DIMENSIONS OF INDIAN CONSUMERS' BELIEFS ABOUT AI: AN ORTHOGONAL LINEAR TRANSFORMATION APPROACH

DIMENSÕES DAS CRENÇAS DOS CONSUMIDORES INDIANOS SOBRE IA: UMA ABORDAGEM DE TRANSFORMAÇÃO LINEAR ORTOGONAL

DIMENSIONES DE LAS CREENCIAS DE LOS CONSUMIDORES INDIOS SOBRE LA IA: UN ENFOQUE DE TRANSFORMACIÓN LINEAL ORTOGONAL

Renu Isidore
Loyola Institute of Business Administration, India
http://orcid.org/0000-0003-3504-3193

C. Joe Arun
Loyola Institute of Business Administration, India

Abstract:

Artificial intelligence (AI) is revolutionizing business practices across different domains. It is very important and essential for businesses to understand the consumers' beliefs about this expensive complex AI technology before they invest their resources in AI applications. This research aims to capture the various dimensions of consumers beliefs about AI technology with respect to the Indian consumer market. By conducting a pan India survey of 1028 Indian consumers, their thoughts on the various dimensions of AI were measured on a Likert scale. These fifty statements measuring the various AI dimensions were loaded onto nine factors comprising of forty four statements using the Principal Component Factor analysis which was then followed by the Varimax rotation. These nine factors comprising of statements with Eigen values greater than 1 were then renamed to form meaningful AI beliefs namely: Trust in AI, Knowledge about AI, Personalization Preference, Current usage of AI, Awareness of AI, Positive outlook on Current AI Performance, Future Dangers of AI, Negative outlook on Current AI Performance and Desired Applications of AI. The extracted factors which were derived based on ground research could serve as an instrument to measure the various AI beliefs of consumers, mainly for businesses attempting to understand their target consumer market. This reliable instrument with high Cronbach score could help to understand the consumers preferences prior to AI investments.

Keywords: AI applications, Customer-Machine interaction, Indian Consumer Market, Customer Satisfaction.

Resumo:

A Inteligência Artificial (IA) está revolucionando as práticas de negócios em diferentes domínios. É muito importante e essencial que as empresas entendam as crenças dos consumidores sobre essa cara e complexa tecnologia de IA antes de investirem seus recursos em aplicativos de IA. Esta pesquisa visa capturar as várias dimensões das crenças dos consumidores sobre a tecnologia de IA em relação ao mercado consumidor indiano. Ao conduzir uma pesquisa na Índia com 1.028 consumidores indianos, seus pensamentos sobre as várias dimensões da IA foram medidos em uma escala Likert. Essas cinquenta declarações que medem as várias dimensões da IA foram carregadas em nove fatores compostos por quarenta e quatro declarações usando a análise do fator de componentes principais, que foi seguida pela rotação Varimax. Esses nove fatores compostos por declarações com valores próprios maiores que 1 foram então renomeados para formar crenças significativas de IA, a saber: confiança em IA, conhecimento sobre IA, preferência de personalização, uso atual de IA, consciência de IA, perspectiva positiva sobre o desempenho atual da IA, futuro Perigos da IA, perspectivas negativas sobre o desempenho atual da IA e aplicações desejadas da IA. Os fatores extraídos derivados da pesquisa de campo podem servir como um instrumento para medir as várias crenças de IA dos consumidores, principalmente para empresas que tentam entender seu mercado consumidor-alvo. Este instrumento confiável com alta pontuação de Cronbach pode ajudar a entender as preferências dos consumidores antes dos investimentos em IA.

Palavras-chave: Aplicações de IA, interação cliente-máquina, mercado consumidor indiano, satisfação do cliente.

Resumen:

La Inteligencia Artificial (IA) está revolucionando las prácticas comerciales en diferentes dominios. Es muy importante y esencial que las empresas entiendan las creencias de los consumidores sobre esta costosa y compleja tecnología de IA antes de invertir sus recursos en aplicaciones de IA. Esta investigación tiene como objetivo capturar las diversas dimensiones de las creencias de los consumidores sobre la tecnología de IA con respecto al mercado de consumo indio. Al realizar una encuesta en toda la India de 1028 consumidores indios, se midieron sus pensamientos sobre las diversas dimensiones de la IA en una escala de Likert. Estas cincuenta declaraciones que miden las diversas dimensiones de la IA se cargaron en nueve factores que comprenden cuarenta y cuatro declaraciones utilizando el análisis del factor de componente principal, seguido de la rotación Varimax. Estos nueve factores que comprenden declaraciones con valores propios superiores a 1 se renombraron para formar creencias significativas de IA, a saber: Confianza en la IA, Conocimiento sobre la IA, Preferencia de personalización, Uso actual de la IA, Conciencia de la IA, Perspectiva positiva sobre el rendimiento actual de la IA, Futuro Peligros de la IA, perspectiva negativa sobre el rendimiento actual de la IA y las aplicaciones deseadas de la IA. Los factores extraídos que se derivaron en base a la investigación de campo podrían servir como un instrumento para medir las diversas creencias de los consumidores sobre la IA, principalmente para las empresas que intentan comprender su mercado de consumo objetivo. Este instrumento confiable con un alto puntaje de Cronbach podría ayudar a comprender las preferencias de los consumidores antes de las inversiones en IA.

Palabras clave: aplicaciones de IA, interacción cliente-máquina, mercado de consumo indio, satisfacción del cliente.

1. INTRODUCTION

Globally, the AI technology has been rapidly growing and this growth has kindled the development of AI-based intelligent products. These AI products are in an early adoption stage where there is a lot of curiosity among the consumers to gather knowledge about the new sophisticated technology. This curiosity about the AI technology and keenness to embrace new experiences gains priority over utilitarian aspects with respect to AI devices (Sohn & Kwon, 2020). The adoption of AI by an economy would depend on factors like the technological maturity of the various sectors and the composition of the structure. Firms employing AI applications reap several economic benefits like: greater quality testing across industries, reduced cost, reduced turnaround time and improving the performance of supporting functions. The firms which are in short of technology infrastructure owing to reasons like talent shortage, price of new technology and the load of legacy infrastructure are less likely to adopt AI

(Kathuria et al., 2020). The continuous usage of AI applications like chatbots depend on the quality of service provided and the quality of information which determine the satisfaction level. The other determinants of the continuance intention include perceived ease of use, perceived enjoyment and perceived usefulness (Ashfaq et al., 2020).

The Indian consumer market is one of the receptive markets to AI among the Asian countries. Nearly 64% of the Indian consumers surveyed in a Salesforce study are very positive about AI and 54% feel that their trust in AI increases with increased understanding about the AI technology (Salesforce, 2018). India is now in the phase of unprecedented technological development which is taking place simultaneously in different sectors. The Indian government strongly believes that this new wave of AI is bound to stay and grow as there has been tremendous developments worldwide owing to AI. Given the limitations of labour and capital in India, AI can help to complement human capabilities (Chatterjee, 2020). In India, the division caused by education and language can be bridged by AI as India is a multicultural country with people of diverse education and income levels co-existing in society. The barriers of language can be bridged, and the underprivileged sections of society can be benefited by information technology with increased research in AI (Khemani, 2012). The AI technology is very promising and can mould the Indian economy and the national security. In order to maximise the benefits of AI, the Indian government must adopt policies to navigate AI innovations, followed by adaptation and finally proliferation in various sectors (Vempati, 2016). The Indian government should look at issues like training and development, research and application, responsible development and adoption of AI while framing AI policies. The adoption of AI should be encouraged in sectors like private enterprises, PSUs and government sectors (Chatterjee, 2020). When the Indian government increases the AI investments, the AI intensity will increase 1.3 times which would ultimately boost the Indian economy. In India, specific sectors like retail and financial services have a higher scale of adoption of AI compared to the manufacturing sector (Kathuria et al., 2020). In comparison to other developed countries, AI spending in India is relatively low and in any given business process, approximately only 22% of the companies employ AI technology (Intel and IDC Survey Report, 2018).

2. LITERATURE REVIEW

Today, a large amount of consumer data, popularly known as *big data* is utilised by businesses via AI applications to expand their marketing capabilities (Fulgoni, 2013). Big data is changing consumer communication fundamentally. Personalization has increased and thereby consumer relationships are strengthened. From mass market centric and transaction driven nature of marketing, marketing has become more consumer centric and relationship based (Rust and Huang, 2014). Advanced technologies which socially interact and engage consumers tend to form affective, cognitive and behavioral bonds with them (McLean et al., 2021). Consumer interactions with a brand have become more effective and efficient, when facilitated by technological advancements (Marinova et al., 2017). Brands are now employing AI as a channel of consumer interaction and service delivery. The engagement of the consumers with a brand through AI devices like virtual assistants influence the usage intention of that brand. Consumers engagement with brands via AI devices like voice assistants is influenced by factors like technology attributes, AI attributes and situational attributes. The important AI attributes which influence the engagement include: perceived intelligence, social presence and social attraction (McLean et al., 2021). AI applications like chatbots are found to be as efficient as skilled human workers and nearly four times more efficient in performance when compared to the less proficient inexperienced human workers, when their identity is undisclosed (Luo et al., 2019).

The foundation of intelligent advertising lies in forming perceptions of the consumers based on their needs, preferences, tastes, habits, wants and interests. This data is very essential and can be gathered at various touch points by employing AI applications like virtual assistants (Li, 2019). Businesses need to plan about adopting AI in their customer communications in accordance with what consumers feel about their engagements with AI recommendation engines, bots and virtual assistants (Pega, 2017). The physical, cognitive and emotional abilities of AI devices influence the consumers' AI adoption decision (Castelo, 2019). Depending on the activity, the AI adoption decision varies. In activities wherein the consumers' personal identity is involved, the adoption of AI is mostly avoided (Davenport et al., 2020). When the consumption is caused by identity motives, consumers reject automation. With regard to

identity relevant products wherein there is attribution of the results to oneself, consumers who associate themselves to a particular social group are also hesitant to adopt automation (Leung et al., 2018). In medicine, for example, consumers are hesitant to adopt AI because of neglect of uniqueness. In comparison to the human providers in medicine, the AI providers are recognized as less capable to accommodate the unique traits of consumers (Longoni et al., 2019). The AI agents are either relied on completely for the information they provide or are perceived as low-construal agents. This perception however declines when the AI agents are considered as capable of learning from the environment (Kim and Duhachek, 2018). Since the consumer – AI communication causes discomfort and is perceived as a threat to consumers' individual identity, consumers have the propensity to engage in higher compensatory consumption like buying status goods or eating in excess (Mende et al., 2019).

Trust in AI

In order to comprehend the consumers' perception of technology and to predict technology usage, trust is an important primary construct. Specifically, with respect to new technology, formation of trust is important to control uncertainty and risk perception (Li et al., 2008). Technology acceptance model states that the key determinants of consumers' intention to use any technology are effort expectancy, performance expectancy and social influence. And the determinants of usage behavior include: intention and facilitating conditions (Venkatesh et al., 2003). Added to these determinants of perceived usefulness and perceived ease of use, trust is an important determinant influencing the acceptance (Gefen et al., 2003; Bahmanziari et al., 2003). In order to develop this trust in new technology, businesses need to focus on organizational factors, reputation, social influence and cost-benefit perceptions (Li et al., 2008). With regard to AI technology as well, trust plays a very prominent role as consumers tend to follow the recommendations of AI applications only based on trust. Trust can be built based on repeated usage which in turn develops familiarity and the capability to assess the performance (Xiao & Benbasat, 2007). On one hand though consumers perceive AI as powerful, they also perceive them to lack the ability to feel. This lacking of emotional intelligence can convert to a feeling of distrust towards AI applications and devices. This distrust is due to reasons like lack of vulnerability as the AI applications do not have any problem of wrong judgement and also

because as AI is created to work within limited conditions, it leads to disappointment when the thresholds are crossed. In order to further advance the sophistication in AI, forming a foundation of trust is essential (Gray, 2017).

The level of consumers' understanding of AI has a strong bearing on the level of trust they have in AI (Salesforce, 2018). Trust is an important belief as it plays an important role in the adoption decision of AI agents (Wan & Benbasat, 2005) as consumers tend to form interpersonal relationships with them. By increasing both emotional trust (attitude) and cognitive trust (belief), familiarity increases and thus the consumers' intention to adopt increases (Komiak & Benbasat, 2006). When business adopt AI applications like chatbots to sell their products or services, the consumers' trust in these AI applications influences their purchase intention via factors like competence, social presence, credibility and informativeness (Yen & Chiang, 2020). Consumers accept the recommendations on the basis of trust and perceive the human traits of integrity and benevolence in AI recommendation agents (Wang & Benbasat, 2005). On the other hand, consumers are likely to refrain from following the AI recommendations if there is a risk involved that doing so might not lead to the desired satisfactory outcome. It is trust which minimises that risk (Hughes et al., 2019). The Salesforce study which surveyed Asian consumers show that overall Asian consumers trust humans over AI. Among the various AI applications, the respondents distrust chatbots the most. 53% of their respondents felt that they would trust humans to assist them resolve issues and only 13% would trust AI. However only with respect to AI recommendation engines, the respondents trust AI over humans (Salesforce, 2018). In conversational commerce, the consumers' purchase rates reduce by nearly 79.7% after consumers become aware of the identity of AI applications like chatbots as consumers discern the AI bots to be less empathetic and less knowledgeable. However, prior AI exposure and delayed disclosure of AI bot identity can reduce this subjective bias (Luo et al., 2019).

Personalisation Preference

Personalisation aims in "sending the right message to the right consumers will (dramatically) increase the effectiveness of communication" (p.137, Postma & Brokke, 2002). When large amounts of consumer data are collected, it helps to offer personalization. But, there

is personalization paradox when the data is gathered without the consumers' consent which thereby leads to consumer vulnerability and reduced adoption rates. Therefore, businesses need to cautiously plan the consumers' data collection strategy as it plays an important role in influencing the consumers' reaction to personalization (Aguirre et al., 2015). The Thinking intelligence AI has been employed to learn continuously from the data and adapt accordingly to provide for personalization (Huang and Rust, 2021). The personalization provided by the AI applications would be considered efficient only when there is little distinction between the consumers' own decisions and the recommendations offered. When consumers understand that the AI agents have higher personalization, the consumers develop a sense of oneness with the agents. This personalization preference increases the trust and thereby the intent to adopt AI (Komiak & Benbasat, 2006). Even when the recommendation agents (AI agents) are perceived to be less trustworthy or with less expertise, the consumers' decisions tend to be more influenced by the recommendations provided by the AI applications than by the conventional recommendation sources (Senecal & Nantel, 2004). When the category risk is high, the AI recommendation agents greatly influence the consumers' decision and thereby improve the quality of the decision. When the product attributes are higher, the search becomes more complex, AI recommendation agents help to minimise the attributes (Swaminathan, 2003). Enhanced personalisation provided by the AI applications to offer more efficient and customised choices to the consumers can sometimes be a threat to the autonomy of consumers. Consumers' propensity to be in control of their options is threatened which thereby leads to isolation instead of empowerment (André et al., 2018).

Fear of AI

The fear of autonomous robots and artificial intelligence also known as FARAI is a kind of sociological fear which consumers have towards artificial intelligence. This fear influences the way consumers interact with AI applications like autonomous robots. This fear corresponds to the anticipation of encountering a large extent of negative experiences. FARAI is more prominent among older consumers, female consumers and consumers with lower income and lower education levels. FARAI is also correlated with fears of unemployment and loneliness (Liang & Lee, 2017). The anxiousness associated with AI technology leads to fears of cloning

advancement, nuclear weapons, genetically modified food and different fields of technology (Vempati, 2016).

The main focus of the study is to measure the beliefs of Indian consumers about AI applications in their day-to-day lives. Fifty variables derived from the review of literature are measured and by employing the principal component factor analysis, they are reduced to forty-four variables loaded onto nine factors. The factors are renamed to form the dimensions of AI beliefs namely: Trust in AI, Knowledge about AI, Personalization Preference, Current usage of AI, Awareness of AI, Positive outlook on Current AI Performance, Future Dangers of AI, Negative outlook on Current AI Performance and Desired Applications of AI.

3. SAMPLE AND METHODOLOGY

The population for the study is the Indian consumers residing in India who have at least minimum knowledge about online e-commerce communication (need to at least have an active Facebook account). Questionnaire survey method was adopted for data collection and the survey was administered via the Google forms application of Google. Convenience sampling and snow-ball sampling (Goodman, 1961) techniques were adopted to identify the sample. As a large sample was needed from a hard-to-reach population, the choice of convenience and snow-ball sampling methodologies is justified (Gile & Handcock, 2010).

India is a diverse country with different cultural and economic diversities. In order to include this diversity in the study, the sample was collected from the northern, southern, eastern and western regions covering the major states of Maharashtra, West Bengal, Karnataka, Tamil Nadu, Kerala and Telangana. The sample consisted of respondents residing in the major metropolitan cities of India namely Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Pune and Cochin. The total valid questionnaires collected were 1028 and hence the sample size was 1028. The data was collected during the time period of April 2020 to June 2020.

The sample size of 1028 is justified based on the sample size table given online (ResearchAdvisors.com). Going by the table, for a population of 264 million, a sample size of 784 (for a confidence level of 95%) or 1354 (for a confidence level of 99%) was recommended for a margin of error of 3.5%. Hence the minimum sample size needed was 784, as the urban Indian population of active internet users is 205 million (The Times of India, 2020).

4. RESULTS AND ANALYSIS

In order to determine the consumers' view of the current and future performance of AI devices and applications, fifty statements relating the same were framed based on several market reports. These statements were measured on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Principal Component method of factor analysis was used followed by the orthogonal Varimax rotation in order to determine the factors. In the rotated factor matrix, only the statements with factor loading of greater than 0.5 and Eigen value of greater than 1 was taken to form the derived factors. The derived factors comprising of forty four statements, cumulatively explained 63.359% of the variation (given in Table 1) which was around one sigma level.

Table 1
Variation explained by the derived factors

Factor	Initial Eigen values			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Trust in AI	10.634	23.632	23.632	5.103	11.341	11.341
Knowledge about AI	4.546	10.101	33.733	4.172	9.270	20.611
Personalization Preference	2.932	6.515	40.48	3.607	8.016	28.627
Current Usage of AI	2.646	5.879	46.127	3.162	7.026	35.653
Awareness of AI	2.055	4.567	50.695	2.992	6.650	42.303
Positive outlook on Current AI Performance	1.698	3.772	54.467	2.846	6.324	48.627
Future Dangers of AI	1.457	3.237	57.704	2.407	5.349	53.976
Negative outlook on Current AI Performance	1.353	3.008	60.712	2.292	5.094	59.069
Desired Applications of AI	1.191	2.647	**63.359**	1.930	4.289	**63.359**

Source: research data

The factor loading of each of the derived factors along with their Cronbach's alpha is given in Table 2, Table 3 and Table 4. The Cronbach's alpha of each of the derived factors was

much greater than 0.5 indicating the reliability of the factors. Factor analysis reduced the fifty statements to forty-four statements loaded onto nine factors which were then renamed based on the statements loaded in each factor. The derived factors which are the "Dimensions of Consumers' beliefs about AI" were labelled as:

- Trust in AI
- Knowledge about AI
- Personalization Preference
- Current Usage of AI
- Awareness of AI
- Positive outlook on Current AI Performance
- Negative outlook on Current AI Performance
- Desired Applications of AI
- Future Dangers of AI

The first factor **Trust in AI** included variables like trusting AI to provide financial or legal advice; trusting AI to drive a car or other passenger vehicles; trusting AI to serve as soldiers, security, police, fire or military services; trusting AI to perform a medical procedure and offer health advice; AI machines doing the job of piloting public transport; life-saving surgery; military/fire-fighting jobs; agricultural jobs and cooking jobs better than humans in terms of safety and efficiency. This factor was labelled as Trust in AI as the variables composing this factor measured the dimension of trust in the performance of AI in various domains in terms of safety and efficiency. A complete perspective of the dimension of trust was measured with respect to the AI applications in different fields.

The second factor **Knowledge about AI** consisted of variables like Siri and other virtual assistants employ AI technology; Netflix, prime and other OTT media services employ AI to personalize content based on preferences; Amazon, Flipkart and other online shopping portals employ AI to personalize shopping recommendations; Facebook, YouTube and other websites employ AI to personalize content and Swiggy, Zomato and other food delivery services employ AI to send personalized recommendations. This factor was named as Knowledge about AI as the variables contributing to this factor measured the dimension of knowledge about AI applications in various domains. A wholistic measurement of the dimension of knowledge was done covering the various popular AI applications.

The third factor **Personalization Preference** comprised of variables like willingness to share personal purchase data to get personalized recommendations on items wanting to purchase; willingness to share personal medical data to allow a doctor to make a better diagnosis or recommendation about health treatment using AI; willingness to share personal data to allow the government to provide better and more personalized public services using AI; willingness to share personal financial preferences to allow a financial advisor to help determine better investment choices using AI; willingness to share personal browsing history to allow social media handles to provide better personalized content recommendations using AI. This factor was named Personalization Preference as the items in the factor measured the willingness of the consumers to share personal preferences in order to get personalized recommendations in various domains. Hence the dimension of personalization preference in various prominent consumer domains was measured comprehensively.

The fourth factor **Current usage of AI** included variables namely: usage of Office Intelligent services for their extra functions to make work better; usage of Virtual assistants (Siri/Alexa/Google assistant/Cortana) to complete daily tasks; usage of smart email categorization, smart reply options and efficient spam filters to personalize email; usage of chatbot and other AI enabled service operators to solve customer service enquiries and following the personalized recommendations given by social networking sites like Facebook, OTT media services like Netflix, shopping portals like Flipkart and others. This factor was termed Current usage of AI as the variables included in this factor measured the usage of various AI devices and applications in day-to-day life for advanced assistance. This factor thus measured the dimension of current usage by including the usage of various popular AI applications.

The fifth factor **Awareness of AI** comprises of variables like: consumers have seen/heard that computer programs show websites or advertisements based on web browsing habits; computers that can recognize speech and answer questions; facial recognition computers which can learn identities through CCTV video to catch criminals; driverless vehicles which can adapt to road and traffic conditions and robots which can make their own decisions and can be used by the armed forces. The factor was named as Awareness of AI as it includes all the variables which measure the awareness of the consumers about the AI technology. A complete

perspective of the Awareness dimension with regard to the AI technology in various fields was measured by this factor.

The sixth factor **Positive outlook on Current AI Performance** comprises of variables namely: AI can provide the same, if not better, levels of customer service than a human can today; AI knows all the facts and policies better than many customer service representatives I've dealt with; Getting customer issues resolved without human interaction is faster and less of a hassle dealing with an AI-powered chatbot or phone operator; AI has a big positive impact on my personal life via shopping and customer service with personalized recommendations and AI enabled service operators; AI has successfully provided personal customized content on all my social handles which I follow. This factor included all positive statements about the present AI performance, hence it was termed Positive outlook on Current AI Performance. On the other hand, the seventh factor Negative outlook on Current AI Performance consists of variables like preference for dealing with a real person when there are customer service issues; AI having screwed up in the past and not dealt with the problem satisfactorily; Not seeing AI having an impact on personal life because of not trusting AI to help at all and not liking the idea of a robot being used by companies to communicate with their customers. This factor was termed as Negative outlook on Current AI Performance as it consisted of all the negative impressions about the current performance of AI.

The eight factor **Future dangers of AI** included fears like in the future robots will eventually uncover the deepest secrets; AI will take over, replace all jobs, and possibly one day, replace humans and AI immersion into daily lives will improve them, but also make them a lot less personal and intimate. This factor was labelled as Future dangers of AI as all the variables describing the various fears of AI immersion in the future were loaded onto this factor.

The ninth factor **Desired Applications of AI** comprised of variables describing the AI applications most wanted by the consumers like: fully autonomous vehicles that are far safer; robots to assist with day-to-day physical activities and houses and offices that react instinctively to users' needs. This factor was termed as Desired Applications of AI as the variables describing the most desirable AI applications of the consumers were loaded on this factor.

Thus, the various dimensions of the consumer beliefs about the AI devices and applications were initially measured and then reduced to form factors using Factor analysis.

The descriptives of the derived factors comprising of the factor loading and Cronbach's alpha are given in the tables, Table 2, Table 3 and Table 4 below.

Table 2

Descriptives of the Factors

S. No	Factors	Factor Loading	Cronbach's alpha
1	**Trust in AI**		
A	I would trust AI to provide financial or legal advice	0.549	
B	I would trust AI to drive a car or other passenger vehicles	0.604	
C	I would trust AI to serve as soldiers, security, police, fire or military services	0.707	
D	I would trust AI to perform a medical procedure and offer health advice	0.727	
E	AI machines can do the job of piloting public transport better than humans in terms of safety and efficiency	0.695	
F	AI machines can do life-saving surgery better than humans in terms of safety and efficiency	0.746	0.883
G	AI machines can do military/fire-fighting jobs better than humans in terms of safety and efficiency	0.766	
H	AI machines can do agricultural jobs better than humans in terms of safety and efficiency	0.621	
I	AI machines can do cooking jobs better than humans in terms of safety and efficiency	0.646	
2	**Knowledge about AI**		
A	Siri and other virtual assistants employ AI technology	0.729	
B	Netflix, prime and other OTT media services employ AI to personalize content based on preferences.	0.845	
C	Amazon, Flipkart and other online shopping portals employ AI to personalize shopping recommendations	0.882	0.933
D	Facebook, YouTube and other websites employ AI to personalize content	0.879	
E	Swiggy, Zomato and other food delivery services employ AI to send personalized recommendations	0.821	
3	**Personalization Preference**		
A	I am willing to share personal purchase data to get personalized recommendations on items I may want to purchase.	0.773	
B	I am willing to share personal medical data to allow a doctor to make a better diagnosis or recommendation about my health treatment using AI.	0.775	
C	I am willing to share personal data to allow the government to provide me with better and more personalized public services using AI.	0.849	0.892
D	I am willing to share personal financial preferences to allow a financial advisor to help determine better investment choices for me using AI.	0.838	
E	I am willing to share personal browsing history to allow social media handles to provide me with better personalized content recommendations using AI.	0.77	

Table 3

Descriptives of the Factors Contd.

S. No	Factors	Factor Loading	Cronbach's alpha
4	**Current Usage of AI**		
A	I am using Office Intelligent services for their extra functions to make my work better.	0.668	0.821
B	I am using Virtual assistants (Siri/Alexa/Google assistant/Cortana) to complete my daily tasks.	0.726	
C	I am using smart email categorization, smart reply options and efficient spam filters to personalize my email.	0.751	
D	I am using chatbot and other AI enabled service operators to solve my customer service enquiries.	0.756	
E	I follow the personalized recommendations given by social networking sites like Facebook, OTT media services like Netflix, shopping portals like Flipkart and others.	0.582	
5	**Awareness of AI**		
A	I have seen/heard that computer programs which show me websites or advertisements based on my web browsing habits	0.628	0.816
B	I have seen/heard that computers that can recognize speech and answer questions	0.741	
C	I have seen/heard that facial recognition computers which can learn identities through CCTV video to catch criminals	0.736	
D	I have seen/heard that driverless vehicles which can adapt to road and traffic conditions	0.754	
E	I have seen/heard that robots which can make their own decisions and can be used by the armed forces	0.574	
6	**Positive outlook on Current AI Performance**		
A	AI can provide the same, if not better, levels of customer service than a human can today	0.691	0.827
B	AI knows all the facts and policies better than many customer service representatives I've dealt with	0.692	
C	Getting customer issues resolved without human interaction is faster and less of a hassle dealing with an AI-powered chatbot or phone operator	0.687	
D	AI has a big positive impact on my personal life via shopping and customer service with personalized recommendations and AI enabled service operators	0.668	
E	AI has successfully provided personal customized content on all my social handles which I follow	0.64	

Source: research data

Table 4
Descriptives of the Factors Contd.

S. No	Factors	Factor Loading	Cronbach's alpha
7	**Future Dangers of AI**		
A	I fear that in the future robots will eventually uncover my deepest secrets	0.763	
B	I fear that AI will take over, replace all jobs, and possibly one day, replace humans.	0.724	0.713
C	I fear that AI immersion into my daily life will improve them, but also make them a lot less personal and intimate	0.782	
8	**Negative outlook on Current AI Performance**		
A	I prefer dealing with a real person when I have a customer service issue	0.655	
B	AI has screwed up in the past and not dealt with my problem satisfactorily	0.704	
C	Don't see AI having an impact on my personal life because I don't trust AI to help at all.	0.743	0.746
D	I do not like the idea of a robot being used by companies to communicate with their customers	0.751	
9	**Desired Applications of AI**		
A	I want fully autonomous vehicles that are far safer	0.663	
B	I want robots to assist with my day-to-day physical activities	0.691	0.793
C	I want houses and offices that react instinctively to users' needs	0.754	

Source: research data

5. CONCLUSION

This study probes into the beliefs of Indian consumers about Artificial Intelligence interactions they encounter in day-to-day lives. Artificial intelligence technology is relatively new to Indian consumers compared to the consumers in other developed countries. Before businesses invest large amounts of money and resources into this sophisticated technology it is important for businesses to assess the consumers' awareness level, knowledge level, their willingness to trust AI, their preference for personalization in terms of recommendations, their current level of adoption of AI, their outlook on the present performance of AI applications, their fears and desires of futuristic AI applications. This study which is based on ground research measures each of these dimensions using fifty variables framed based on literature review. A pan India survey using the questionnaire survey method was conducted in order to

measure these variables from a sample of 1028 Indian consumers. These variables measured on a Likert scale were then reduced to forty-four variables using the Principal component factor analysis followed by Varimax rotation and then loaded onto nine factors. The factors were then renamed to form meaningful AI beliefs namely: Trust in AI, Knowledge about AI, Personalization Preference, Current usage of AI, Awareness of AI, Positive outlook on Current AI Performance, Future Dangers of AI, Negative outlook on Current AI Performance and Desired Applications of AI. This template could help businesses assess their target consumers' beliefs about AI before investing in this technology.

REFERENCES

Aguirre, E., Mahr, D., Grewal, D., De Ruyter, K., & Wetzels, M. (2015). Unraveling the personalization paradox: The effect of information collection and trust-building strategies on online advertisement effectiveness. *Journal of Retailing*, *91*(1), 34-49.

André, Q., Carmon, Z., Wertenbroch, K., Crum, A., Frank, D., Goldstein, W., & Yang, H. (2018). Consumer choice and autonomy in the age of artificial intelligence and big data. *Customer Needs and Solutions*, *5*(1), 28-37.

Ashfaq, M., Yun, J., Yu, S., & Loureiro, S. M. C. (2020). I, Chatbot: Modeling the determinants of users' satisfaction and continuance intention of AI-powered service agents. *Telematics and Informatics*, *54*, 101473.

Bahmanziari, T., Pearson, J. M., & Crosby, L. (2003). Is trust important in technology adoption? A policy capturing approach. *Journal of Computer Information Systems*, *43*(4), 46-54.

Castelo, N. (2019). *Blurring the line between human and machine: marketing artificial intelligence* (Doctoral dissertation, Columbia University).

Chatterjee, S. (2020). AI strategy of India: policy framework, adoption challenges and actions for government. *Transforming Government: People, Process and Policy*. DOI: 10.1108/TG-05-2019-0031

Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science*, *48*(1), 24-42.

Fulgoni, G. (2013). Big data: Friend or foe of digital advertising? Five ways marketers should use digital big data to their advantage. *Journal of advertising research*, *53*(4), 372-376.

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in Online Shopping: An Integrated Model. *MIS Quarterly, 27*(1), 51–90. https://doi.org/10.2307/30036519

Gile, K. J., & Handcock, M. S. (2010). 7. Respondent-driven sampling: An assessment of current methodology. *Sociological methodology*, *40*(1), 285-327.

Goodman, L. A. (1961). Snowball sampling. *The annals of mathematical statistics*, 148-170.

Gray, K. (2017). AI can be a troublesome teammate. *Harvard Business Review, 20*. Retrieved April 9, 2021, Retrieved from https://hbr.org/2017/07/ai-can-be-a-troublesome-teammate

Huang, M. H., & Rust, R. T. (2021). Engaged to a robot? The role of AI in service. *Journal of Service Research*, *24*(1), 30-41.

Hughes, C., Robert, L., Frady, K., & Arroyos, A. (2019). Artificial intelligence, employee engagement, fairness, and job outcomes. In *Managing Technology and Middle-and Low-skilled Employees*. Emerald Publishing Limited, 61-68, DOI: https://doi.org/10.1108/978-1-78973-077-720191005

Intel and IDC Survey Report (2018). IDC survey reveals enterprises in India consider IoT a key enabler for their DX journey, available at: www.idc.com/getdoc.jsp?containerId=prAP44077918

Kathuria, R., Kedia, M., & Kapilavai, S. (2020). Implications of AI on the Indian economy. Retrieved from https://www.think-asia.org/handle/11540/12242

Khemani, D. (2012). A perspective on AI research in India. *AI Magazine*, *33*(1), 96-98.

Kim, T. W., & Duhachek, A. (2018). The impact of artificial agents on persuasion: A construal level account. *ACR Asia-Pacific Advances*, *12,* 53. Retrieved from http://www.acrwebsite.org/volumes/1700328/volumes/ap12/AP-12

Komiak, S. Y., & Benbasat, I. (2006). The effects of personalization and familiarity on trust and adoption of recommendation agents. *MIS quarterly*, 941-960.

Leung, E., Paolacci, G., & Puntoni, S. (2018). Man versus machine: Resisting automation in identity-based consumer behavior. *Journal of Marketing Research*, *55*(6), 818-831

Li, H. (2019). Special section introduction: Artificial intelligence and advertising. *Journal of advertising*, *48*(4), 333-337.

Liang, Y., & Lee, S. A. (2017). Fear of autonomous robots and artificial intelligence: Evidence from national representative data with probability sampling. *International Journal of Social Robotics*, *9*(3), 379-384.

Longoni, C., Bonezzi, A., & Morewedge, C.K. (2019). Resistance to medical artificial intelligence. *Journal of Consumer Research*, *46*(4), 629-650.

Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: machines vs. humans: The impact of artificial intelligence chatbot disclosure on customer purchases. *Marketing Science*, *38*(6), 937–947.

Marinova, D., de Ruyter, K., Huang, M. H., Meuter, M. L., & Challagalla, G. (2017). Getting smart: Learning from technology-empowered frontline interactions. *Journal of Service Research*, *20*(1), 29-42.

McLean, G., Osei-Frimpong, K., & Barhorst, J. (2021). Alexa, do voice assistants influence consumer brand engagement? Examining the role of AI powered voice assistants in influencing consumer brand engagement. *Journal of Business Research*, *124*, 312-328.

Mende, M., Scott, M.L., van Doorn, J., Grewal, D., & Shanks, I. (2019). Service robots rising: How humanoid robots influence service experiences and elicit compensatory consumer responses. *Journal of Marketing Research*, *56*(4), 535-556.

Pega (2017). What Consumers really think about AI: A Global study. *Pega.* Retrieved April 9, 2021, Retrieved from https://www.ciosummits.com/what-consumers-really-think-about-ai.pdf

Postma, O. J., & Brokke, M. (2002). Personalisation in practice: The proven effects of personalisation. *Journal of Database Marketing & Customer Strategy Management*, *9*(2), 137-142.

Research Advisors.com. Retrieved from https://www.research-advisors.com/tools/SampleSize.htm on April 13th, 2021.

Rust, R. T., & Huang, M. H. (2014). The Service Revolution and the Transformation of Marketing Science. *Marketing Science, 33*(2), 206–221. https://doi.org/10.1287/mksc.2013.0836

Salesforce (2018). Artificial Intelligence in Asia: Trust, Understanding and the Opportunity to Re-Skill. Retrieved from https://www.sellingsimplifiedinsights.asia/asset/IoT-&-Business-Intelligence/Salesforce_Artificial-intelligence-in-Asia_Trust-Understanding-and-the-opportunity-to-reskill.pdf

Senecal, S., & Nantel, J. (2004). The influence of online product recommendations on consumers' online choices. *Journal of retailing*, *80*(2), 159-169.

Sohn, K., & Kwon, O. (2020). Technology acceptance theories and factors influencing artificial intelligence-based intelligent products. *Telematics and Informatics*, DOI: https://doi.org/10.1016/j.tele.2019.101324

Swaminathan, V. (2003). The impact of recommendation agents on consumer evaluation and choice: the moderating role of category risk, product complexity, and consumer knowledge. *Journal of Consumer Psychology*, *13*(1-2), 93-101.

The Times of India (2020). *For the first time, India has more rural net users than urban* (Updated on May 6, 2020). Retrieved April 13, 2021, Retrieved from https://timesofindia.indiatimes.com/business/india-business/for-the-first-time-india-has-more-rural-net-users-than-urban/articleshow/75566025.cms

Vempati, S. S. (2016). *India and the artificial intelligence revolution*. Carnegie Endowment for International Peace.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Wang, W., & Benbasat, I. (2005). Trust in and adoption of online recommendation agents. *Journal of the association for information systems*, *6*(3), 72-101.

Xiao, B. & Benbasat, I. (2007). E-Commerce Product Recommendation Agents: Use, Characteristics, and Impact. *MIS Quarterly, 31*(1), 137–209. https://doi.org/10.2307/25148784

Yen, C., & Chiang, M. C. (2020). Trust me, if you can: a study on the factors that influence consumers' purchase intention triggered by chatbots based on brain image evidence and self-reported assessments. *Behaviour & Information Technology*, 1-18.