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Internship Report

On

'Application of Chatbots in HR Division
With reference to Indian Company'

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February, 2021

Certificate

This internship report titled *"Application of Chatbots in HR Division With reference to Indian Company"* is a report on the study taken up at the Fiscal Policy Institute (FPI) in 2020-21.

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All opinion and conclusions expressed in the internship report are of the Intern and usual disclaimer applies.
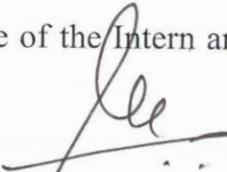
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Institute's Seal

***A*knowledgement**

I would like to thank Shri Sujit Kumar Chowdhury, Director, Fiscal Policy Institute, for providing this great opportunity to study on the subject. I thank my mentor Smt. Shashikala K. B., Special Officer in FPI, for guiding me and supporting me to complete this project successfully. I would like to extend my gratitude to Dr. M. R. Anantharamu for motivating me and whose interventions have enriched my understanding of the subject. Lastly, a special token of thanks goes to my friends, professors and HR professionals whose remarks were indispensable to the work.

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ABBREVIATIONS:

RESTAPI- Representational state transfer API

NLU- Natural language understanding

NLP- Natural language processing

A2P- Application-to-person

ASR- Automated speech recognition

BBT- Bot builder tool

CUI- Conversational UI

EBS- Enterprise bots store

GUI- Graphic user interface

ICT- Information and communication technologies

LAH- Live agent handoff

MSP- Managed services provider

MLA- Multi-layer authentication

POC- Proof of concept

ANN- Artificial natural network

RPA- Robotic processing automation

VAR- Value-added reseller

MAAP- Messaging as a platform

CAAP- Conversation as a platform

SDIC- Software development kit

ML- Machine learning

DL- Deep learning

AI- Artificial intelligence

BF- Bot framework

BC- Bot convertor

DB- Dialog builder

IR- Intent recognition

LP- Logic programming

NI- Natural language

SB- Sunnet bot

UX- User experience

UI- User interface

VA- Virtual assistant

1. Abstract:

In recent years, multiple resource persons, academicians, scholars and patrons were following up on digitalisation. The era of digital empowerment commenced on the 1st of July, 2015 under the leadership of Honourable Prime Minister, Shri Narendra Modi. It had been 4 years of celebration. The chief aim of Digital India was to improve infrastructure, introduce a life for people and raise India's stature in the global scenario. A citizen's life has been transformed from a traditional life into digital life. One aspect of digitalisation is 'Artificial Intelligence' (AI). The research on AI began at an early stage, say around the 1950s. The first AI program was conceived by Newell and Simon in 1955 and they are credited with having coined the term Artificial Intelligence. John McCarthy is considered to be the "Father of AI". After organising the conferences on AI drawing on the knowledge of various experts along with brainstorming, they formed centres at *Carnegie Mellon University* as well as *Massachusetts Institute of Technology (MIT)*. After a demonstration of many breakthroughs in AI, history was created by John McCarthy in 1958 and it was soon adopted by AI analysts and is still in use today.

This paper explores and determines specifically on the 'Application of Chatbots in the Human Resource department'. Every organisation is aware of the emergence of AI, but they were not aware of the numerous reach and implications of the use of Chatbots as far as efficiency and productivity are concerned. This awareness could guide them in future days for implementation, especially in the HR department of Indian companies. The viewpoint of the paper deals with the practice and challenges in Artificial Intelligence as it relates to Chatbots.

*1.1 Introduction***:**

A computer programme that simulates human conversation through voice commands or chats or both is known as a Chatbot. In shorter terms, the 'Chatterbot' is an Artificial Intelligence feature that can be rooted and used through major messaging applications. There are synonyms for this i.e., Talkbot, Bot, IM bot, interactive agent and artificial conversation entity. The Chatbot acts as a virtual assistant that increases to handle simple look-up tasks in both B2C (Business to Consumer) and B2B (Business to Business) environments.

A Chatbot is an online software application used to conduct conversations through text or text-to-speech in place of providing direct contact with a live human agent. These are typically used in dialogue systems for multiple purposes including customer services, request routing or for the gathering of information. Early classic Chatbots include ELIZA (1966) and PARRY (1972) based on paranoid schizophrenic behaviour. As you are all well aware, the Chatbot is a conversational AI application built to answer questions. It is powered by NLP (Natural Language processors) and it is trained to field questions from users in various languages. Chatbots are integrated into a variety of digital channels such as websites, mobile apps and workplace dashboards (Addressing business challenges with digital transformation, 2015).

Today, Chatbots are accessed through online websites popups and virtual assistants such as Google, Amazon Alexa, messaging apps like Facebook Messenger or WeChat. Chatbots are also classified into usage categories that include: e-commerce, education, entertainment, finance, health, news and productivity (chatbots introduction).

In 1950, Alan Turing's famous study on "Computing Machinery and Intelligence" was published. It proposed the Turing test as a criterion of intelligence. The criterion depends on the ability of a programmed computer to impersonate a human into a real-time written conversation with a human judge to the extent of distinguishing between the programme and a real human being on the reliable basis of conversational consent (Emerc, 2020). The program of ELIZA was published in 1966 by a great scholar named Joseph Weizenbaums, which seemed to be the first Chatbot that was able to fool users into believing that they were conversing with a real human. But later, Joseph himself did not claim that ELIZA was de facto intelligent.

Early in 2016, he founded the introduction of the first wave of artificial data technology in the design of Chatbots. For customers, trademark and services, social media platforms like Facebook had developed Chatbots to carry out their daily actions through the messaging platforms. The establishment of Chatbots into a community has bought the time of conversational interface between

the end-users. The interface will be entirely conversational and those communications will be indistinguishable from the conversations that persons have with his relatives and friends. Therefore, Chatbots are fondly defined as one of the most advanced and promising tools of expression of interactions between Human and Machines.

1.2   Importance of Chatbots:

The technological point of view represents Chatbots as a natural evolution of a Question-Answering system leveraging Natural Language Processing (NLP). One of the examples of NLP is responding to Questions in traditional languages which have been applied in various enterprises' end-users. Through 'user request analysis' and 'returning the response', Chatbots begin to function with these aspects. The major importance of the Chatbot is to interact between the people and services to enhance customer experience. At the same time, they offer companies a new opportunity to reduce the cost of customer services and improve customer's engagement process (Emerc, 2020). It is important to perform effectively in both of these tasks; human support plays a key role here: the kind of approaches and the platform, configuration of crucial Human Intervention, training and optimising the Chatbot system.

1.3   Previous researches on the Chatbots:

Here, we discuss various curbs about the Artificial Intelligence of Chatbots in sense of using in Human Resource sector of the firms. But the past researches about Chatbots have been published in multiple journals. Taking these papers into consideration and constructing further studies would help us to know and learn a few more facts.

A previous study conducted by the Uncanny Valley was about 'Experimental study of Human-Chatbot Interaction' (Bhushan). They have stated the relationship between Human and Machine interactions through voice-text expressions. The hypothesis suggests that they are humanoid objects which appear almost, but not exactly.

Each Chatbot will be having a different level of AI, depending on interactions with other robots. This can be channelled to create an intuition-driven Human Resource Department. This was stated by Dr. Reenu Mohan in her paper published in March 2019 (Mohan, 2018).

Mahmudul Hassan Munna had given flow chart of the recruitment process and strategy of a solid foundation with flexibility and that not all positions need the skill set.

From the company 'First Job' that solely developed the Chatbot named 'Mya', the aim was to keep the connection alive between the recruiter and the applicant. Swedish Chatbot 'Jabbot' was developed to answer the questions before the applicant asks. It is currently based on the Facebook Messenger channel to connect with the individual.

According to Dr. Michael Garrett, a Chatbot computer- programmed user language helps as a conversational tool between the employees and recruiter. Natural language text or speech is becoming increasingly feasible as the technology matures and users become more accustomed to interacting with digital media.

The last section of the thesis discusses the seq2seq (sequence-to-sequence) training of a recurrent neutral network (RNN) model on a dataset, on which the model had been trained to answer specific questions asked to the dataset domain to the final Chatbot.

'Leena' was also an Artificial Intelligence, powered by Human resource assistant, that helps in automating and improving the employee experience.

It was designed to answer the questions of employee on-boarding and Human resource ticketing.

Today, CAs and chatbots, in particular, have already become a reality in electronic markets and customer service on many websites, social media platforms and in messaging apps. For instance, the number of chatbots on Facebook Messenger soared from 11,000 to 3,00,000 between June 2016 and April 2019 (Facebook, 2019). Although these technological artefacts are on the rise, previous studies indicated that chatbots still suffer from problems linked to their infancy, resulting in high failure rates and user scepticism when it comes to the application of AI-based chatbots (Orlowski, 2017). Moreover, previous research has revealed that while human language skills transfer easily to human chatbot communication, there are notable differences in the content and quality of such conversations. For instance, users communicate with chatbots for a longer duration and with less rich vocabulary as well as greater profanity (Hill *et al*., 2015).

The Chatbot was created to the needs of users in the recruiting process in companies. The implications of the Chatbot in Human Resource Management: It found various constraints while answering or questioning accurately between the users. Lastly, while dealing with personal

information, proper security precautions need to be taken to ensure that all Chatbots are designed to all aspects and implemented with security in mind.

2. *Hypothesis*:

The hypothesis of this paper fosuses on the implementation of Chatbots used in the HR division while recruiting candidates in their firm. Here, we are observing the miscellaneous challenges or difficulties while installing the AI in Human Resource segment. An HR professional finds a major problem in adopting the Artificial Intelligence of Chatbots in their company in various stages. Problems are like the appliance of the Chatbot, complications in operating the machine, understanding the complications, hindrances of time while implementing. However, Chatbots started working in many Indian companies and they were still not comfortable with it (Brain westfall, 2019). They were facing difficulties even though the accessibility is easier. Technical teams need to modernise their intelligence while dealing with such machines. Thus, they need to be trained well and should inculcate their practical skills.

The AI-powered Chatbots for Human Resource management can streamline and personalise the process across seasonal, temporary, part or full-time employees. In this HR area, there is a need for automation for intelligence within the enterprise (chatbots, 2015)

3. *Objectives:*
- Application of Chatbot in Human resource division.
- Overcoming the complications of the machine.
- Identifying the user experiences for a conversational interface.
- Services provided to the public corporate sector in lieu of Chatbot support.
- Identification of technological failure of Chatbots.

These objectives help the scientists to create better Chatbot agents and the outcome of it helps the recruiters and applicants to deal with AI. Therefore, the main objective of the use of Chatbots in a firm is to reach the goal towards the better usage of AI and bring down the HR professionals' workload or work pressure (palenja). The usage of these bots will be helpful to both the HR person as well as employees. In the case of employees, they are free to clarify their doubts or queries using Chatbots instead of asking the HR person. They can take the help of such bots and therefore, this could save their time from waiting for a response. This also helps HR professionals from responding to simple queries. They can give their time for other important works. Even though we could not

match human intelligence and machine intelligence, for the time being, it will be very helpful for quick responses. When it comes to the utilisation of AI, we need to train the employees and users of bots from the technical teams and we need to have a practice of using the latest technology. Therefore, the overall objective of Chatbots deals with the suitability, purpose and knowledge of installing it in the Human Resource division.

4. Research Methodology:

This paper is a descriptive study in which secondary data like journals, company reports and magazines, blogs, websites, interview with experts, videos and questionnaires are used. With primary consent, I am going to follow up questions and interviewing process. Here, targeted persons will be HR managers or professionals of different companies.

5. Operation of Chatbots in IT firms:

Chatbots work depending on 3 methodologies which can be adoptable:

a. Pattern Matchers: Texts will be matching with bots and it produces suitable responses to the customers with the help of a matching pattern. A calibre structure of these patterns is "Artificial Intelligence Markup Language" (AIML).

Example for pattern matching:

```
<aiml version="1.0.1"encoding="UTF-8"?>
<Category>
<Pattern>WHO IS ALFRED MARSHELL</pattern>
<Template>Alfred Marshall was an economist</template></category>

<Category>
<Pattern>DO YOU KNOW WHO*IS</pattern>
<Template>
<Srai>WHO IS<star/></srai>
</template>
</category>
</aiml>
```

Therefore machine gives output:

"Human: Do you know who Alfred Marshell is? Robot: Alfred Marshell was an economist."

Only with the associated pattern will the Chatbot come to know the answers. Similarly, it responds to anything related to the associated patterns. But it cannot go beyond the pattern. Algorithms will be taking up the advanced level which can be helpful.

b. Algorithms: On providence of suitable response, a unique pattern should be available in the database for each question, a hierarchical structure will be created with lots of combinations. For a more manageable structure and reducing the classifiers, we will be using algorithms. Technical scientists called it a 'Reductionist' approach - to give simplified solutions and reduce the problem. For text classification and NLP, multinational naive bays will be the classic algorithm pattern.

Example for Algorithms:

"Class: wishing, "How are you?" "Good evening" "hi there"

Few input sentence classification:

Input: "hello good evening" term: "hello" (no matches)

Term: "good" (class: wishing) term: "morning" (class wishing)

Classification: wishing (score-2)"

For each class sentences, word matches are found with the help of equations. Classification scores are identified and the class with the highest term matches. It also shows some limitations.

c. Artificial Neural Networks: This is a way of calculating the output from the input using weighted connections which are calculated from repetitions while training the data. Each step amends the weights, resulting in the output with accuracy.

There will be multiple variations in neural networks, patterns matching code as well as algorithms. The fundamentals remain constant but the complexity will be increased in some of the variations.

5.1. Operation of Chatbots in the Human Resource Department:

We come across various studies in which Chatbots are termed as the new HR Managers. A question arises here that, 'Are there Chatbots in our future?'. HR can transform their service delivery model using Chatbots. HR teams would like to free up their time and adopt Chatbots in place of them so that they can concentrate on their employees' more sophisticated needs in areas of development of career management plans. With particular types of objectives, HR teams will be facing challenges to resolve the tasks. They need to keep their employees happy and satisfied at work. They need to pay attention to them while working with assignments. Most of the HR time will be invested in

managing the routine processes and activities that a Chatbot could handle. This allows HR teams and staff to focus on exact activities. While handling sensitive issues in a department, HR teams have time limitations to deal with employees in such matters. Therefore, Chatbots will be very helpful in solving these problems as simpler tasks. This will push the HR staff to be actively participating with employees and guide them through their career paths (Application of chatbot in human resource).

5.2. Indian companies working on Chatbots:

Some Indian companies have already commenced working with Chatbots. This will build their business processes to enhance their entities throughout the world. Chatbots also build up better services to connect with end-users.

A few Indian companies had adapted themselves to work on Chatbots. They are:

a. Intelliticks

b. Supertext.ai

c. Bottr.me

d. Engati

e. Vernacular.ai

f. Fandango

g. Spotify

h. Sephora

i. Bold 360

j. Staples

5.3. Types of Chatbots:

There are six types of Chatbots mentioned below with their descriptions:

Table-1: Types of Chatbots

Types of Chatbots	Description
Scripted or Quick reply Bots	These type of Chatbots respond to the customers very quickly through pre-defined knowledge and with specific instructions.

NLP Chatbots	NLP is a core of Artificial Intelligence which will be utilised in AI-technology. It maps out user text or voice to intent.
Service or Action Chatbots	These bots receive customer requests through relevant information from the user and take quick action. This was highly used in the airline industry.
Social messaging Chatbots	These are integrated with a social messaging platform like Telegram, WhatsApp, Hike, etc. This makes it easy for end-users to interact with the bot directly, just like they do with their relatives and friends.
Context enabled Chatbots	These are an advanced type of conversational bots. They utilise ML and AI to remember past conversations with specific users so that they could learn and grow over time. Examples: Alexa, Siri and Google assistant.
Voice-enabled Chatbots	This type of Chatbot would create a personalised experience for users. It performs many creative tasks like identifying the voice of user request and answers their queries.

Source: (chatbots, 2015)

Other than these, we have 3 main types of Chatbots namely:

i. *Support Chatbots*: These are built with a single domain, like knowledge about the company. Support Chatbots need to have personality, multi-turn capability and context awareness because they should be processing with businesses and should able to answer a wide range of FAQ type questions.

ii. *Skill Chatbots*: These are built with single-turn-bots and need not require more contextual awareness. Here, speech functionality will play a role and users need not turn on a device and/or buttons, unless and until you design a particular advanced contextual awareness, there is no need to worry too much.

iii. *Assistant Chatbots*: These will stay in more or less as a middle ground when compared with the above Chatbots. When they are aware of the topics, they work with the best knowledge. These Bots are mainly used in the banking sector in resolving their queries in terms of paying the bill amount.

6. HR Chatbots:

HR Chatbots are Bots that have taken human life's entire work as Artificial Intelligence or as virtual assistants. As technology is emerging, it is important to be more personalised and tedious in employee experience while automating administration for the HR department.
Chatbots would be user-friendly to hard workers and it eased the pain that industries were currently facing. Chatbots can be used in any sector or any type of firm and business scale. It is seen in major chat applications like Facebook Messenger, Telegram and many other applications as mentioned earlier (Frankenfield, 2020)

6.1. Recruiting and HR Chatbots:
Few HR Chatbots used in the recruiting process at different levels:

- XOR – These are automated Chatbots used in the firm while recruiting the candidates. It helps in HR workflows through various modes of communication including SMS, WhatsApp, Facebook, web, e-mail, etc. Their Bots support candidates' screening, interview scheduling, HR FAQ and many other cases. There are 99.3% of candidates and HR engaged with XOR.

- Olivia/Paradox – Paradox is the company behind Olivia. It plays a major role in the implementation of taking the burden off the HR team and had assured the initial set of responses to candidate's most frequently asked questions.

- Smash fly – These Chatbots pioneered with recruiting marketing software and tightly integrated into a leading candidate's relationship management offering. This type of solution is only for companies who were using Smash fly and is not available as standalone offerings.

- Ideal – This is a type of Chatbot which saves time in recruiting by screening and staging candidates throughout the process. It is all done through an AI-powered assistant.

- Eightfold – This is the type of Chatbot that was used in the recruiting process, designed to engage job seekers on a career site, to answer their questions and direct them to the best-fit jobs as per their qualification and skills or interests.

6.2. HR and Chatbots learning together:

We knew that conversational agents are one of the visible applications that connect intelligent assistants with people through text or voice channels. Arthur Franke, a data scientist and director of data and analytics in KPMG in New York City stated that "conversations between Man (customers) and AI had become routine and very soon it will be for employees too".

Experts agree that Chatbots would provide value to HR in several ways. In past years, an employee would have to clarify his doubts with a knowledgeable colleague for a specific answer, but in future, this would not happen. They will ask a conversational agent and AI to clarify their doubts. It gives an accurate answer to their question. "The use of Chatbots has exploded in talent acquisition in recent decades". This was stated by Ben Eubanks, SHRM-SCP and Research advisory.

6.3. Utilisation of Chatbots in HR:

The technologies of Chatbots are mainly used in communication. HR is supposed to interact at a human level, but not through AI level. Though these provide a level of comfort and distance, you must be aware that you are conversing with a Chatbot instead of real Human and what you write will likely stay between employee and Bot. That is why users love to use them as if they were real and because of this, they will not feel shy.

Chatbots could help HR with better responses, which is important to both candidates and existing teams and employees. Chatbots have a mere power of movement like a real human being. It could give feedback accurately for every question, complaint and idea, in case it is required in a specific situation (Brain westfall, 2019). This will make it very easy to deliver the answers to the end-users. Finally, it could take off a load of work from HR in terms of questions, scheduling and so on.

The bot will be trained well through the operational process and learn from new interactions, in case of wrong delivery of answers or sending wrong answers. To eliminate such errors in sending answers, they can use a hybrid agent + AI technology. If the bot receives new questions, a human agent can add into it so that it could learn about new questions and learn to respond.

6.4. Benefits of having Chatbots in HR:

Here are some processes:

a. *Recruiting:*

When candidates move to job interviews, they face various issues regarding the interview process. Here, candidates need to connect with eye contact, eye-raising, attitude and judging humans. They

feel afraid with certain attitudes of HR and this makes them confused and causes anxiety. These reactions can also affect even the most confident candidates.

But, in the case of Chatbots, they are the user that asks questions and do not pose any judgments about the candidate. Sometimes, candidates are placed in the same place. If they were at home, they will be interviewed from there itself and later recruiters can go through their answers. This also brings a huge load off HRs back because they can just observe and decide whom they are calling back without sitting in front of hundreds of candidates.

b. *Employer branding*:

Employer branding is also a type of benefits to HR. It recuces hiring cost and increases the time to hire. It can differentiate between candidates on the job market and helps in lowering the costs. This would satisfy the candidate's brand ultimately and standardises the consistency of communication by ensuring a unified approach of the candidate.

c. *Answers candidate questions*:

Every candidate will be having a set of doubts about the job profile and also have many questions about the company. This can be clarified easily by Chatbots and they will not feel tired or any discomfort while answering, whereas HR will feel tired, ignore a few queries and will not feel sparing time for this. Instead of HRs, Chatbots take over their job and this will help HR in giving time for other important issues.

d. *Collect feedback:*

Feedback from candidates is very essential in improving the candidate's experience and helps in creating a better employer image about the job. Chatbots collect candidate's feedback in the drop box during the process of application.

e. *Assistance to teams:*

Chatbots are not only useful in the recruiting process but also useful for existing employees. The HR can use the Chatbots for scheduling, answering operational questions and many other queries or elements in day-to-day business life.

Chatbots are also beneficial to HR departments. They have the power of keeping their candidates happy and take a load off HR works. There is no necessity to answer basic questions (Aakrit vaish, 2018)

6.5. Challenges while adopting HR Chatbots:

Usually, every company faces the challenges in case of compliance risks and accessibility issues for most prevalent Chatbot adoption. They found the lack of data from which Bot can learn. KPMG HR head, Franke said that "a company should use inclusive design practices to ensure the Bot Interface is accessible to all potential users and capability of a work situation or language proficiency". The biggest challenge is how AI and Chatbots work and how it understands the work measures while adoption. A Chatbot recognises that it cannot make specific decisions, but it informs the decision which was made by the people. Here, HR needs to get more understanding and while making decisions, data must be understood for the betterment (Aakrit vaish, 2018).

The major challenge was the cost of Chatbot and is largely based on:
- Complexity and platforms
- NLP tool like dialogue flow
- More complex bots cost £500,000.

(conversational- platform (NLU easy chatbot management), 2019)

6.6. Technological failure of Chatbots while implementing:
A survey of about 1,000 executives done by Capgemini SE in September 2019 (Taylor *et al*., 2019) found that 76% of the respondents have seen quantifiable benefits of Chatbot implementation, such as up to 30% reduction in customer service costs and higher net promoter score (NPS). However, the same research also indicates that less than 30% of the surveyed organisations have mastered the organisational capability (for example, employee awareness of the existence of Chatbot, enterprise data and system integration, supportive organisational structure) required to reap the full potentials of Chatbot technology.

There are countless numbers of new technologies being released and implemented in organisations in the era of business digitalisation. However, many technology implementations have failed to deliver expected results. To put this in perspective, a recent survey by the International Data Corporation (Jyoti, 2019) indicates that approximately 25% of companies encountered up to 50%

failure rate in their AI adoption efforts and the lack of skilled staff and unrealistic expectations were identified as the top reasons for failures. Their findings further corroborate the complexity of the implementation of new technology and the importance of non-technical success factors. Jones *et al.* (2001) argue that to effectively utilise new technologies, organisations need to consider all of the factors involved in the implementation process, such as new technology characteristics, organisation structure, task factors, environmental characteristics as well as the human elements involved. The authors further suggest that organisations should take a holistic "big picture" approach in new technology implementation and pay attention to the interactions between all factors that exist. The findings of Alami (2016) on an in-depth investigation of failed IT projects also highlighted the importance of non-technical success factors, namely a balanced ecosystem (ecosystem is defined as "the structure that becomes manifest in the interdependencies between stakeholders and resources), clear roadmaps for transformation and sound project management practice.

6.7. Guidance for adoption:

Implementation of Chatbots in the workplace was one of the greatest deals and requires major change and is rarely without opponents. Some people think that technology would be eliminating their job and it can do their job very well. Change management and governance are crucial, but often they look at areas of implementation of the conversational agent (Ayah atiyay, 2019).

Eubanks said that "organisations should be transparent enough while using Bots". Some users may get irritated while speaking to a person and end up with errors in their message. HR should train the Bot to keep track with candidates in answering their uncommon questions. HR was commonly known as "risk manager" and the nature of Chatbots and AI is that there is learning involved. Organisations move forward and they were willing to take up calculated risks with technology before expanding its use.

6.8. Difference between virtual assistant and interactive agent:

Table-2: Virtual Assistant and Interactive agent: Differences

Basis	*Virtual assistant*	*Interactive agent*
Intelligence	Virtual assistant has a platform of sophisticated interaction between the persons and can understand not only the language of the applicant but can also look into their emotions.	These are programmed to reply to the questions asked by the applicant. Its job is only to answer but cannot understand the applicant's emotions.

Natural language processing	They mainly concentrate on NLP and NLU. These can handle the conversation and can limit language time.	It is not programmed to changes in different languages. It does not have any high level of skills in language processing.
Tasks	They can handle the huge tasks and can make the decisions in the case of e-commerce platform.	It cannot perform the complex tasks and it can follow the tasks based on simple rules programmed.
Technology	They use artificial neural networks to learn from situations. Through the help of ANN's, they can analyse the recognition, classification and prediction.	There are two models used in interactive agent, generative model and interactive model. The generator model has a lot of layers of information and the questions asked that can go through with each layer. On the other hand, the interactive model can rank the information by the user.

Source: (Difference between artificial interface and human bots, 2016)

6.9. Pros and Cons of HR Chatbots:

Table-3: Pros and Cons of Chatbot

Pros of Chatbot	*Cons of Chatbot*
Faster customer service	Extent of resolving queries
Higher customer satisfaction	Cannot handle angry customers subtly
Reduction in costs of HRs	Higher complexity results in higher costs
Varied applications and industries	Not suitable for all businesses and applications
Appealing to millennial	Do not provide accurate solutions always

Source: (Aakrit vaish, 2018)

7. Example of Chatbots that have been used and developed:

'Bot Artisanz' is a specialised development of Chatbot Company from Kerala in India.

'SmatBot' is also an Indian company working on the development of Chatbots in Hyderabad. It supports generating leads, conducting surveys, scheduling appointments and assists 24/7 for users. With Amazon Alex, the same deep learning technology that is powered by Amazon Alexa, these are now available to any developer and enables you to build quickly and easier with natural languages (companies working on chatbots, 2004).

8. *Performance of the Chatbots that are available in the market*:

a) Google dialogue flow

b) Microsoft bot framework

c) Amazon Lex

d) Botkit

e) Bot press

f) Bot man

g) Wit.ai

h) Rasa stack

i) SAP Conversational AI

j) IBM Watson

k) Gupshup

l) FlowXO

m) Botsify

n) Pandorabots

o) Chat fuel

p) Many chat

q) Mobile monkey

r) Corover

(companies working on chatbots, 2004)

8.1. Growth of Chatbot market:

Table-4: Growth of Chatbot Market

Year	*CAGR %*
2015	35%
2018	30.9%
2019	34.75%
By the end of 2020	38.15%

Source: (study on chatbots: high demand for conversational platforms, 2019)

The Table-4 estimates the growth of Chatbots in the years 2015, 2018, 2019 and 2020. According to the prediction, by the end of 2024, CAGR will be 38.15% with the estimated value of $1.34 billion.

8.2. Chatbot developers in India:

Table-5: Chatbot Developers in India

Place name	Company name	% of AI	% of Chatbots
Mohali	Applify	10%	40%
Gurgaon	Apple	20%	35%
Gurgaon	Quytech	20%	20%
Bangalore	Day one technologies	20%	20
Bangalore	NeenopalInc	20%	20%
Chandigarh	Xenon stack	20%	20%
Delhi	Infotech	15%	20%
Kolkata	Third Eye Data	60%	25%
Noida	One Graph Technologies Corporation	10%	100%
Ahmadabad	Softweb Solutions	10%	30%
Gurgaon	Solveda	10%	60%
Ahmadabad	E2logy	20%	50%
Ahmadabad	Fusion Informatrics	25%	30%
Ahmadabad	Maruti Techlabs	20%	30%

Source: (top companies reveiw, 2019)

152 Indian companies were developing Chatbots, but only a few of them have been mentioned above. The Table-5 gives us information regarding the company's name, rate of percentages in the view of service focus with AI% and AI focus with Chatbots%. One Graph Technologies Corporation which is in Noida uses 100% of Chatbots, whereas AI used is at least a percentage of 10. We can observe that many companies have equal development percentages of 20% both in the case of AI and Chatbots (vogel, 2017).

Figure-1: Usage of Chatbots and AI in Companies
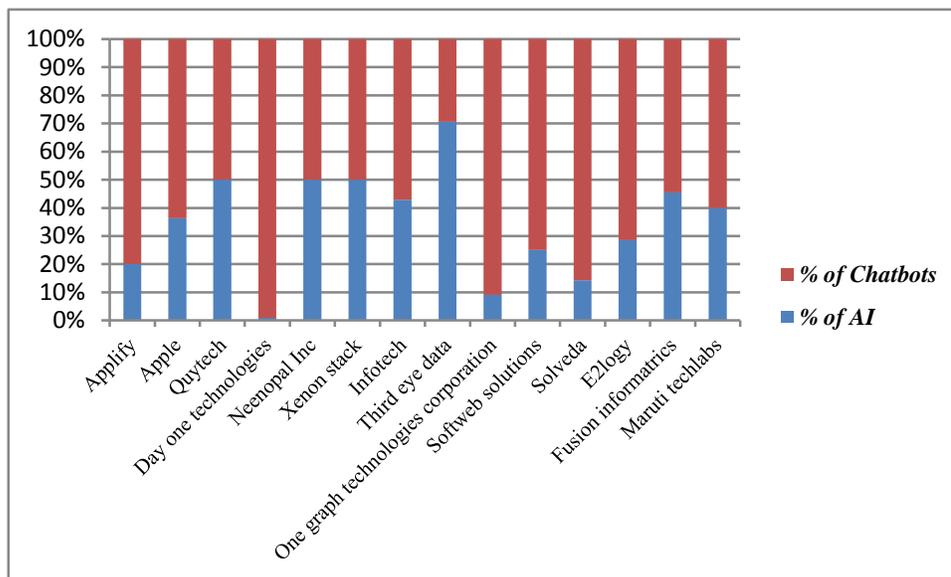
Source: Respondents

The above-mentioned companies (refer Figure-1) are developing Chatbots in their own firm. In the year 2019, there were 40% users of Chatbot and by the end of 2020, it will increase to 60% users in their firm's HR division. Many Indian firms adopt Chatbot application while recruiting the candidate and at the time of interviewing, these bots come into the picture.

8.3. Cost-effective Chatbots in Industries:

The cost of investment in Chatbots can range from a few thousand dollars to millions of dollars depending on the industry, company size and requirements of the Chatbot. For instance, an average Facebook Messenger Chatbot used by many small e-Commerce enterprises costs between $3,000 to $5,000 (Ismail, 2018), while the Bank of America has reportedly spent 2 years and approximately $30 million to bring its Chatbot ERICA to market (Mehta, 2019). Furthermore, a Chatbot requires continuous maintenance and improvement works even as it enters the operational phase. Despite the massive leap in conversational AI technology, Gartner (2019) predicts that 40% of chatbots launched in 2018 will have been abandoned by 2020. Therefore, companies must ensure that they have the organisational capability to support the successful implementation of Chatbots and its subsequent development.

8.4. Chatbots for Customer Service:

 For the last two decades, Chatbots have been explored as a means to strengthen customer service. While such Chatbots have seen substantial development throughout this period, the interest in Chatbots for customer service seems to have come in two waves. The first wave, in early 2000, concerned so-called 'virtual agents' set up to respond to frequently asked questions. The second wave, with onset circa 2016, has been driven by conversational initiatives from big tech companies, such as Microsoft, Facebook, Google [13] and the maturing successes of Apple's Siri and Amazon's Alexa [9]. In this second wave, progress in artificial intelligence and natural language processing promises substantial improvements in Chatbots' interpretational capabilities relative to those of the first wave. These technological advances suggest a renewed potential for Chatbots in customer service. Consultancy and advisory companies, such as Capgemini [6], Oracle [30] and Forrester [2] have forecasted that Chatbots will become an important part of customer service in the foreseeable future. Still, the limitations of contemporary Chatbots have tempered the most recent forecasts in the customer-service realm. The importance of making implementation strategies sensitive to the strengths and limitations of chatbot technology is accentuated [37]. Moreover, it is recommended to implement Chatbots for customer service in ways that allow for escalation to manual customer service when needed; a so-called 'tiered' approach.

Benefits of Chatbots:

There are many benefits of using Chatbots in customer service compared to traditional options. Being able to offer service to all customers round the clock is one of the biggest benefits that Chatbots offer, while also giving answers immediately. Cancel & Gerhardt (2019) agree with this, stating that when asked from consumers, both of these were the benefits that were mentioned the most when asked how Chatbots can improve the experience of website visitors. Cancel & Gerhardt (2018) were also surprised about the fact that not only millennials understand the benefits of Chatbots, but they also provide benefits for the ageing population.

The use of Chatbots allows companies to understand their website visitors even better through data collection. They can track how the visitors interact with the bot to know the most popular questions the visitors have. Saunders (2017) says that when a company has a higher insight into its visitors, it is possible to change the website to offer the information at an earlier stage.

9. Public sector user experiences on Chatbots:

Now we take a quick look at how Chatbots help public sector organisations:

- Strengthening customer service output – public sector organisations incorporate a load of the support team and some services with the largest customer bases in the world.
- Bolster Human Resource services – every HR requires time and attention towards the candidate, who seeks particular information. Something needs to be scarce in an organisation. Chatbots helps in answering mundane questions and saves the HR time.

With the help of the above two products, we look into the public sector company's improvements in their internal and external services.

a. Servicing thousands of customers, 24/7: Public sector organisations often deal with a large number of customers. Customers are increasingly looking for immediate gratification and flawless service. As this expectation grows, companies in the public sector must evolve. Technology so far, particularly websites, have helped. As an example, the Driver and Vehicle Standards Agency use the gov.uk website to send MOT renewal notifications to millions of UK citizens every month.

b. Automating processes with HR Chabot: Public sector companies are some of the biggest employers. In the UK, some 5.36 million people were public-sector employees in 2018. About 16.5% of the working population unsurprisingly provided that an excellent HR experience to their employees is a priority. To achieve excellence, public sector HR organisations are looking to transform and modernise their processes. Paperback employee handbooks and direct dials to the HR team are not only antiquated, they are inefficient.

10.   Limitations of the paper:

This paper reflects the limitations only to the application of Chabots. Due to lack of time, it could not take up further steps of research. In the future, the study should take up the cost of installation in India, handling machines, employment in case of technology and growing global developments in the Chatbot arena.

11.   Conclusion:

The brief ideas on Artificial Intelligence have been imparted from the above. Now, we got to know about Chatbots and its application in the HR Division. A conversational Bot will be very helpful to

HR professionals to decrease their work pressure while recruiting candidates. In some cases, HR professionals will not be in a state to answer or respond to the candidate's questions in a general sense. But Chatbots do not review such things and it has the capacity of answering the candidates regarding recruitment or vacancy. When candidates text their queries, the HR will be busy with other kinds of work, they would not be able to reply to the messages very quickly. It takes time to respond. But in the case of Chatbots, it does not repeat the same. It gives an immediate response to messages. It is important to program the system with a specific technology with latest updates. Chatbots can be in an invisible robotic form or sometimes maybe in a visible robotic form too. As a result, we have found out that many Indian companies adopted invisible Chatbots, but only a few were going with a visible robotic Chatbot. It has been many years since they adopted invisible Bots, say as automated messages and popups. Now the trend is following with visible Bots, where the candidates can directly interact with an artificial person.

Chatbots have taken up the position of HR and HR professionals need not worry about unnecessary issues going on with candidates. If any employee needs to know about their incentive or salary to be paid for the month, then they can directly ask the AI Chatbot. Immediately, they find an answer to their question. This was just given as an example, but employees can clarify anything concerning their job.

12. *STRUCTURE OF CHATBOT:*
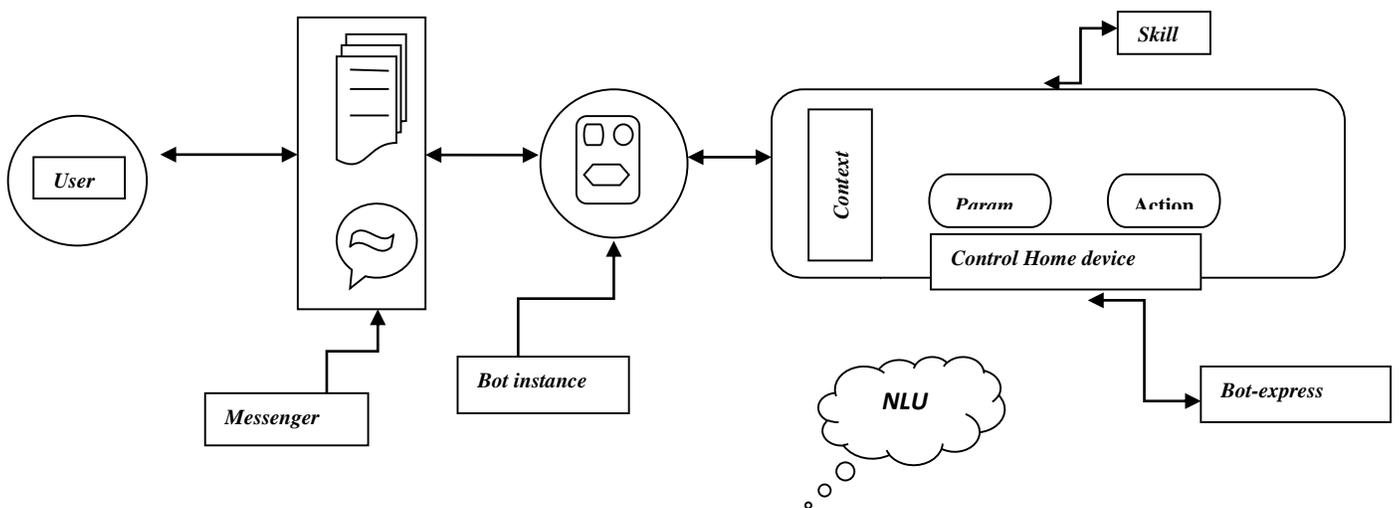
Source: (chatbots, 2015)

13.   *Results of survey:*

The last section of the report will uphold all the results of preliminary research. We look into various questions that had been asked to HR professionals of various companies in India. There are 12 questions in the survey form and responses were from 15 HR professionals.

The following Table shows the company name and their designation.

Table-6: Summary : Firms included in the survey

Name of the firm	*Designation in a particular firm*
MNC	HR manager
Partian	HR head
MNC	Senior HR
Kites senior care	TA executive
Self-employed	HR consultant
Appsian	HR director
Avnet India	KAM corporate sales
OLX people	HR recruiter
BLR Labs Pvt Ltd	Strategic HR
Career net technologies	HR manager
NPR auto parts Mfg India Pvt Ltd	HR head
ELDAAS technologies	HR director
Affordable business solutions	HR executive
HGS	HR recruiter
Getix health India Pvt Ltd	HR head

Source: Respondents

Figure-2: Summary of Survey Responses
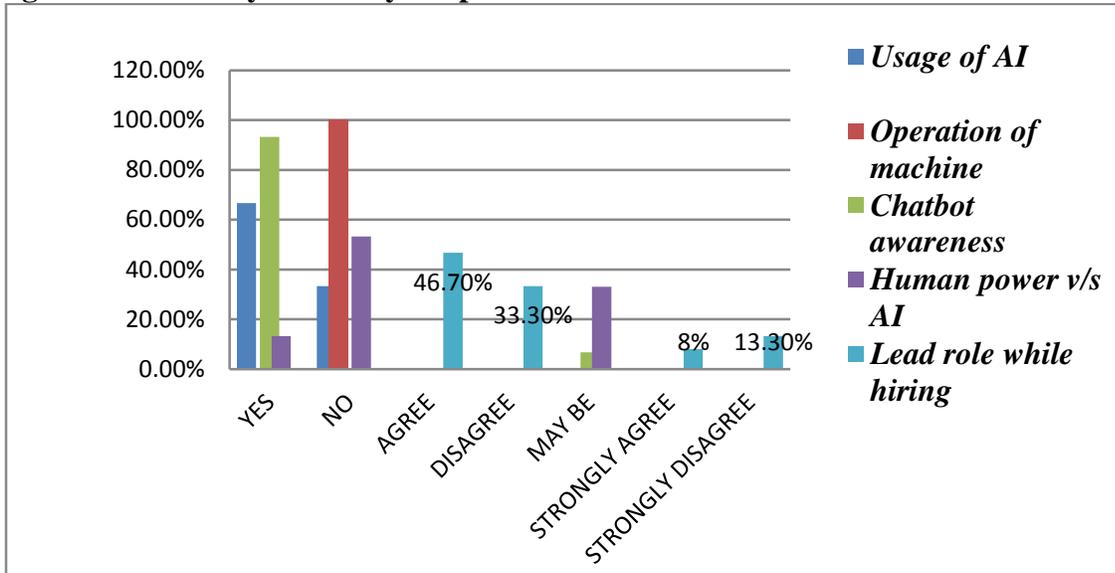
Source: **Respondents**

The Figure-2 states that Indian firms use Artificial Intelligence, say about 70%, whereas the rest did ot use it. But, there are Indian firms who were working with machines; data shows 100% of machine users. Here, the machine is nothing but Artificial Intelligence. The data shows that Chatbot awareness is about 93.3%. So, there are people who know about Chatbots. There are differences between Artificial Intelligence and Human Intelligence; most of the HRs believe that Human Intelligence cannot be matched with Artificial Intelligence. Even though AI works better than man, it is not able to identify emotions. Finally, the above data shows the information about the lead role of Chatbot while hiring the candidate into their firm. Nearly 46.7% of the respondents agree with this and 33.3% of people do not agree with this. Yes, Chatbots play a lead role while recruiting candidates. It is very helpful in the interviewing process. As we discussed in previous paragraphs, Chatbots clarify the candidate's doubts and it has the capacity of answering the questions of candidates. Its major role is in responding towards the queries in just a fraction of seconds.

Among the 15 respondents, only 10 respondents were using AI in their firm, whereas 5 respondents were not using any type of AI. The type of Artificial Intelligence they are using right now is given below:

Watson

TAMS

ArcGis

As all are aware of the Chatbots, they do not find any difficulty in operating the machine and they have adopted Chatbots in the division of HR web stream, while in cloud documentation, some were in recruitment and TA department and some of them were willing to adopt it to build up the Microsoft teams. The opinions of HR professionals is that AI cannot be replaced with human power and robots are not better than human beings. Some say that a combination of Artificial Intelligence and Human Intelligence will be more efficient.

Hence, HR Chatbots are user-friendly and, for sure, it takes the workload off HR managers while hiring candidates and it is capable of answering all the questions of candidates. This ensures that HR managers can involve and concentrate on other specific jobs.

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