SCHOOL OF
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TECHNOLOGY CONVERGENCE AND DIGITAL TRANSFORMATION: SUCCESS OF AI-GENERATED CHATBOTS IN THE WEST BENGAL GOVERNMENT SECTOR

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ABSTRACT

This paper has been written with a presumption that Artificial Intelligence and AI-generated technology like chatbots has been successfully accepted for "Amar Ration App" in the Food & Supplies Department in the state sector of West Bengal due to wide awareness among major portions of the government employees. The stakeholder government employees and other beneficiaries who adopted AI-generated technologies like chatbots are doing that for both internal administration and external service deliveries. It tries to highlight the pros and cons of such adoption principles and implementation strategies with the help of analysing sets of observed variables through

The objective of the paper is to assess the success of such ongoing AI-generated technology projects in the Food & Supplies Department and list the sources of impediments which are negatively influencing the successful implementation of AI-generated chatbots and review several influencing factors such as Politics, Awareness of Bureaucrats, Citizens' Acceptance and State-Central Relationship which has affected the growth or created challenges in implementation of chatbots.

The paper therefore predicts some factors which are required to be either avoided or welcomed for attaining success in implementing Artificial Intelligence andAI-generated chatbots. The research has studied to what degree a certain chatbot project has been accepted, new technologies related to that has been adopted, and in way of implementation, how far the technology-based service has been delivered to beneficiaries.

This research paper has made a confirmatory factor analysis of the primary information to deduce how much the respondents among the employees of the Department agree with the proposed objective of the research, that is, how they perceive that the challenges of implementation of chatbot projects can be successfully overcome through proper planning and subsequently how such successful steps towards Artificial Intelligence andAI-generated chatbot project implementation can be adopted for future projects by different State sectors in West Bengal.

Also, the research has reviewed the personal views of respondents implementing such projects and as a result made an effort to draw inference on availability of a proper planning algorithm behind strategizing and implementing such projects in terms of service delivering as well as funding for long-term running to call the projects as successful ones.

The paper concludes that there are uneven demands of chatbots and such online service delivery technology in different departments and not all the challenges can always be overcome by the

government. whether a well-planned project in the State sectors is both successfully implemented and also being strategically accepted by the government employees and such executing stakeholders. Also, it concludes that there is a clear requirement of establishing a system on Training and Development for future innovation and successful AI-generated chatbots in West Bengal.

Keywords: Artificial Intelligence, AI-generated technology, chatbots, State sector, West Bengal.

1. Introduction:

Globalisation is translating into the exchange of technology among all sectors, private and public. There is a global shift towards the use of Information Technology. Government agencies are using different Information & Communication Technologies (ICT) as tools to transform government as well as serve citizens, businesses, and other departments of government itself.

However, over the decades, in India, globalization in exchange for technologies for excellence, innovation, and upgradation of information technology, and use of ICT for benefits of common people rides government initiatives like the development of the National E-governance plan, introduction of e-Kranti and Digital India concepts and relentless campaigns of such initiatives have seen changes in practice among public sectors delivering services.

1.A. Background

There have been several major corporate governance initiatives launched in India since the mid-1990s. The first was by the Confederation of Indian Industry (CII), which came up with the first voluntary code of corporate governance in 1998. The second was by the SEBI. In India, the e-governance initiative has started via what is known as the National e-Governance Plan (NeGP), which was later christened as the Digital India initiative.

In 1999, the Union Ministry of Information Technology was created. By 2000, a 12-point minimum agenda for E-governance was identified by the Government of India for implementation in all the Union Government Ministries/Departments.

In 2006, the National E-governance Plan was launched by the central government of India.

With service delivery being the priority of the government and with advance technology such as smart phones available to citizens, the government launched Mobile Seva or National Mobile Governance Initiative since 2013, an UN-award-winning e-governance initiative by India.

As India approaches its centenary of independence in 2047, the vision of Viksit Bharat charts a bold, inclusive pathway to becoming a developed nation. At its core lies a critical imperative, the role that AI and frontier technologies can play in unlocking the potential of India's workforce and transforming them into catalysts for Viksit Bharat.

With technological advancement, the Indian government too has been focusing on leveraging machine learning and AI in the past few years. In fact, it has doubled the budget allocation to the Digital India initiative spearheaded by NITI Ayog

Chatbots are becoming the default customer support solution for most services across the globe.

Ministry of Electronics & Information Technology designed and launched in 2017, a single platform for all e-Governance services, available on mobile app, web, chatbot & voice interfaces named Unified Mobile Application for New-age Governance (UMANG), supporting 13 Indian languages.

NIC designed and developed the Digidhan Mitra chatbot which can provide bank-wise transaction details and the growth patterns of various modes of transactions, such as BHIM, IMPS, and cards.

SEBI launched the SEBI's Virtual Assistant chatbot christened "SEVA" with features like citations for generated response, speech-to-text and text-to-speech functionality for accessibility etc.

In India on July, 2015 the newly elected Government of India launched the Digital India campaign and e-Kranti aiming to make all government services accessible to the citizens through common service delivery outlets. Since 2010, the Government of India has regularly spent a major share of the national budget in developing ICT infrastructure. In FY 2011-12, Department of Information Technology spent more than Rs. 250 Crores towards digitalization and IT; In FY 2012-13, this spending was more than Rs. 400 Crores; In FY 2013-14, the spending increased to Rs. 700 Crores; In FY 2014-15, Govt. of India made a pan-India launching of Digital India with a Rs. 500 Crores outlay. From 2015 onwards, however, the Government of India decided to delink E-governance as a centrally sponsored scheme and state governments are entrusted upon with shared investments for research and development, innovation, and building infrastructure.

The Digital India portal, Ministry of Electronics & IT stated that the digital economy grew 2.4 times faster than the economy between 2014 and 2019, generating around 62.4 million jobs. The size of the digital economy has grown from $107.7 billion in 2014 to $222.5 billion in 2019.

India's economy of digitalization has emerged as a major contributor towardsthe national economic growth, thus accounting for 11.7% of the GDP (Rs.31.64 lakh crore or $402 billion)in 2022-23. Employing 14.67 million workers (2.55% of the workforce), the digital economy is nearly five times more productive than the rest of the economy.

Key growth drivers include the rapid adoption of AI, cloud services, and the rise of global capability centers (GCCs), with India hosting55% of the world's GCCs.

India's dedication to AI is reflected in the IndiaAI Mission, a $1.38 billion initiative supporting AI growth in areas like healthcare and agriculture.

As per Press Release Bureau's notification in January, 2025 by the Ministry of Electronics & IT by 2030, India's digital economy is projected to contribute nearly one-fifth of the country's overall economy, outpacing the growth of traditional sectors.

In the light of this, Government of West Bengal has also rolled out all government schemes through online digital service and thus match international standards in terms of service delivery quality.

West Bengal's Food & Supplies department has launched a dedicated bilingual chatbot in 2021 to make it easier for the citizens of the State to apply for a ration card, lodge grievances, and get access to other critical resources. The chatbot also help farmers with verified information pertaining to paddy-related procurement.

In the same year, 2021, the Health & Family Welfare department also launched the ICMS WhatsApp bot to help citizens during the pandemic period to request and track allocation of hospital beds and also monitor the status of government monitored health scheme, Swasthya Sathi, in the state.

Presently, the Transport Department is nurturing the idea of initiating a chatbot to help citizens avail certain online services, which otherwise require beneficiaries to appear physically before the authority, which often proves to be challenging in today's fast-moving world.

1.B. Literature Review:

In todays' digital age, the availabilityofinformation is vital for informed research and analysis, and operational efficiency. Researching people have always explored different methodologies and techniques to increase the presentation and competence of these systems, aiming towards improvingthe citizen-government interactions as well asdemocratizing access to government services and information.

While discussing initiatives of building AI-Enabled Chatbots for Data Accessibility, the Deputy Director General, Ministry of Statistics and Programme Implementation, stated that AI-enabled chatbots are emerging as transformative tools in this space, bridging the gap between users and data by providing instant, intelligent, and contextually relevant responses based on queries made in Natural Language.

The first chatbot, known as ELIZA, was developed at MIT in 1966 and simulated by a Rogerian psychotherapist to mimic a psychotherapist using simple keyword-based responses. Another notable chatbot is PARRY, created in 1972 by Kenneth Mark Colby, a psychiatrist and computer scientist at Stanford's Psychiatry Department. In 1995, the chatbot ALICE was developed using Artificial Intelligence Markup Language (AIML) based pattern matching and later won multiple Loebner Prizes for its "human-like responses".

The history of chatbot integration in e-governance has seen a notable evolution over the years. In the early 2000s, simple rule-based chatbots were first employed on government websites to address frequently asked questions and provide basic information. The scenario witnessed

noteworthyprogress in natural language processing and machine learning during the first half of the 21st century, thus leading to the development of high-endstate-of-the-art chatbots capable of engaging in conversational interactions. Governments globally began incorporating chatbots into social media platforms, such as Facebook Messenger and Twitter, to offer citizens accessible and user-friendly information and services. Personal assistant chatbots emerged, enabling citizens to perform specific tasks, such as scheduling appointments and checking application statuses.

M. Jain, P. Kumar, R. Kota, and S. N. Patel, M. Jain, P. Kumar, R. Kota, and S. N. Patel, in their Research paper in 2018, titled "Evaluating and informing the design of chatbots," stated that, over time, chatbots evolved with better language processing, using ontologies, intent recognition, and contextual memory to enable more natural and meaningful conversations.

E. Adamopoulou and L. Moussiades, in their Research Paper "Chatbots: History, technology, and applications," in 2020, remarked that by the end of 2016, there were around 34,000 active chatbots in the different spheres covering marketing, healthcare, education, and support, with many designed for specific functions on popular platforms and in the industry and research sphere.

Verne et al. (2022) have extensively analyzed the integration of chatbots within the public sector, particularly focusing on their application in welfare services to optimize service delivery and improve citizen engagement.

Similarly, Amiri and Krahanna (2022) have investigated the strategic utilization of chatbots as part of pandemic response frameworks, demonstrating their effectiveness in ensuring timely communication and support during public health emergencies.

Abbas et al. (2022) have further expanded on their perspective by examining the role of chatbots within municipal contexts, emphasizing their potential to streamline administrative functions and improve public accessibility.

Complementing these findings, Makasi et al. (2022) have underscored the role of public sector chatbots as essential tools for service triaging - assisting users in navigating available services and providing information on frequently asked questions.

Dhanushprakash V. C.BalajiA.MalathiM.SripriyaT.ArthyG.Sinthia P (2024) in their paper "Schemes Paaru! - A Multi-Platform Chatbot for Government Scheme Information in India" discussed a chatbot application developed to empower individuals with knowledge about government schemes through an intuitive user interface and smooth interaction with OpenAI.

Similarly, Shreyas et al. (Jan 2024) introduced "Scheme Setu," a special chatbot designed to democratize admission to government financial assistance programs while promoting financial literacy and inclusivity. They emphasize the use of advanced NLP and machine learning models to ensure the accuracy and credibility of information provided by the chatbot.

2. Research Objective

Identifying factors that are responsible for creating challenges in implementing AI-generated programs in the Food & Supply Department and other departments like Health and Transport departments

Identifying the different ways in which those challenges are hindering the growth or success of AI-generated chatbot projects in these sectors

Identifying the different ways to overcome these challenges

2.A. Significance of the study:

The research proposed a combination of better conceptualisation of implementation strategy of chatbots and such AI-generated projects and adoption principles specially in India, in the State Sectors of West Bengal.

This paper has the objective to assess the success of ongoing AI-generated chatbot projects in the Food & Supplies department in the state sector of West Bengal and list the sources of impediments that negatively influence the successful implementation of AI-generated chatbots by the government, and therefore predict factors to avoid or welcome for attaining success in implementing chatbot projects.

This paper has made an effort to review several influencing factors which has affected the growth or created challenges in implementation of AI-generated chatbots, such as, (i) Politics (or changing face of politics),(ii) Awareness of the bureaucrats (or degree of consciousness while delivering services by Govt. officials), (iii) Citizens' acceptance, and (iv) Relationship and resultant coordination between the central govt. and the state govt. in implementing chatbots in a federal country like India.

The study has been made from two different perspectives, such as, understanding through secondary information collected from different AI projects already running in the State sectors within a given time period taken under the research consideration and also the primary information based upon statistical analysis of the responses received through interview process of the sample population studied out of the population of employees taken under consideration of this research study.

2.B. Gap Area Analysis

The research has reviewed sources of impediments that negatively influence the successful implementation of AI-generated chatbots and reviewed several influencing factors, such as Politics, Awareness of Bureaucrats, Citizens' Acceptance, and State-Central Relationship, which have affected the growth or created challenges in the implementation of such technology. It has been observed that no such research study has been carried out so far in West Bengal.

This research paper has made a confirmatory factor analysis of the primary information to deduce how much the respondents within the sample set agrees with the proposed objective of the research,

that is, how the challenges of implementation of AI generated chatbots projects can be successfully overcome through proper planning and subsequently how such successful steps towards AI and chatbot project implementation can be adopted for future projects by different State sectors in West Bengal.

To add to this, the research paper also consolidates and focuses on other pertinent studies wherefrom most of the identified relevant information has been examined, statistically analysed from relevant perspectives, and those have rendered auxiliary support to the research in conceptualising the new context.

Cross-sectional data have been collected from the specific State sector, i.e. Food & Supplies Department and other Departments like Health and Transport, within the specified time period of 10 years between 2015 and 2025, for generating statistical analysis and generalisation of findings for this research within its limited scope. In furtherance of the research, the paper also has a target to offer a remedial pathway to overcome the identified and listed challenges for future implementation of AI-generated chatbots in public services.

3. Research Methodology

3.A. Coverage: Cross-sectional data have been collected only from West Bengal, and for a specific time period between 2015 and 2025.

3.B. Data collection: The sample population consists – The Food & Supply department along with other departments, such as Health and Transport, where either ideas related to AI-generated projects in relation to chatbots and such interactive portals are being planned or is in some form of implementation stage in terms of NIC standards. The officials, only at the managerial level and above, have been considered. Personal interviews and surveys through Questionnaires with the officials at the Managerial level have been the primary source of data.

3.CResearch Hypotheses:

H-1: A major portion of the employees in the concerned Govt. sectors has a significant role in being sufficiently aware about technology

This Hypothesis has been conceptualised has this researcher believes that with the turn of the newer, stronger and robust IT policy in place, it has become utmost important for the government employees in the State Sectors of West Bengal to become aware on IT and AI-generated IT projects

H-2: AI-generated chatbots' needs have a significant role in being not equally high in all of these Govt. sectors

This Hypothesis has been conceptualised with the view that the statement on equal highness in demand as per the Hypothesis is a comparative term as sometimes, the services provided by governments in some circumstances are proved to be inadequate, unreliable and expensive while

in other cases citizens may not have right access, awareness, capacity etc. to avail the service delivery or reach out to the offerings.

H-3: Challenges and impediments of AI-generated programs have a significant role in being short-term and can be overcome in the long term

This Hypothesis has been conceptualised as per the researcher's perception that even though there are challenges remained in implementation of AI-generated programs but still considerable progress has been made in implementing AI-generated chatbot projects and so it is not incorrect to believe that the challenges whatsoever are ultimately be overcome in the long run and it is possible to implement successful AI-generated chatbot projects which can serve better deliveries

3.D. Research Questions

X-1: Do computerization and AI-generated programspromote service deliveries as smarter, faster, and more empowered methods?

X-2: What are the influencing effects of the success/failure of the implemented AI-generated chatbots?

X-3: AreAI-generated chatbotprojects testing success in all the Govt. departments/sectors?

X-4: Do successful service deliveries by AI-generated IT programs influence users to participate in further Training and Development for future innovation?

X-5: How does the acceptability/popularity quotient of a particular program help in building trust and influence mental satisfaction in other departments' workers in a similar environment?

4. Results

4.1 Data Analysis:

Primary Data was collected for the span of 10 years. A Time-Series Analysis has been performed to analyse the success trend of AI-generated chatbot programs. The officials who are working with different successful chatbot projects in West Bengal have been interviewed and their projects' performance in the limited scope of this research has been researched. Different officials working in the different Department has been interviewed to seek information on successful implementation of IT based, AI-generated chatbot system, for different service delivery system which directly involves citizens.

It has been identified by the Researcher that the Transport Department and different State Transport Authorities underneath it are undergoing a change with AI-generated chatbot implementation in some forms or others. For example, this government department is providing online services as a part of Govt-to-Citizen services under which a system was build to provide online, Permits and Licenses at regional transport areas by all RTOs of West Bengal; The policy of adopting AI-generated systems for all the RTOs is being planned since when Transport

Department, NIC and MoRT&H (Govt. of India) are planning smooth citizen experience. Research information was collected from the above mentioned places and 5 of its authorities.

The results from Interviews and Surveys have been studied through confirmatory factor analysis process to reach to a decision. Normalization Test has been performed for filtering the data. The Research Questions, here also mentioned as, 5 observed or measured variables were analysed against the 3 nos. of Hypotheses factors. Confirmatory factor analysis of the responses obtained from interviewing the officials were analysed based upon the 3 Hypotheses factors and a correlation among those hypotheses have been further analyzed to conclude that which are the Hypotheses are having a positive effect.

#	Research Question	#	Hypothesis
X-1	Do computerization and AI-generated programs promote service deliveries as smarter, faster, and more empowered methods?	H-1	A major portion of the employees in the concerned Govt. sectors has a significant role in being sufficiently aware about technology
X-2	What are the influencing effects of the success/failure of the implemented AI-generated chatbots?	H-2	AI-generated chatbots' needs have a significant role in being not equally high in all of these Govt. sectors
X-3	Are AI-generated chatbot projects testing success in all the Govt. departments/sectors?		
X-4	Do successful service deliveries by AI-generated IT programs influence users to participate in further Training and Development for future innovation?	H-3	Challenges and impediments of AI-generated programs have a significant role in being short-term and can be overcome in the long term
X-5	How does the acceptability/popularity quotient of a particular program help in building trust and influence mental satisfaction in other departments' workers in a similar environment?		

Table 1: Research Question vs Hypothesis comparison

Our objective is to see whether the model specified above is true in connection with the data collected.

In confirmatory factor analysis, it is assumed that the underlying factors are correlated with each other. It measures how similar (associated) two hypotheses are across the variables. Factor Correlation must be <0.85 and the range should be within 0 and 1. Out of the responses obtained from the analysis of the research question, Skewness and Kurtosis values are found to be closer to 0 [Skewness from (-)0.24 to (+)0.49 i.e. in limit of thumb rule of -0.8 |S| +0.8 and Kurtosis from (-)0.92 to (+)0.21 i.e. within limit of thumb rule of -3.0 |K| +3.0].

When all the above criteria meet the acceptable range, we go for parameter estimates.

4.2. Results obtained:

All the above measures are more all less within the acceptable range.

	X-2	X-2	X-3	X-4	X-5
X-1	1	0.575	0.261	0.487	0.409
X-2	0.575	1	0.516	0.658	-0.012
X-3	0.261	0.516	1	0.254	0.000
X-4	0.487	0.658	0.254	1	0.341
X-5	0.409	-0.012	0.000	0.341	1

Table 2: Pearson 'r' correlation status of Research Questions

Pearson 'r' correlation statistical measure has been used to measure the degree of relationship between two linearly related variables with each other. The Pearson value of r is obtained, therefore in the above table suggesting that there are either positive values (as one variable increases, the other also increases) or negative values (when one increases, the other variable decreases) of the linear relationship between two research questions at any point of time.

Also, from the statistical analytical result we saw that the research question "Do computerization and AI-generated programs promote service deliveries as smarter, faster, and more empowered methods?" has a high association with the Hypothesis "A major portion of the employees in the concerned Govt. sectors has a significant role in being sufficiently aware about technology" the correlation coefficient being 1.0.

In case of the pair of research questions "What are the influencing effects of the success/failure of the implemented AI-generated chatbots?" and "Are AI-generated chatbot projects testing success in all the Govt. departments/sectors?" the first question has high association with the Hypothesis "AI-generated chatbots' needs have a significant role in being not equally high in all of these Govt.

sectors" its correlation coefficients being 0.966 but the second research question have low association with the Hypothesis where correlation coefficient is 0.512).

Then, the other pair of research questions "Do successful service deliveries by E-governance influencing users to participate in further Training and Development for future innovation" and "How the acceptability/popularity quotient of particular program helps in the trust building and influence mental satisfaction in other departments' workers in similar environment" have high association with the Hypothesis "Challenges and impediments of E-governance has a significant role in being short-term and can be overcome in the long-term" (correlation coefficients being 0.804 and 0.631)

Hence, based on this, we can say that the question "Do E-governance projects are tasting success in all the Govt. departments/sectors?" has lower effects than the other questions that are becoming challenges in implementing E-governance in Govt. sectors.

	H-1	H-2	H-3
H-1	--	0.446	0.065
H-2		--	0.063
H-3			--

Table 3: Hypotheses Correlation

Looking into the correlations among the factors, we come to the conclusion that Hypothesis 1 has a strong positive correlation (0.446) with Hypothesis 2, whereas the relation with Hypothesis 3 is low (0.065). Again, the relation between Hypothesis 2 and Hypothesis 3 is observed to be a low association (0.063).

As for Hypothesis 1 and 2, it can be stated that A major portion of the employees in the concerned Govt. sectors are sufficiently aware of technology and also AI-generated chatbot needs are not equally high in all of these Govt. sectors.

As for Hypothesis 1 and 3, and Hypothesis 2 and 3, it has to be stated that challenges and impediments of E-governance are not always short-term and cannot always be overcome in the long term.

The overall measurement indices, such as chi-square value (83.595), SRMR (0.05), RMSEA (0.044), CFI (0.946) etc. are within the acceptable range. So, as a conclusion, we can say that the data that is collected through the questionnaire gives enough evidence to support the hypotheses that were guessed from prior research studies.

Conclusion and Further Research:

The AI-generated chatbot project has been widely and strategically accepted in the Food & Supply departmentlike Amar Ration App, and well-received for the betterment of service deliveries in departments like Health and Transport due to wide awareness among major portions of the government employees, but there are uneven demands of AI-generated chatbots in different departments and not all the challenges can always be overcome by the government. There is a clear requirement to establish a system for Training and Development for future innovation and successful E-governance in the government departments.

As a matter of fact, the main objective of this research is to explore influence of the initiatives taken by the AI-generated chatbot projects by the government departments, study the different influencing external factors on those projects, personally interviewing stakeholders in the state sector of the West Bengal government and conceptualise perspectives of acceptance and success of AI-generated chatbots for administration as well as in the service delivery process. The statistical analysis suggests there are certain challenges in the forms of External Pressure and Influencers which are affecting the normal adoption and implementation practices, which if can be overcome in the long run, and successful and sustainable adoption and implementation of AI-generated chatbot projects is assured. The Questionnaire and personal interviewing, in this process, can be seen as both quantitative and qualitative towards the research study. Besides, the study of the secondary information in the form of progress of different ongoing AI-generated chatbot projects also provided useful information and understanding on the impact and implementation perspectives.

The stakeholders were asked about their opinions on running AI-generated chatbot projects and the completed projects that took place during the research period between 2015 and 2025, and the perceptions they gained to handle the future projects they will face. The responses from the questionnaire have been carefully analysed in the process and after analysing, several obtained observations were carefully calculated with statistical tools, and considerable findings have been summarised.

Alike many other research studies, there are some limitations in this study also. Though this study has been conducted in respect of three state sectors of West Bengal, the generalisation of the study in a broader aspect should be carefully carried out.

The data for the research has been collected from the best performing (based upon expenditures made in IT and e-governance applications) state departments of the said time period of 2015 and 2025, and therefore, it should be understood that such a list of best performing departments in terms of implementation of technology like AI-generated chatbot projects may change in the future.

The study has been carried out over a certain time period and should be considered as cross-sectional in nature. The primary source of information for this research is personal interviews, and

one may argue, information gathered through suc method may often prove to be biased, which could be from the interviewer's side or the respondent's side; also, personal interviews have time constraints and situational influences and for that, information supplied by respondents may even vary on any different conditions.

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