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Technology Impact on Employee Sustainability in Pharmaceutical Companies with special reference to Grand Pharma

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Abstract: ***Organizations are rushing to adopt digital transformation for sake of shiniest new technologies in their business and for sustainability, the present study examine how the technology influencing on employee sustainability in organization by a adopting digital transformation in pharmaceutical companies. The main aim of this study is to comprehend how digitalization has changed work place. A quantitative approach is used to collect the data from 139 employees in Hyderabad pharmaceutical companies through a structured framework of questions by using 5 point scale method, and the questionnaire is distributed among the employees by using sampling techniques, multi regression method is used to analyse the variables, the result show that the sustainability of organization is important for stakeholders and for employees also, employees plays a vital role to fulfil organizational goals, they should provide proper training needs to employees according to transformation, so that they can also sustain and work hard to achieve and increase the performance of organizations.***
Keywords: Organizations digital transformation, employee's sustainability, employee motivation,

I. INTRODUCTION

The pharmaceutical industry during the pandemic and how it affects its operations are explained in this section. One of the sectors that changed the fastest in 2020 was the pharmaceutical industry, as new digital technologies were increasingly adopted throughout the pandemic. In an effort to stop the rapid spread of COVID-19 and the deaths of millions of people worldwide, technology has become increasingly prevalent. These DTs included big data analytics to support clinical trials and research and development (R&D). Drone-borne cameras and artificial intelligence (AI) surveillance cameras, among others, are able to track and limit people's movement within a monitored or locked-down area in addition to gathering real-time data.

By 2030, the pharmaceutical industry is expected to spend over $4.5 billion on DT. Pharmaceutical businesses anticipate savings of 20% or more from the adoption of digital procedures, including a 14% decrease in delivery reliability and a 17% reduction in costs related to subpar product quality. According to Lee et al., Pharma 4.0 might boost output by 200% above existing capacities. They also emphasized how automation and digital transformations have reduced testing times by 60–90% and overall deviations by over 65%.

The digital transformation is a process that takes time to complete. There may be some trial and error involved, and it can be beneficial to use the advice of cutting-edge technology vendors. To embrace the change that comes with technology and see it as a beneficial answer, a culture shift is required. Training, drug development, supply chain, forecasting, teamwork, and consumer outreach are all impacted by digital trends in pharmaceuticals.

The Digital transformation can identify the importance of digitalisation in the pharmaceutical industry by looking at the challenges the industry is facing:

1) Lack of consolidation – We're seeing lots of teams work in silos rather than a unified approach to research. Some have embraced digital solutions, and others haven't, causing difficulties in sharing information. This results in mistakes and slower discoveries. Tech is connecting global teams.
2) Ineffective communication – Long email chains of various versions of documents slow down productivity. The digital transformation in pharma has accelerated the use of SaaS systems such as Microsoft Teams for instant communication, cloud-based file sharing, and consolidated reporting powered by AI tools.
3) A growing patient demand – The population is rising and the role of the consumer has evolved into well-informed individuals, with research tools at their fingertips. They don't want to wait for weeks for an appointment to ask questions.

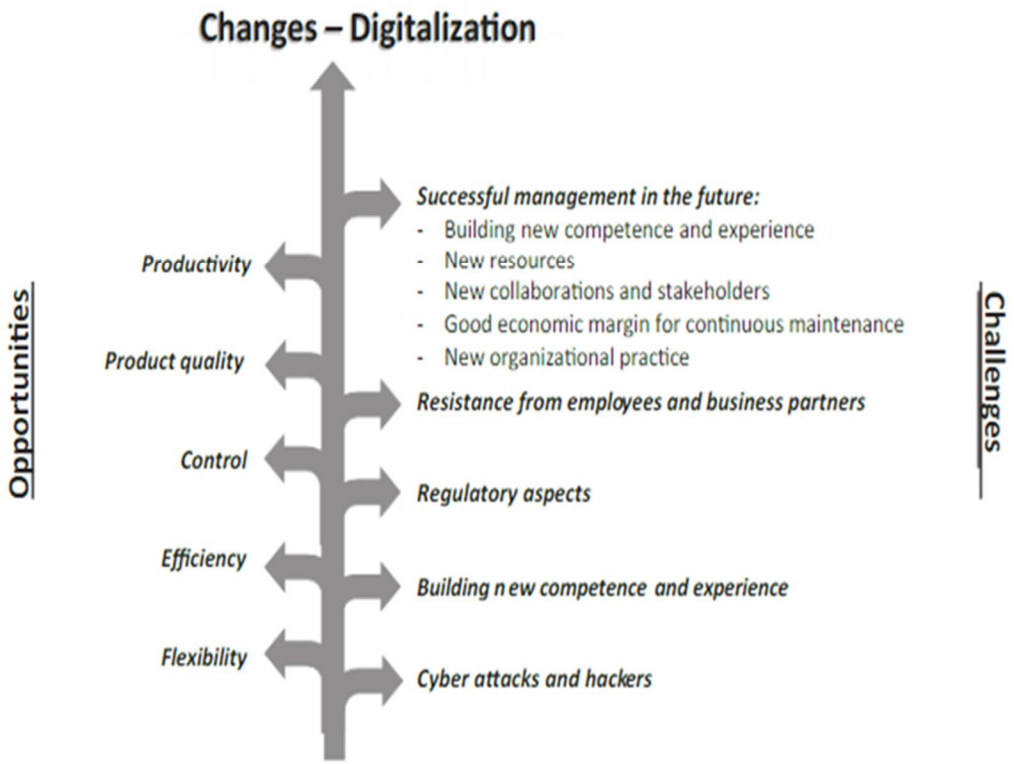
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Pharma needs to move away from having a big business feel with distance and find opportunities to connect with consumers to create a humanistic approach. Social media strategies should be considered full of videos and informational content, as well as AI chatbots, so consumers can receive answers to their specific questions.

4) Data gaps – Historically, there has been an underrepresentation of women and other patient groups within clinical trials, resulting in data gaps. Data is a crucial component of drug development. It accurately helps us to predict patient outcomes and the best treatments based on gender, race, genetics, lifestyle, etc. Technology is an enabler; a tool to help us accurately look closely at factors that have been left out in traditional drug testing, such as race, gender, age, and even pregnancy. Using digital solutions, we not only speed up drug testing, but can proactively fill in the existing data gaps for improved patient outcomes. Technology can also accelerate clinical trial outputs by reaching subjects remotely, giving access to more global data. This is particularly important for rare diseases, where patient numbers are low, making it hard to conduct a clinical trial in a local area.

5) Inflation – Rising costs and limited funding put pressure on pharma to meet demand while maintaining profit margins. Digital solutions could save pharmaceutical companies money by streamlining research so that no penny is wasted, optimising the supply chain by improving logistics processes, and automating processes to save time, preventing labour cost wastage.

In order to create novel medications, the pharmaceutical industry is constantly refining the procedures and methods utilized in drug development. Nevertheless, traditionally, the industry has not seized the potential presented by the data and digital revolution at the forefront.3. It can take days or even weeks to finish the laborious, time-consuming procedures involved in the drug development process by hand. Take the management of clinical trials as an example. To summarize the status of a single study required a thorough examination of numerous spreadsheets in order to obtain the national, regional, and global overviews. All data is obtained from various systems using manual, one-time extractions, at various times, and frequently in accordance with various presumptions and guidelines.



II. REVIEW OF LITERATURE

The Internet of things (IoT), 3D printing, the Industrial Internet of things (IIOT), Enterprise Resource Planning (ERP) Systems, Artificial Intelligence (AI), Machine Learning (ML), Big data (BD), and the convergence of physical manufacturing and digital technologies have all resulted from this revolution [13].

DT is inextricably linked to Industry 4.0, whether in the services or industrial sectors; it is the transformation that propels Industry 4.0 forward. Businesses are now ensuring that digitalization and automation eliminate mistakes that have the potential to harm their brand and result in massive financial losses.

On the other hand, the pharmaceutical industry has a history of resistance to new technologies and digital solutions. Nonetheless, with the Covid-19 outbreak causing widespread concern and posing a continuing threat, digitalization appears to be the best way to ensure everyone has access to safe medication [2]. Environmental changes because of the growing population and pollution cause contention and disruption. Therefore, digitalization was required to address these environmental challenges while simultaneously increasing competition, and improving customer relations, productivity, profitability, effective planning, problem-solving, and decision-making to continue delivering medical items [14].

The pharmaceutical industries are extremely sophisticated in terms of technological use. However, in terms of operations, the sector has been quite conservative in embracing new technology thus far, relying on a long-established supply chain and manufacturing models [15]. The highly regulated environment in which pharmaceutical companies operate is an important factor. Digitalization has enormous potential to assist pharmaceutical businesses in addressing these difficulties of lack of integrated planning throughout the network

The consequent workflow and process optimization save time once spent chasing data. With automated logistics and quality documentation, you can quickly and easily review shipments, do root cause analysis, and automate product releases for temperature-compliant shipments – i.e. for almost all shipments. You can also find and address any 'soft spots' where temperature excursions occur throughout all your shipments to reduce critical temperature excursion rates in your supply chain.

For firms unsure about the digital transition, partnering with experienced providers like Controlant simplifies the process, offering expert support and compliance with regional regulations through their GxP-validated platform. Used by major pharmaceutical and logistics companies worldwide, the platform ensures a streamlined and efficient supply chain. With Controlant, companies have a trusted partner to help maximise the benefits of digitalisation without having to navigate the complexities alone. Download the whitepaper on this page to learn more.

Role of Artificial Intelligence in Pharmaceutical sector AI, or artificial intelligence refers to creation and deployment of computer systems that can do activities that normally require human intellect. It is a multidisciplinary field of research that includes a variety of methodologies and approaches for enabling machines to replicate human intelligence, including as learning, reasoning, problem-solving, perception, and language understanding (Bajwa, J., et al.2021). AI systems are built to collect and analyse massive volumes of data, learn from patterns and experiences, make sound judgements, and adapt to changing conditions. They are divided into two categories: narrow or weak AI, which is meant to do certain activities with human-like intelligence, and general or strong AI, which designed to duplicate human intellect across a wide variety of tasks and circumstances. Artificial intelligence is being used in a variety of businesses and disciplines, including healthcare, finance, transportation, manufacturing, and entertainment. The pharmaceutical sector cannot overlook the significant role of AI, given its extensive applications throughout various stages. The domain of medicine and pharmaceuticals revolve around the development and identification of chemical compounds and combinations that alleviate physical and psychological distress. Throughout numerous years, the production of medicinal substances has been overseen by a regulatory structure designed to ensure the excellence of the final products. This involves rigorous testing of raw materials, in-progress materials, end-product attributes, batch-oriented procedures, and established process conditions. Recent researches have highlighted the application of AI in various fields such as medicinal chemistry, healthcare, pharmaceuticals, and biomedical studies (Sunarti, S., et al.2021). Specifically, AI has garnered attention in areas like target protein identification, computer-aided drug design, virtual screening, and in silico pharmacokinetic evaluation. These advancements have proven instrumental in disease diagnosis, with a particular emphasis on cancer diagnosis and treatment. The integration of AI technologies in these domains has shown great potential for enhancing research and development efforts, improving drug discovery processes, and revolutionizing the way diseases are diagnosed and treated, particularly in the context of cancer. The impact of AI is clearly evident across the entire pharmaceutical product lifecycle, encompassing drug discovery and product management. In the field of drug discovery, AI technologies play a crucial role in both drug screening and drug design. These algorithms include an array of methodologies such as machine learning (ML), deep learning, AI-based quantitative structure-activity relationship (QSAR) technologies, virtual screening (VS), support vector machines (SVMs), deep neural networks (DNNs), recurrent neural networks (RNNs), and more. These AI-driven neural networks draw inspiration from biological neural networks, processing input data to produce output responses.

Artificial neural networks (ANNs) consist of interconnected units for information processing, while DNNs incorporate multiple layers of data processing units.

RNNs, on the other hand, analyse data sequentially, utilizing output data from previous analyses as input for subsequent phases. SVMs are instrumental in classifying and regressing input data. In pharmaceutical product development, AI plays a pivotal role in selecting appropriate excipients, determining the development process, and ensuring compliance with specifications.

Tools like model expert systems (MES) and ANNs find applications in pharmaceutical product development. Within manufacturing, AI facilitates automated and personalized production, effectively identifying manufacturing errors within predefined limits. AI technologies like meta classifiers and tablet classifiers are deployed to achieve the desired quality in the final product (Paul, D., et al.2021). AI has made significant strides in the domain of clinical trials, playing a crucial role in subject selection and trial monitoring while effectively reducing participant dropouts through close monitoring. Here are some of the core areas where AI is utilized in pharmaceutical sector: Drug Discovery The development of a vast number of drug molecules from the chemical space can be a time-consuming process, hindered by the lack of suitable technologies. However, the integration of AI in the drug development process holds promise for overcoming these challenges (Mak, K. K., & Pichika, M. R. 2019), (Mishra, V. 2018) As of March 2022, Boston Consulting Group reported that biotech companies employing an AI-first approach had made significant progress in drug development. These companies had over 150 small-molecule drugs in the discovery phase, indicating the successful application of AI technologies in the early stages of drug development. Furthermore, more than 15 of these AI-driven small-molecule drugs had already advanced to clinical trials. This data underscores the growing adoption of AI in the biotech sector and highlights its potential to accelerate the drug discovery process and advance promising candidates into clinical testing. The use of AI-first approaches holds promise for improving efficiency, reducing costs, and increasing the success rate of drug development efforts in the pharmaceutical industry. By leveraging AI, researchers can optimize and streamline the identification and design of potential drug candidates. AI technologies, enable efficient exploration of the chemical space, allowing for the identification of promising molecules with desired properties. This integration

The main research fields in DT of pharmaceutical companies have been drug development (Finelli and Narasimhan, 2020), supply chains (Ângelo et al., 2017), and quality of care (Laurenza et al., 2018). Research focusing on DT in sales functions in pharmaceutical companies is rare (Guenzi and Habel, 2020). Combined with the high evaluation of DT in the area of innovation (Gurbaxani and Dunkle, 2019), the function with the lowest level of digital maturity in pharmaceutical companies might be attributed to sales and marketing. Irrespective of industry, how DT is promoted in sales activities is not clear, although digital technologies are reported to have positive effects on company performance (Zhao, 2018). Most of the research was interested in implementing or exploiting specific digital tools (Wedell and Hempeck, 1987; Davis et al., 1989). The pharmaceutical industry is a core of the healthcare ecosystem, and DT was also studied in the framework of healthcare (Agarwal et al., 2010) with hospitals (Frick et al., 2021). DT was expected to have positive impacts on healthcare as a whole (Haggerty, 2017; Kraus et al., 2021). According to the review of DT on healthcare (Kraus et al., 2021), existing research has discussed operational efficiency by health care providers, patient-centered approaches, organizational factors and managerial implications, workforce practices, and socioeconomic aspects. When applying DT in a specific industry, we should pay much attention to industry regulations. According to Breidbach et al. (2020), regulations in the financial industry, which were as strict as those in the pharmaceutical industry, had a two-sided effect of both promoting and hindering the introduction of fintech. Gopal et al. (2019) pointed out that regulations in the pharmaceutical industry impeded the efficient usage of health information. However, since regulations depend on the specific country, the impacts may not be easily determined. Regulations for the pharmaceutical industry in Japan are strictly formulated in the "Guidelines for Sales Information Provision Activities for Drugs"(Ministry of Health, Labour and Welfare, 2018). For instance, salespeople in pharmaceutical companies are generally termed medicine representatives (MRs), who must provide precise information regarding the company's drugs to medical professionals or customers (e.g., doctors and pharmacists at hospitals and clinics). In addition, they are not allowed to sell drugs directly to customers or patients. In relation to DT, a recent remarkable environmental factor was the COVID-19 pandemic. The pandemic stimulated the digitalization of customer relationships (Kim, 2020). In the retail business, omnichannel sales have been a hot topic not only in B2.

Since the pharmaceutical industry in Japan was assumed to be at an early stage of DT with scarce literature, our explorative research adopted semi-structured interviews with leaders in the companies practically realizing DT to collect data about how DT was promoted with an open mind (Myers and Newman, 2007). Preliminary Interview First, we conducted 8 preliminary interviews in May 2020 to obtain a comprehensive view of the DT in sales of pharmaceutical companies in Japan and to decide on sampling and the questionnaire to be applied in the subsequent main interview.

The respondents were expected to have an overall understanding of pharmaceutical companies. • One CDO (Chief Digital Officer) (R1) and one MR leader of a pharmaceutical company • One researcher studying pharmaceutical industry policies in a research institute (R2)

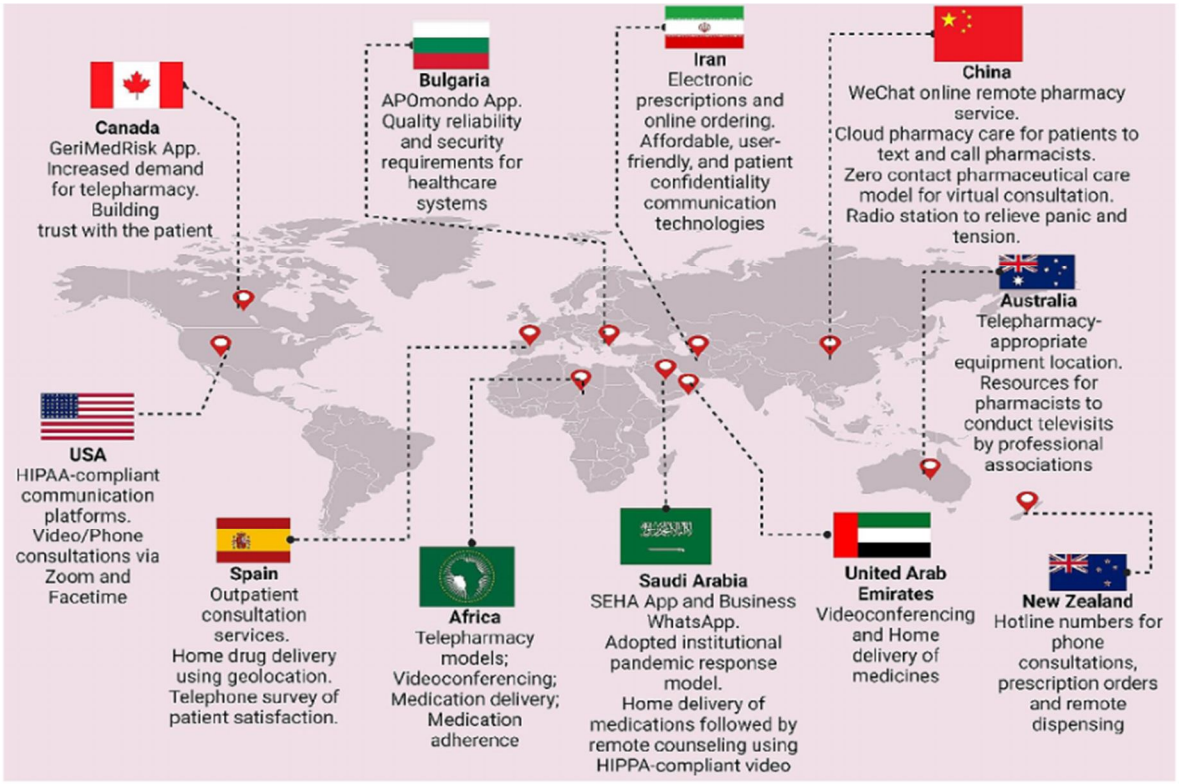
Two consultants for the pharmaceutical industry and three staff members in charge of MR contact in a solution service company In this preliminary interview, we confirmed that they perceived that the sales function was in the early stage of DT, for example: "Pharmaceutical companies have been lagging behind other industries in digital progress to some extent, especially on the sales and marketing side." (R2) "Our research and development function had taken advantage of data since before, and now leverages AI, but not in sales and other functions."

(R1) This perception was consistent with research outside Japan (Remane et al., 2017; Gurbaxani and Dunkle, 2019). The low level of digital maturity in this industry was considered to be influenced by common factors, so we were careful with the external factors in the main interview. On the other hand, most respondents suspected that there were large gaps in DT between companies in the planning stages and those in the implementation stages. To collect more meaningful data on what truly happened in relation to DT, we were careful to choose companies with a certain amount of DT experience to include in the sample of firms in the main interview. Liu et. al., 2021 Asian Journal of Business Research, Volume 11, Issue 3, 2021 76 Sampling Based on the preliminary interview, supposing that companies with higher sales performance could advance more in sales of DT (Barann et al., 2019), we targeted our sample on the top 20 companies in medicine sales revenue in Japan in 2019 or companies that had the top 10 sales performance of a specific type of medicine. We tried to contact those target companies, and 6 companies responded and participated in the main interview (Table 1). Companies A, B, C and D were major Japanese pharmaceutical companies. Companies E and F were foreign-owned companies, but the management and business operations of Company E were independent of the owner. An author who had been involved in consulting for the pharmaceutical industry for more than 15 years arranged for appropriate interviewees. Two types of interviewees were selected from each company, so a total of 12 interviews were conducted from September to November 2020. All of the X1-type interviewees had experiences in IT/digital or sales more than 20 years, and were supposed to provide information on those factors likely to boost or hinder DT, as well as on their current status and achievements. The other interviewee type, labeled X2 (e.g., A2, B2), was the general manager- or director-level position and familiar with real sales activities and promoting digital solutions to business (e.g., sales promotion headquarters). All of the X2-type interviewees had worked in this industry more than 10 years and were involved in sales with digital more than 3 years, so that they were expected to answer effectively questions regarding the use of digital technologies in practical applications. Table 1: Information of Respondents Company Type of the Company Respondent Short Profile Company A Domestic; In the top 5 medicine sales in Japan; Exploiting digital technologies in sales A1 E-Communication; Promotion/ Sales Planning Officer; Over 20 years of sales in pharma A2 Director; Information Analysis; Over 10 years of sales in pharma Company B Domestic; In the top 10 medicine sales in Japan; Exploiting digital technologies in sales; A clear digital strategy B1 CDO; Marketing, Technology, Strategy Promotion Officer; Over 20 years of sales/IT/digital/marketing in pharma B2 Director in Frontier Business Promotion; Over 10 years of sales in pharma Company C Domestic; In the top 5 medicine sales in Japan; C1 Senior Managing Executive Officer in DT Promotion; Over 20 years of R&D/digital in pharma Liu et. al., 2021 Asian Journal of Business Research, Volume 11, Issue 3, 2021 77 Company Type of the Company Respondent Short Profile Exploiting digital technologies in sales; A clear digital strategy C2 General Manager in Digital Planning; Over 10 years of sales in pharma Company D Domestic; In the top 15 medicine sales in Japan; Exploiting digital technologies in sales D1 Executive Officer in Marketing and Sales; Over 20 years of marketing/sales in pharma D2 General Manager; Sales Planning; Over 10 years of sales in pharma Company E Foreign-owned with independent management; In the top 5 medicine sales in Japan and the top 3 sales of a specific medicine type; Exploiting digital technologies in sales E1 CDO; Digital and IT Management; Over 20 years of sales and consulting in an IT company E2 General Manager; Digital Planning; Over 10 years of sales in pharma Company F Foreign-owned with no R&D in Japan; In the top sales of a specific medicine type; Exploiting digital technologies in sales F1 Executive Officer in Customer & Strategy Sales; Over 20 years of marketing/digital/data in a consulting company and 5 years in pharma F2 Manager; Customer Experience Management; Over 10 years of sales in pharma Data Collection We conducted interviews with semi-structured, open-ended questions about what factors promoted or hindered DT and how business activities were transformed through DT. All interviews were held for 1 to 2 hours on Zoom. More time was spent with X1-type respondents with questions from the perspective of strategy, resources, and evaluation of DT and with X2-type respondents from the perspective of what changes and problems were happening in their daily work through the use of digital technology. Data Analysis For an in-depth analysis of the results, all interviews were recorded and then transcribed. The transcripts were rigorously processed, and similar statements were clustered by using NVivo 12.

First, open coding was conducted, and the codes and descriptions were then discussed among authors with the support of one of the consultants in the preliminary interviews. Tentatively, 137 descriptive concepts were summarized. After removing the concepts that were irrelevant to sales, 72 concepts were verified and connected with each other into subordinate and general dimensions. In this step, this study discussed the mentioned concepts and referenced previous academic research.

Last, the concepts were grouped into three categories: external factors, top management Liu et. al., 2021 Asian Journal of Business Research, Volume 11, Issue 3, 2021 78 commitment, and new activities and challenges. Findings The findings were summarized in Figure 1. "New Activities and Challenges" were led by the "Top Management Commitment" and influenced by "External Factors that Drive DT". External Factors that Drive DT The following four factors were identified as drivers of DT in the sales of pharmaceutical companies. They express the reasons why sales of pharmaceutical companies started to boost DT.

Emergence of new digital technology DT promotion was stimulated by emerging digital technologies, as seen in other industries (Frank et al., 2019). The interviewed companies that were proceeding with DT were active in not only adopting but also utilizing the technologies. They expected to adapt to a changing technology environment (Chan et al., 2018). "New digital technologies are emerging constantly. I consider that artificial intelligence most significantly impacts our industry … I suppose that the technology for visualization of various data is critical to our business … the significance of existence of sales was raised … I consider the sales should be transformed so that MRs should use technologies in a way that can yield business outcomes." (B1) "In the context of Society 5.0 proposed by the government, a wide variety of data is increasing significantly … Companies expect digital technology to support new business transformation by utilizing data, which is an urgent issue." (C1) Prediction of the decline in sales and profits Most of the interviewees remarked on the prediction that sales and profits would decline as the background of DT. Japan is facing the problem of aging with a decreasing population, and increasing national medical costs have led the government to try to keep pharmaceutical prices down (Umekawa, 2019). In addition, the cost of developing new drugs has been increasing. Against the background of restructuring their salesforce, pharmaceutical companies were inevitably turning to the use of digital technologies. "The pharmaceutical industry is facing a difficult external environment, especially with the price of medicines plummeting, and the future figures are very challenging. Thus, the scale (numbers of MR) cannot be maintained as in the past. It should be reduced in the future, when considering how to maintain at least the same amount of work with less workforce, we think about shifting to digital."



The global distribution of tele pharmacy programs with an analysis of geographical distribution, technological applications, and associated benefits

A. Conceptual frame work of the study :



Fig. 1. Five principles of Good Manufacturing Practice, schematical overview.

3

B. Objectives of the study:

The main objective of the study is

1) To study digital transformation in pharmaceutical companies.
2) To identify the significant change in pharmaceutical companies and its impact on employee sustainability.
3) The study investigates how the technologies can improve efficiency and competitiveness in the pharmaceutical sector.

III. RESEARCH METHODOLOGY

1) Research Design: The study carried out with primary data collected through structured questionnaire from samples of 100 respondents. The sample have been considered by using non-probability technique (Convenient sampling method) and was validated and then took it for further analysis.
2) Sample Design: The main sample group of the survey includes young consumers While preparing questionnaire, objectives of the study were kept in mind
3) Sample Size: The sample size for this study consisted of100 young consumers

For analysis and interpretation, the data collected through questionnaire are taken into the consideration and it is further analysed.

A. Research Instrument:

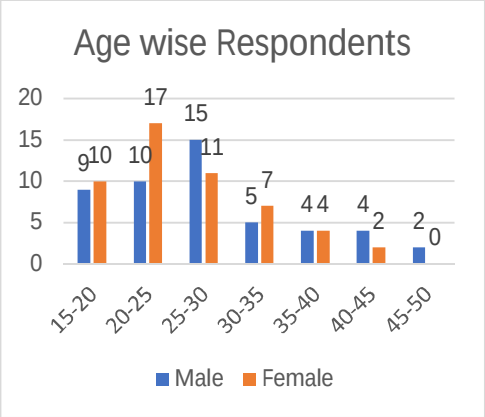
Data was collected through structured questionnaire by using non comparative scaling technique likert scaling in the questionnaire. It has been divided into two parts ,the first part talks about awareness of digital marketing and it influences over the customer buying decision Second talks about the impact of digital marketing

B. Hypothesis Of the Study:

H0- There is no significant relationship between effective marketing strategy and consumer behaviour.
H1- There is a significant relationship between effective marketing strategy and consumer behaviour.

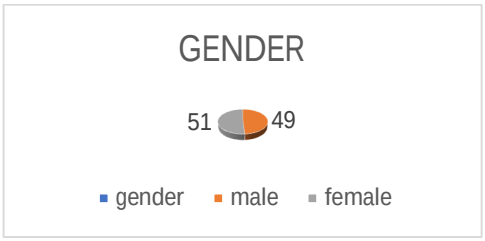
IV. DATA ANALYSIS

Age - Wise Respondent



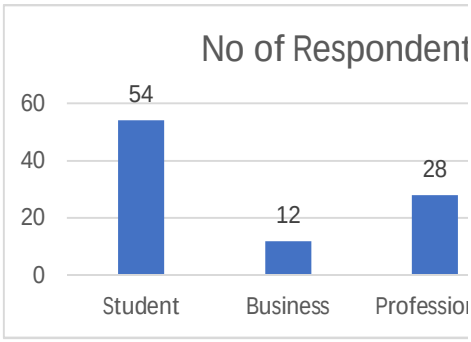
		No Of Respondents	
Sno	Age	Male	Female
1	15-20	9	10
2	20-25	10	17
3	25-30	15	11
4	30-35	5	7
5	35-40	4	4
6	40-45	4	2
7	45-50	2	0
	Total	49	51

Gender Wise Respondents



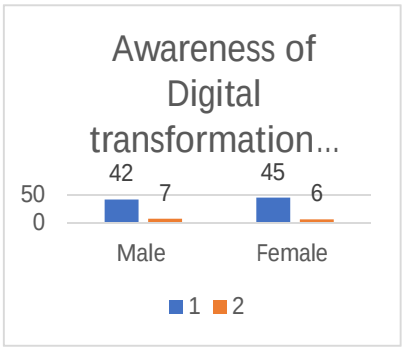
Gender	No of Respondents
Male	49
Female	51

Profession of Respondent



Profession	No of Respondents
Student	54
Business	12
Professional	28
Service	6

Digital transformation Awareness of Respondent

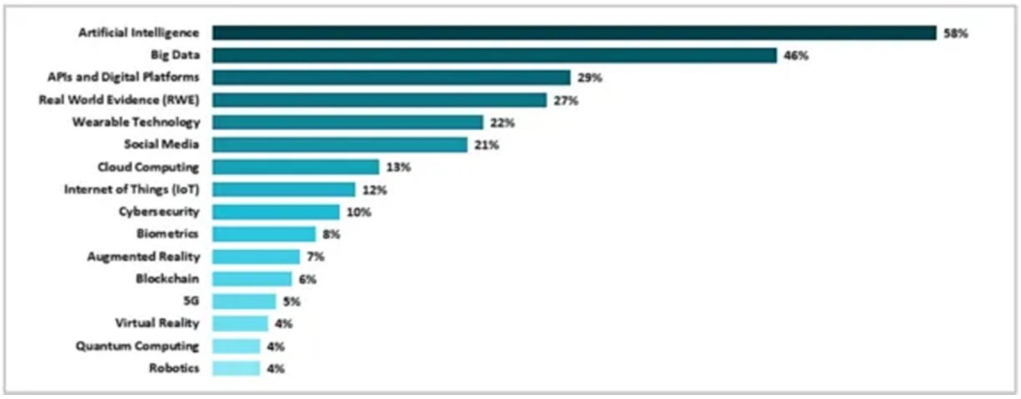


Awareness of Digital transformation among Respondent

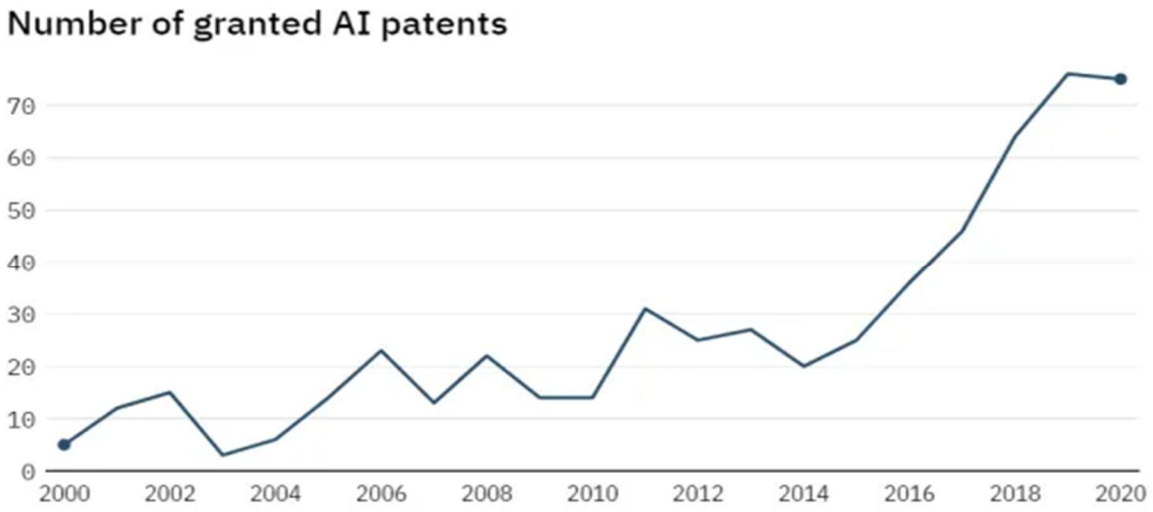
Sno		Male	Female
1	YES	42	45
2	No	7	6

Most disruptive future technologies in pharma

166
Impact of Digital Marketing on the Buying Behavior of Youth With Special Reference
166
Impact of Digital Marketing on the Buying Behavior of Youth With Special Reference
166
Impact of Digital Marketing on the Buying Behavior of Youth With Special Reference
166
Impact of Digital Marketing on the Buying Behavior of Youth With Special Reference



AI innovation in the pharma sector 2000 to 2020



This study used SPSS 26.0 to analyse the degree of correlation between the factors through the Pearson method. The results of the analysis are the correlations between the factors were all significant if correlation coefficient is above 0.9, it means very strong correlation; if it is above 0.7, it means strong correlation; if it is above 0.40, it means moderate correlation; if it is above 0.10, it means weak correlation. The results of this study show that the correlation coefficient values for Digital transformation, information sharing, traceability, employee sustainable and their performance fluctuate from 0.690 to 0.822 and are all significant ($p < 0.000$). This indicates that there is a strong correlation between the factors. The mean value of the variables fluctuates from 4.4 to 4.476. The maximum standard deviation is 0.602 and the minimum is 0.557, indicating that the distribution of the variables is relatively concentrated and dispersion is rare. With the increasing demand in the pharmaceutical market and in the era of rapid development of information technology, With the increasing demand in the pharmaceutical market and in the era of rapid development of information technology, the pharmaceutical supply chain needs to achieve continuous growth in performance through efficient management mechanisms to assist the supply chain.

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This paper provides a comprehensive analysis of the relationship between the four components of digital transformation, information sharing, traceability and sustainable supply chain performance. The results of the empirical analysis reveal that digital transformation is beneficial to the pharmaceutical supply chain in achieving sustainable supply performance. Digital transformation has a significant direct impact on both information sharing and traceability. This is in line with the findings of Alabdali & Salam 2022, Massaro 2021, Omar et al. 2022 [61,69,72]. Therefore, enhanced digital transformation in the pharmaceutical supply chain contributes to the ability to manage information sharing and traceability, which is conducive to achieving sustainable development in the pharmaceutical supply sector. Traceability in supply chain management directly affects sustainable supply performance, and traceability as a mediator can enhance the positive impact of digital transformation on sustainable supply performance, corroborating the findings of Lee & Ha 2021, Haji et al. 2021 [10,76]. Traceability as an important driver can therefore assist the pharmaceutical supply chain in achieving superior performance through digital transformation. The direct effect of information sharing on sustainable supply performance was not significant. This is contrary to the results of Guan et al. 2020, Yatuwa 2020 study [73,74]. The mediating effect of information sharing was not significant during the test of mediating effects of digital transformation and supply performance. This is different from the findings of Nestle et al. 2019, Li 2022 [64,84]. Besides, the distal effect of consisting of information sharing and traceability remains insignificant. However, the total effect of the mediating effect is significant, indicating that information sharing and traceability as two independent trends can have synergistic effects. Due to the uncoordinated development of digital technologies among supply chain members, technological uncertainty will affect the quality of information exchanged between partners, which in turn affects trust between stakeholders and has a negative impact on ultimate performance. Xu et al. (2022) found that technological uncertainty has a U-shaped relationship with inter-organizational solidarity trust in the digital transformation of supply chain management through an empirical study

V. FINDINGS

1) Identifying General Barriers in the Pharmaceutical Industry

The study targeted middle and senior management professionals in the pharmaceutical industry. Data collection began with a preliminary survey informed by literature, research papers, books, and articles on barriers in the pharma industry. The identified barriers were reviewed by pharma company managers, who added others based on their work experiences.

2) Essential barriers identified from the common barriers

In this phase, the identification of key barriers to GSCM implementation was completed using the AHP approach. After the initial review, 24 critical constraints were identified and prioritized. These constraints, outlined were organized into a four-level hierarchical structure, as described below:

Level I: Defining the objective or goal.

Level II: Categorizing and classifying the barriers.

Level III: Establishing a hierarchy of specific barriers.

Level IV: Prioritizing the most essential barriers.

This structured approach facilitated a clear prioritization of the key constraints within the GSCM implementation process.

VI. SUGGESTIONS

1) Financial focus: Overcoming high implementation costs by seeking governmental subsidies, encouraging public-private partnerships, and leveraging green loans.

2) Reverse logistics development: Establishing efficient, cost-effective systems for managing expired drugs and hazardous waste, including improved recycling mechanisms.

3) Technological investment: Promoting the adoption of Industry 4.0 technologies, such as IoT and smart manufacturing, while addressing skill shortages through training programs.

4) Policy and support: Strengthening regulatory frameworks and encourage governmental initiatives to set industry benchmarks and provide financial incentives for green practices.

5) Stakeholder involvement: Enhancing supplier collaboration through clear communication of sustainability goals and regular audits to align with CE principles.

6) Knowledge dissemination: Increasing awareness among employees and stakeholders about green procurement and product lifecycle benefits through training and campaigns.

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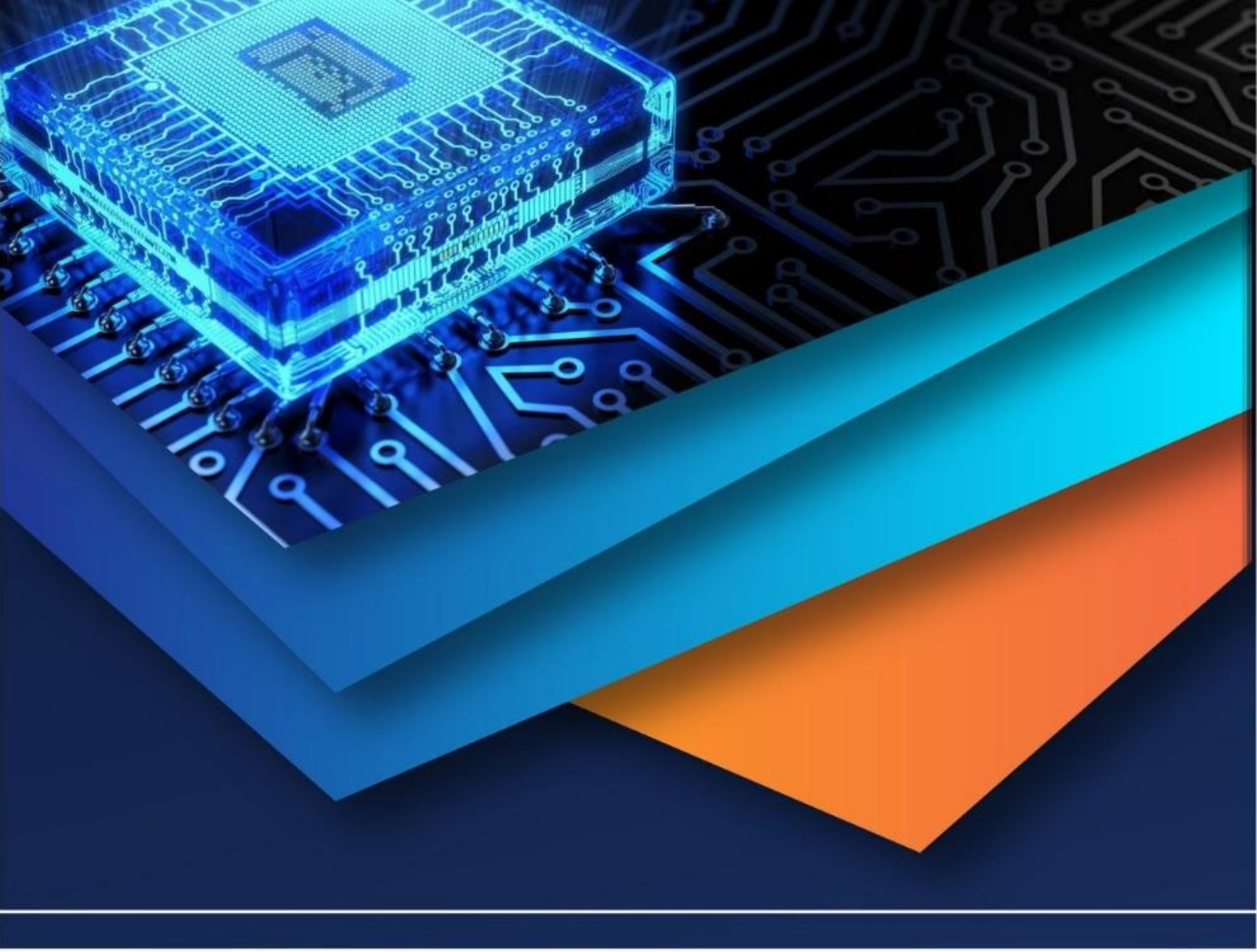
VII. CONCLUSION

Organizations are rushing to adopt digital transformation for sake of shiniest new technologies in their business and for sustainability, the present study examine how the technology influencing on employee sustainability in organization by a adopting digital transformation in pharmaceutical companies. The main aim of this study is to comprehend how digitalization has changed work place.

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