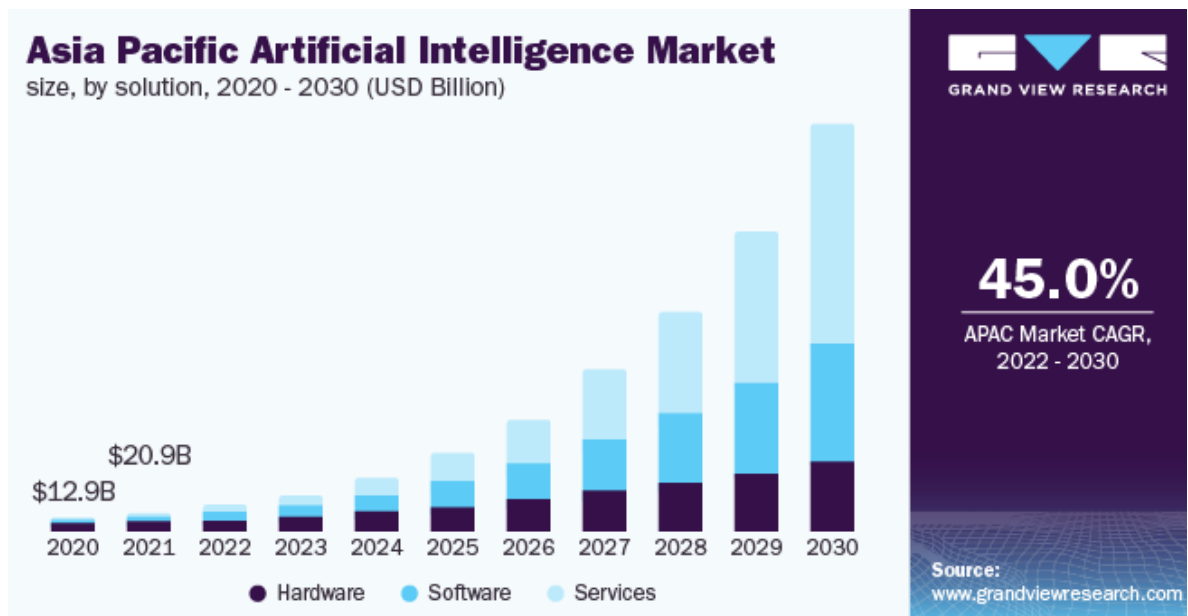


Fig – PSP AND PAP

Digitization using Artificial Intelligence and Machine Learning:

The usage of Artificial Intelligence and Machine Learning has revolutionized the entire consumer behavior, allowing customers to have real-life shopping experiences/medical consultations from the comfort of their own homes. (Softengi, n.d.)

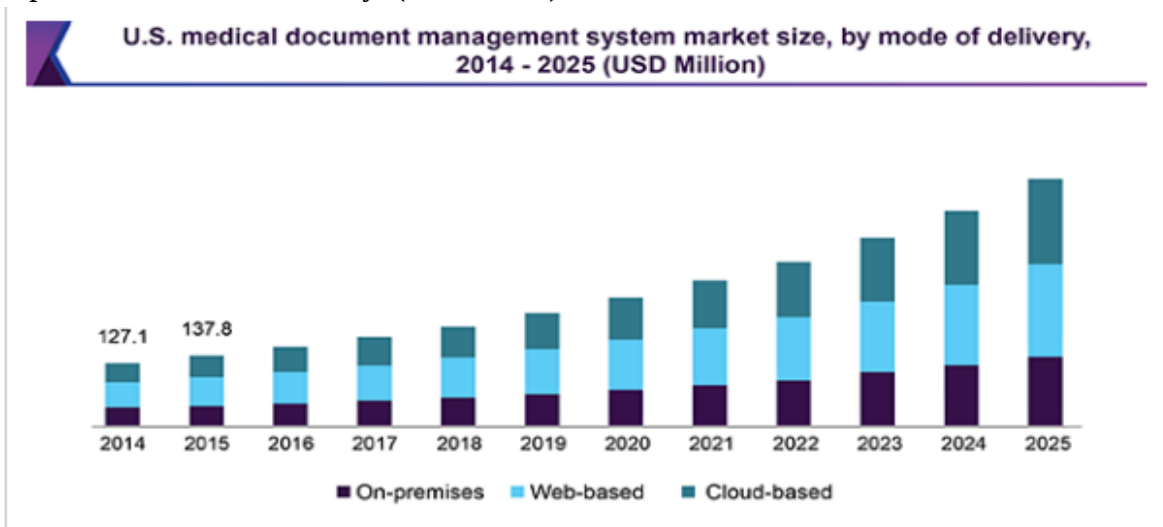


Digital Records:

Digital procedures have been used for a long time and continue to be used in 2022. Because digital processes allow pharmaceutical companies to closely track data, they are particularly beneficial in promoting compliance requirements. (pharmaguideline, n.d.)

Cloud Computing:

To evaluate complicated data in clinical research, pharmaceutical corporations rely on cloud security and central access. Thousands of remotely monitored patients' records are kept on the cloud's scalability. (intone, n.d.)



Digital Trainings:

Virtual learning courses may be delivered at any time, from any location, and can be tailored to the specific needs of each user, making them very cost-effective. In order to improve operations and compliance, online training courses for new technologies in the pharmaceutical business will be increased in 2022. (viseven, n.d.)

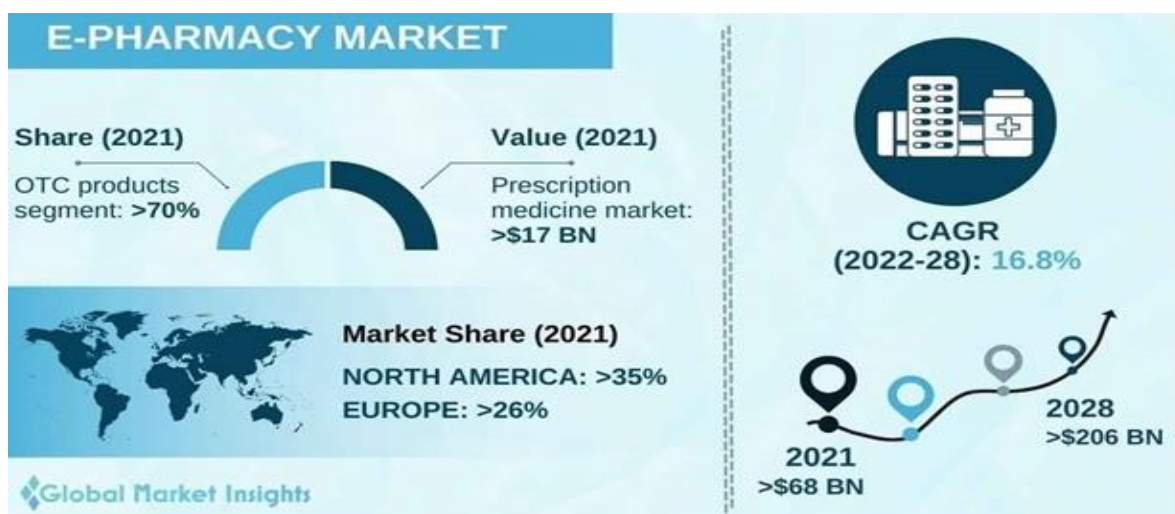
Blockchain Technology and Big Data:

In 2022, blockchain technology will help the pharmaceutical business safeguard data while also increasing visibility, compliance, enhanced drug traceability, and simpler transactions. (Review, 2020)

Key Elements driving the need of digital health in Pharmaceutical Industry

Telehealth, Telemedicine & E-detailing: -

Telehealth has the potential to help address patient non-adherence, which has consequences for patient treatment responses as well as business operations. According to studies, non-adherence is a widespread condition that affects up to 50% of patients to varied degrees. Early data suggest that telehealth services such as smartphone applications, emails, or e-health platforms can provide usage guidance and notifications to remind patients to take their prescription, and that such features boost compliance. Given the detrimental effects of poor adherence on treatment outcomes, telehealth treatments could enhance patient health outcomes and boost product positioning in the market (Strammer, n.d.).



Telehealth & Telemedicine provides easy to customer by creating various options for Customer

Telehealth also provide help for disabled patients by Virtual meeting with them.

Telemedicine gave various option for middle-class and low-class choose the different brand due to price issue.

E-Detailing gave medical representative advantage as doctor sole focus on Medical Representative Detailing E.g., In-Contro MR

All these are example of patient-centricity

Fig: Telehealth & E-Detailing

Drug Discovery: -

The evaluation of hundreds or even thousands of chemical compounds is a multi-step, iterative process in the creation of new chemical compounds, depending on how well each one works against unique disease-related targets. A funnel can be used to represent the drug development process, with only a select few molecules moving on to the following phase.

The hunt for the proper chemicals with the desired therapeutic effects makes use of a few digital technologies and methodologies. For drug development, high-throughput screening (HTS), evolutionary algorithms, and genetic programming, among others, there exist neural networks and knowledge graphs. (ncbi, n.d.)

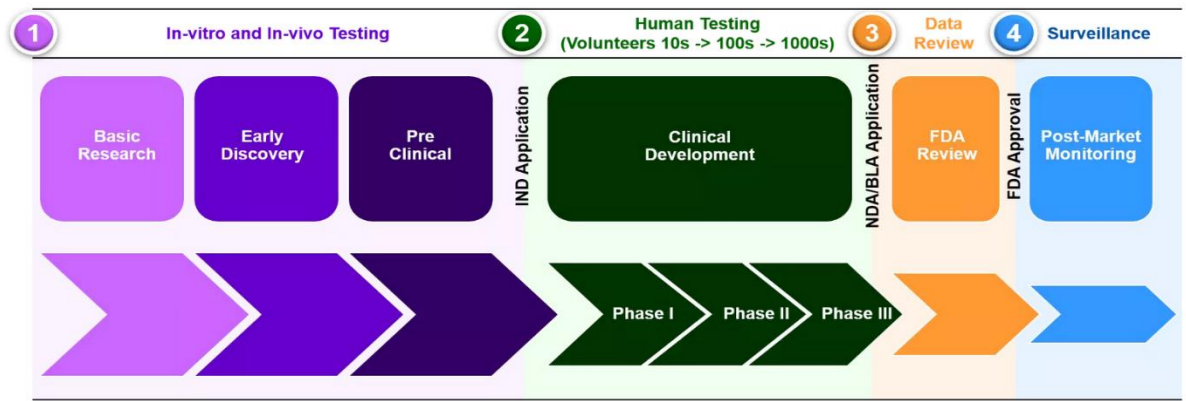


Fig: Drug Discovery

Decentralized Clinical Trials: -

Clinical trial sponsors are always looking for ways to help clinical trials go faster and better for participants and clinicians. Decentralization of trials has emerged as a significant element in this effort. Rather than taking patients to a study site, it includes delivering an increasing part of a trial's operations to the patients.

While most clinical trials will not be totally virtual, they will have one or more decentralized features based on their end points, patient demographics, and treatment options. (mckinsey, n.d.)

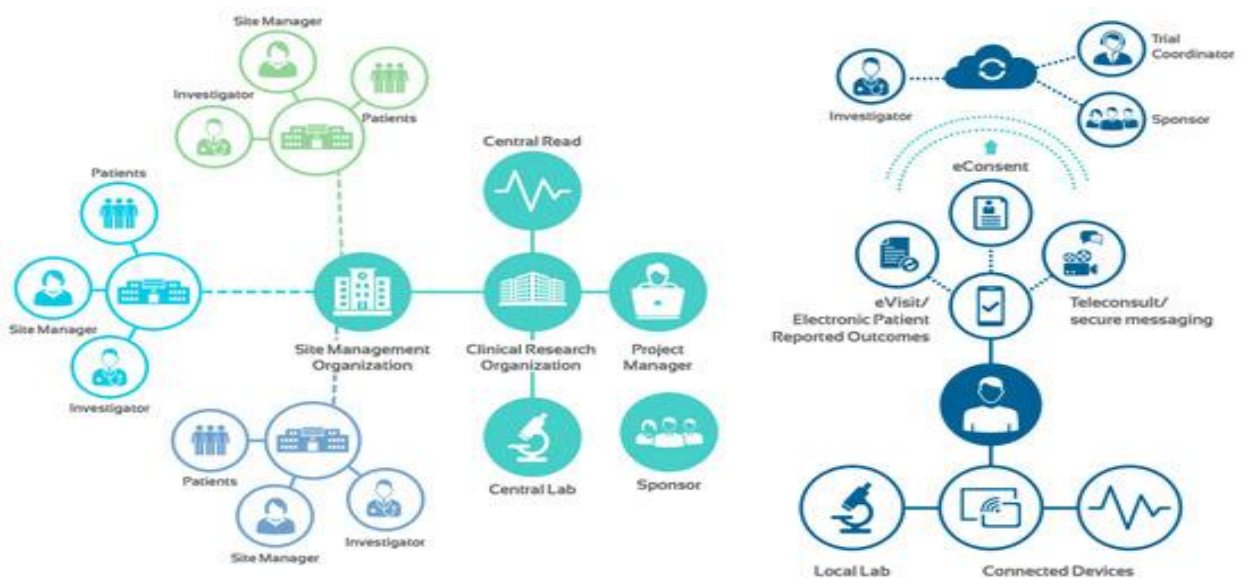


Fig: Traditional & Decentralized Clinical Trials

Digital Supply chain: -

End-to-end visibility of the pharma supply chain is a huge challenge, especially because it frequently involves negotiating with trading partners across the world. The pharmaceutical supply chain has struggled to fully embrace digital technologies.

Data must be collected from both inside and outside the sources to implement a digital supply chain schema. This entails not just the use of modern technology, but also the dismantling of organizational and enterprise silos, as well as those that exist across trading partners, entire networks, and beyond. Gathering and combining all this data, which includes information on operations, processes, regulations, supply chain hazards, social media, patient health patterns, and much more, allows for a more unified image, a more accurate and impactful perspective (pharmatech, n.d.).



How Pharmaceutical Companies using Digital Technology

Acceleration of Drug Discovery and Development: -

The cost of getting a new medicine to market is soaring, and with blockbuster drug patents expiring, the pharmaceutical industry is aiming to shorten the time it takes to bring a drug to market.

By sifting through massive datasets of scientific journals, academic research articles, and control group data and then running prediction algorithms over these vast swathes of data, pharmaceutical analytics can assist enterprises in making more educated decisions.

Innovation in drug development will be a key strategy for improving financial performance.

Drive Effective Sales & Marketing Operations: -

By gathering critical data points, pharma business intelligence can aid in the identification of new markets and the analysis of the effectiveness of various marketing channels to prioritize efforts and acquire a competitive advantage. It will aid in the understanding of sales rep performance, allowing for better and faster decision-making.

This will aid you in making wise capital and resource allocation choices. Pharmaceutical companies are seeing increasing efficacy in their sales and marketing efforts by researching Using big data analytics and modern technology, the pharmaceutical business is using patient trends to locate new markets.

Improving Operations & Employee Training: -

By utilising pharmaceutical analytics and data insights to enhance their current operations and processes, pharmaceutical companies can significantly reduce costs. Advanced analytics can be used by pharmaceutical corporations to predict the effects of machine settings, operator skill levels, and raw material inputs on output quality.

It will assist pharmaceutical businesses in making decisions about how to optimise and enhance the overall procedure. Predictive analytics and big data analytics in the pharmaceutical industry can be used to forecast external signs, such as problems with quality, equipment failures, or substantial changes in demand.

SWOT Analysis:

STRENGTHS	WEAKNESS
Value : Pharma companies have moved away from traditional product and clinical value to a more • Outcome based values for patients and providers Example : the Delaware Health Innovation plan allows this and many payers (like AETNA, united healthcare) are following this to help implement the same. The fixed fee payment is being slowly transitioned out and in the coming years this will become the defacto standards for outcome-based payments. • Value added tools and services for patients. • Superior customer experience	Customers : Pharma companies are still lagging behind on moving away from engaging with traditional providers (Health care providers(doctors, hospitals). • Ability to emphasize and consolidate the various system of care and its interconnections and networks around patients. Example : Patients are now being engaged with their doctors, specialists, nurses, home health aides, lab technician and pharma companies patient hub service employees to ensure complete care. It is important to learn this web of interconnections using latest technologies to provide quality level of care to all patients. • Lack of integrated systems which allows users to get a 360 degree views.
OPPORTUNITIES	THREATS
• Data & Innovation • Use of real-world data (RW)to enable real world evidence(RWE) • Leverage AI/ML to bring about improvements in data quality Example : assign tags or categories to text according to content using Name Entity Recognition(NER) such as symptoms, side effects.	• Talent and skilled resources are a major challenge • Lack of rules governing privacy policies and how it should be handled due to various laws governing this data is a threat to the industry. Example : The GDPR act in Europe prevents the use of personal patient data for any marketing efforts and leveraging digital assets to maximize benefits is becoming a bottleneck. • Difficult to get the tech stack right

Digital Solutions from Some Big Companies in the Market

LivingWith App	Mabu (Robot)	Beyond the Pill	Watson Health platform	Belysa	REACH	Roche (CDS)
Pfizer	Pfizer	UCSF	Apple-IBM	Merck	Roche	Roche
Oncology Patients	Everyone	Women	Companies	Analysts	Healthcare Workers	Doctors
• Gives Support • Gives Updates	• Tracking	• Covers all areas of healthcare	• Uses new technologies	• Multi-analyte views • Curve fit optimization • Auto flagging & Data hygiene	• Multilingual Counseling • Available on all platforms	• Use AI & ML • Value based support
Gives reminders	Emergency Updates	Helps to find gaps and Improve process	Helps to make robust system	Testing parallelism & curves	Improve well being Mental Support	Provide decision support to doctors

METHODOLOGY (E-pharmacy)

Study design- Descriptive study (E-pharmacy)

Data collection method: The data was primary which had collected by using standard questionnaires circulated among the consumers via google forms.

Sample size: 150 consumers.

Analysis: Analysis was done by using Microsoft Excel.

Data collection tool: Questionnaire.

Study area: PAN INDIA.

1.Age group

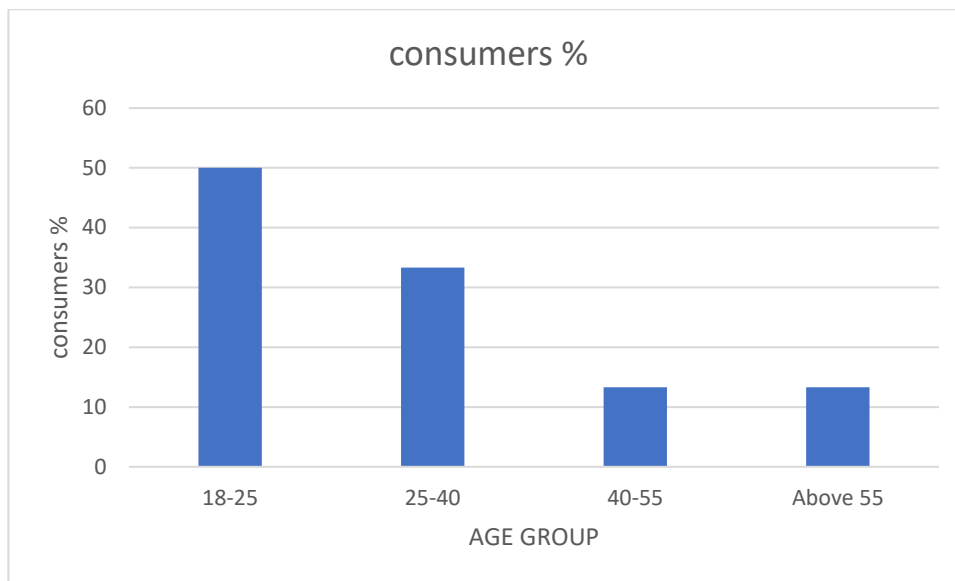


Fig – age group

2.How do you purchase medicines?

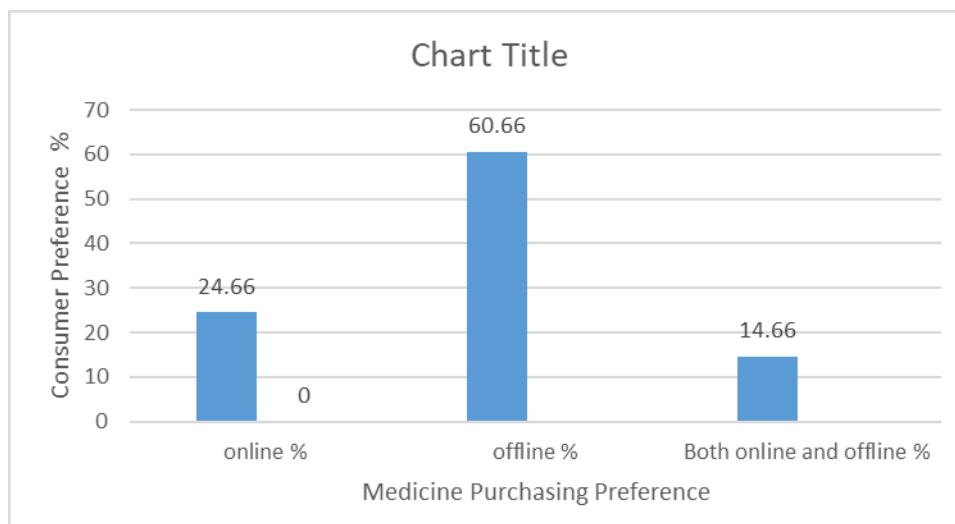


Fig. 1. Medicine purchasing preference

Collected data shows that most of the consumers purchase medicines from offline pharmacy stores, while few of them are from both online and offline pharmacies. Consumers purchasing only from an online pharmacy are 24.66% which is less as compared to an offline pharmacy.

3.If online, what makes you purchase medicines from an online pharmacy?

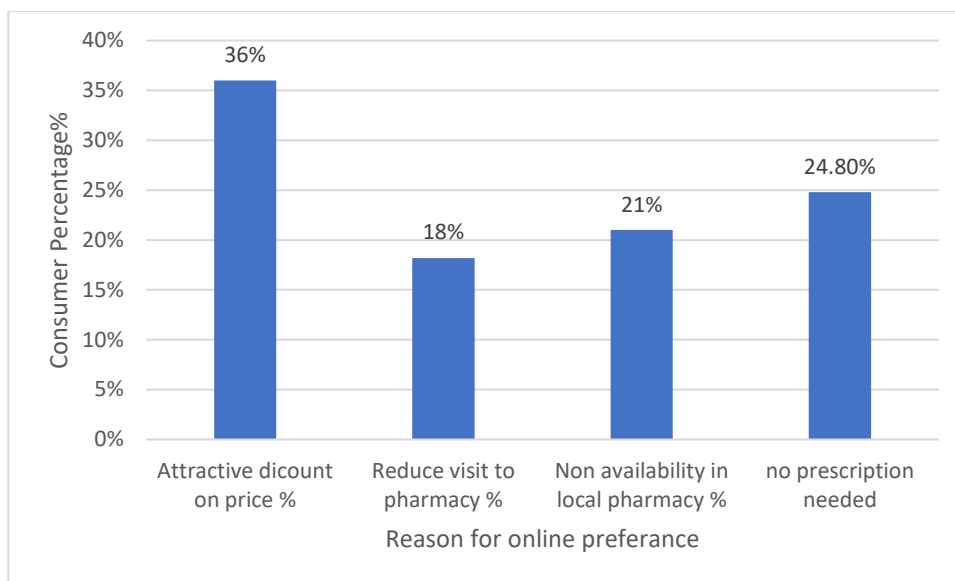


Fig. 2. Reason for online preference

A major reason for purchasing medicines from the online platform is an attractive discount on the price, followed by non-availability in local pharmacies and reduced visits to a pharmacy store.

4.If offline, what makes you purchase medicines from offline pharmacy?

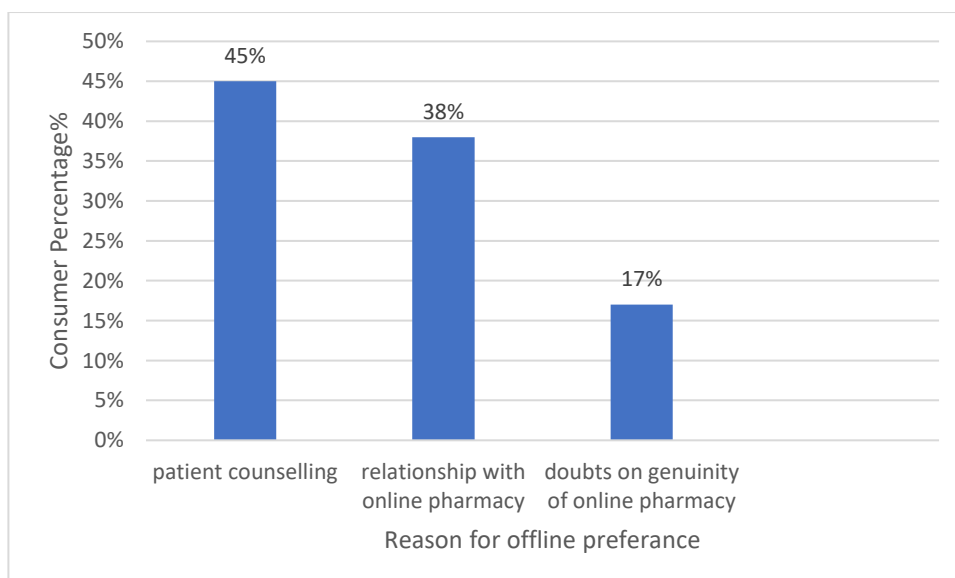


Fig. 3. Reason for offline preference

The reason behind consumers preferring offline pharmacies over online is patient counseling at offline pharmacy stores. Also, relationship with offline pharmacy and doubt about the Genuinenity of online pharmacy also seems to be major reasons.

5. Which medicines do you buy online?

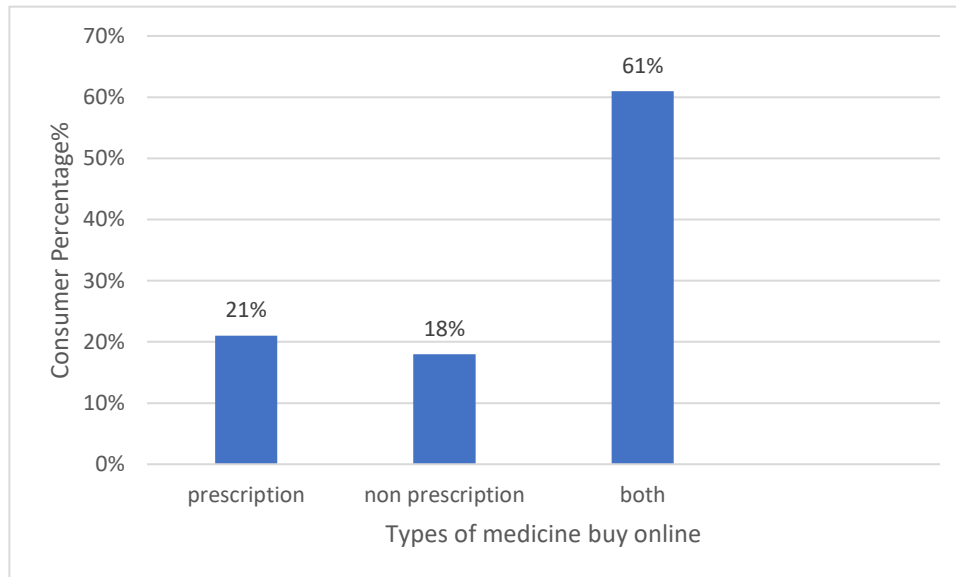


Fig. 4. *Types of medicines buy online*

Both prescription and non-prescription drugs are purchased from online stores.

6. How was the quality of medicines which you purchased from online pharmacy?

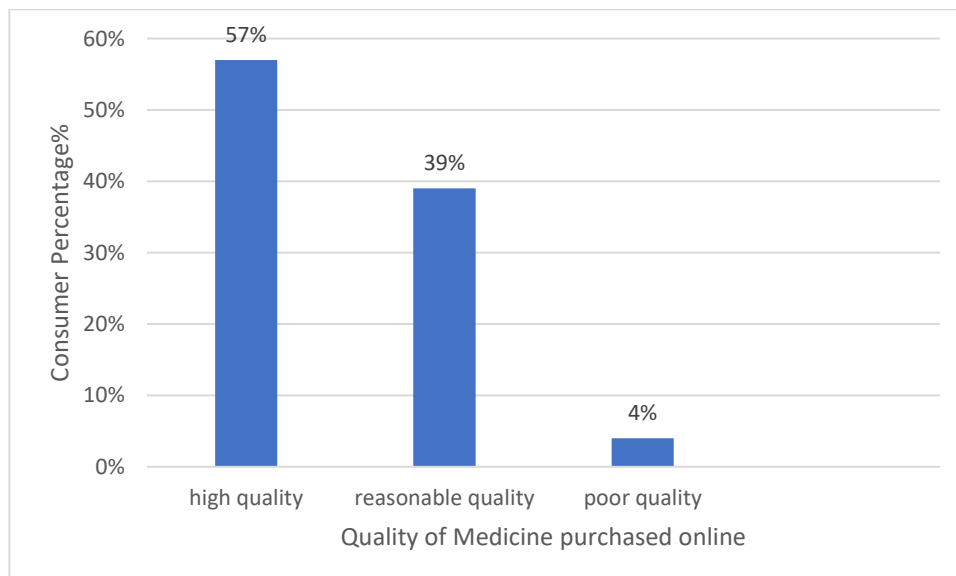


Fig. 5. *Quality of medicines purchased online*

Consumer experience about the quality of medicines from online pharmacy stores is found to be reasonable to high.

7. Would you order medicines online in the future?

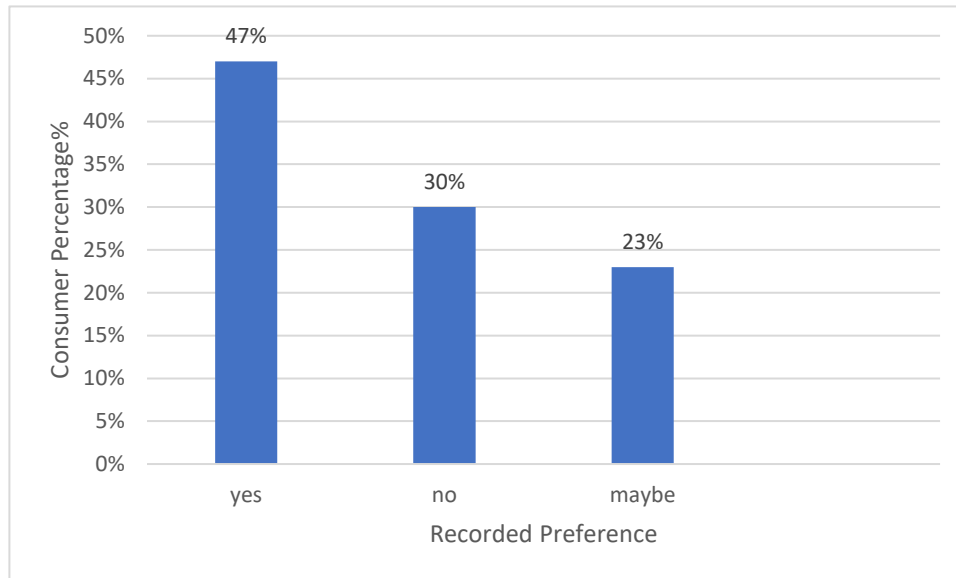


Fig. 7. *Reorder preference*

Most consumer's perception about buying medicines from an online store is positive for the future.

8. Would you like to recommend online pharmacy to your friends and family?

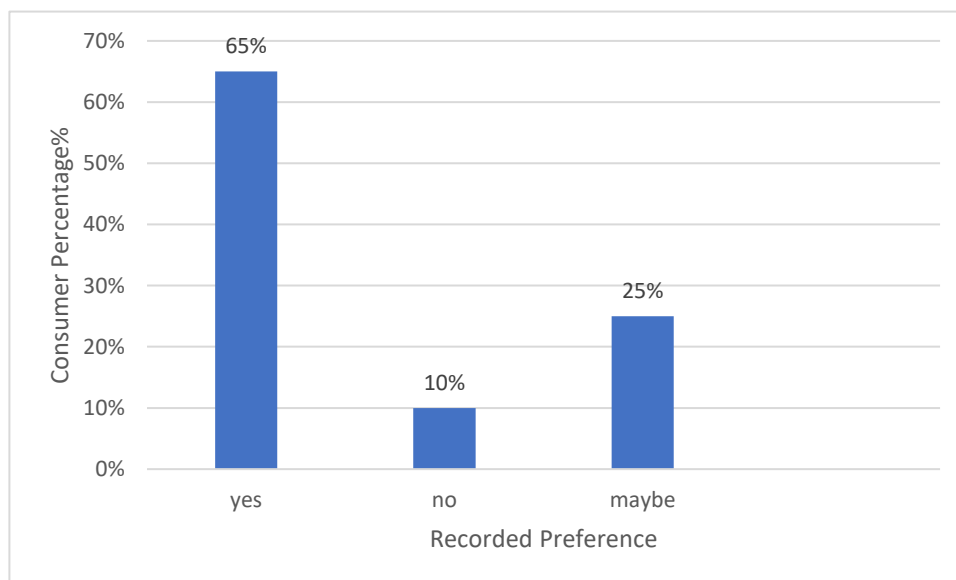


Fig. 8. *Recommendation for online pharmacy*

According to the data, the consumers are willing to recommend online pharmacies to their friends and family for future purchases of medicines.

Challenges in Digital Health

Security Remains a Focus in Healthcare: -

Cybersecurity is a major risk for healthcare organizations. Malicious attacks can cause care to be disrupted, resulting in patient injury and negative medical outcomes.

When it comes to cyber dangers in healthcare, ransomware is the most common. Hackers infiltrate IT systems with malware or digital viruses in order to encrypt important files. The likelihood of a ransomware attack on a hospital database via a patient-connected device, for example, may be low simply because the database is on a private network. However, such an attack might severely harm the hospital's reputation and compromise patient privacy. Such problems necessitate regular monitoring and countermeasures. (frontiers, n.d.)

Regulating adaptive A.I. algorithms: -

An adaptable artificial intelligence (A.I.) is one that can change its behavior in response to new knowledge. We frequently read about an A.I.'s tremendous prowess in the healthcare setting in the news. However, in many cases, these results come from laboratories that use selected datasets or ideal circumstances that aren't entirely representative of real-world clinical settings. Google had to learn the hard way.

The company's medical researchers praised the A.I. tool's capacity to screen patients for diabetic retinopathy (DR) from photographs with 90% accuracy. DR is a leading cause of vision loss around the world and catching it early will help you avoid consequences. However, Google's artificial intelligence didn't perform as well in practice as it did on paper. When used by nurses in a Thai hospital, they ran into several problems. They had internet connection issues at times, and the scan quality didn't meet a particular threshold at other times, so the A.I. just didn't respond. Nurses had to spend extra time altering some of the photographs that the algorithm didn't want to analyze on occasion (frontiers, n.d.).

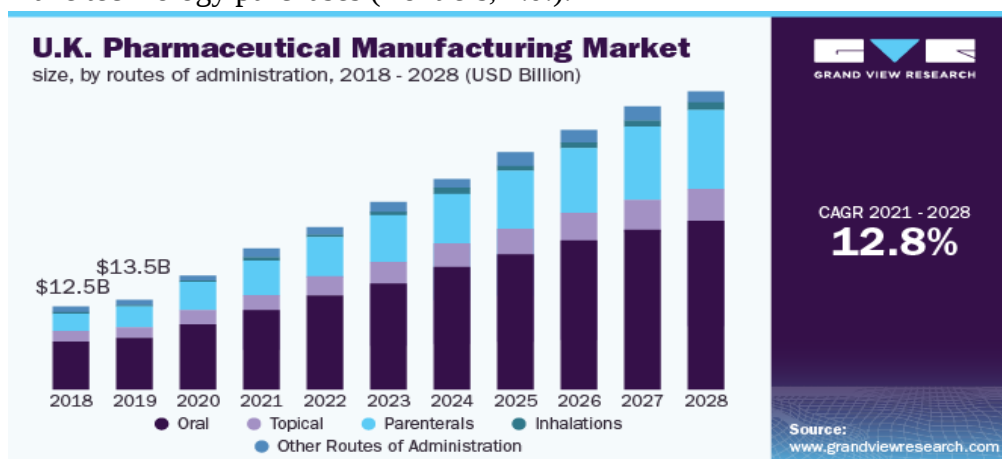
Initial Investment: -

The bandwidth required to embrace new digital solutions is often found in large business enterprises. SMB manufacturers, on the other hand, frequently lack the resources to achieve the same goals. These businesses may decide to continue with old technology, especially if

there are no obvious drawbacks. SMB manufacturers can also make strategic investments in modern technology that can yield quantifiable benefits if they have the proper plan.

Lack of experience in manufacturing: -

Manufacturing has grown faster, more streamlined, and more automated than it has ever been. This industry, on the other hand, is still relatively new to the digital game. Many industrial executives may be unaware of the inner workings of some of the most recent innovations. Although a lack of direct information can stymie development, it should not be used as an excuse to forego digital transformation altogether. Additionally, manufacturers who lack critical technical competence can seek advice from Pharmaceutical ERP partners who have complete control over their industry and technical understanding to help them make technology purchases (frontiers, n.d.).



Recommendations

- Integration of AI and ML in drug discovery and E-prescription.
- Using digital technologies and devices in Clinical trials.
- Using of Blockchain, AI, ML, IoT, RFID (Radio Frequency Identification) in Supply Chain Management.
- Need to concentrate on patient centricity in case of PAPs/PSPs.
- Using of Predictive Analytics in Production & Maintenance
- With the help of Technologies like Advanced Analytics, AI to monitor the quality levels, Cloud based platforms enables Real-time Tracking & ML to address drug Safety in Pharmacovigilance.
- Develop a clear knowledge of the needs for common digital capabilities across value streams, enterprise functional areas, and north stars.
- Develops internal organizational capacity for digital innovation (either centrally or at the functional level) to take innovative ideas from conception to full-scale

execution.

- To connect with innovation partners in specific technological, medical, and geographic sectors, develop an ecosystem engagement plan.
- Examine innovation archetypes, their benefits and drawbacks, and their consequences for business strategy.

Conclusion

According to research, firms should address fundamental concerns such as money, strategy, and talent before attempting to leapfrog digital innovation. Organizational leadership, functional area budgets, innovation groups, or a combination of these sources provide money for digital breakthroughs today. Only incremental innovation will be fueled by investing in individual initiatives or maintaining existing investments. To enable leapfrogging digital innovation, it is necessary to modify old ways of thinking and implement new budgetary methods.

The pandemic forced biopharma companies to prioritize digital innovation, incorporate it into every aspect of their business, and use it to enhance the experiences of patients and partners. On the other hand, the relevance and pace of digital innovation are accelerating to give organizations a new competitive advantage.

The industry is at a crossroads where businesses may either take advantage of the chance and increase their investments in digital innovation by leapfrogging digital innovation, or they can choose to slow down and run the danger of being digitally inferior.

Many successful firms have built operational structures in which dedicated digital innovation resources are in a center of excellence between business and IT. This has aided in the translation of corporate goals into technological requirements, as well as the flexible management of investment portfolios and speedy collaboration with external partners. To assure appropriate funding for digital innovation while simultaneously reinventing old IT budgeting methods, organizations may need to make crucial trade-offs on business goals.

Startups, academic institutions, big tech businesses, and consultancies are the main sources of the inventions and talent behind the most recent technical advancements. To access innovation at its source, businesses in the biopharmaceutical sector should reconsider their IT approach. The execution pace and scale could be influenced by one or more of the archetypes.

Every person has a particular need for a north and west star. To build a successful portfolio of investments in digital innovation, it is crucial to comprehend the various operational, environmental, and technological aspects at play. According to our research, successful portfolios are made up of a number of deliberate investments that reinforce one another to

generate transformative experiences and value to realize north star goals, as opposed to a number of unintentional investments.

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