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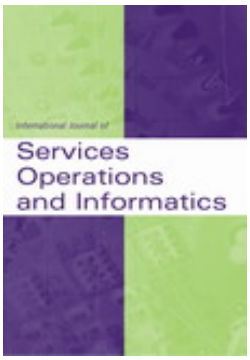


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# Study on artificial intelligence (AI) initiatives in e-service delivery systems: a service process perception model

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# Study on artificial intelligence (AI) initiatives in e-service delivery systems: a service process perception model

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**Abstract:** Artificial intelligence (AI) is shaping the future of e-service delivery systems (e-SDSs). However, the implementation of AI in e-service delivery requires customers to adopt these disruptive technologies. To fulfil this aim, we developed a model to explore customers' service delivery process perceptions of AI-based e-service systems. Using behavioural reasoning theory, the technology acceptance model and the service process perception model, this study examines the impact of 'reasons' (for and against) service process perception on customer attitude and intention. This study also finds the mediating effect of customer attitude on the impact of reasons (for and against)

on intention. Data was collected from 441 Indian e-retail customers. This research uses mediated regression to examine the direct and mediated effects. The findings show the direct impact of service process perceptions on the attitude and intention to be significant. The results also suggest the partial and full mediating effects of attitude.

**Keywords:** service process; service delivery; customer satisfaction; mediated regression; India; artificial intelligence.

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## 1 Introduction

Artificial intelligence (AI), big data analytics (BDA), and the Internet of Things (IoT) are some disruptive technologies that are altering how services are provided in both online and offline environments (Aloysius et al., 2018). Online service providers are using disruptive technologies to attract and retain new and existing customers, respectively. Artificial intelligence is one such technology which provides a competitive advantage to online service providers by enhancing the service offering i.e., service outcomes and service process (Huang and Rust, 2018). The usage of AI-related technologies has been documented in numerous studies in various fields and applications, including education (Chen et al., 2020), agriculture (Jha et al., 2019), medical (He et al., 2019), construction (Pan and Zhang, 2021), aviation sustainability (Singh et al., 2023), public sector (de Sousa et al., 2019), tourism (Tussyadiah, 2020) etc. In 2020, the global AI market size was USD 65 billion and estimated growth is with a CAGR of 38% to reach USD 1581 billion from 2021 to 2030 (Keshav et al., 2022). In India, the AI market is estimated to reach $3.935.5 million by 2028, growing at a CAGR of 33.28% between 2023 and 2028 (Stanly, 2023).

Many authors have emphasised the importance of the service process when compared to service outcomes in service delivery (Dabholkar and Overby, 2005; Gupta et al., 2020b; Gupta et al., 2021b; Liu et al., 2016). Several studies have suggested that online service providers can provide a good service process experience by using AI-related features in their service delivery (Bokhari and Myeong, 2022; Chi et al., 2020; Gursoy et al., 2019; Payne et al., 2021). Lemon and Verhoef (2016) propose a process framework for the customer journey and experience and suggest that the process view of the service delivery presents a stronger understanding to map the customer journey and subsequent experience. Artificial intelligence (AI) tracks customers' real-time data during service delivery and acts fast built on the needs of the customer. AI predicts customers' next move and provides a better customer experience. Reis et al. (2020) highlighted the latest developments in AI on service delivery systems (SDSs) and suggested the advantage of using AI-based technologies such as machine learning (ML), Artificial Neural Networks (ANN), Deep Learning, Speech (such as speech to text and text to speech), Vision (such as image recognition and machine vision) and Natural Language Processing (NLP) in reducing the service lead times in different stage of online SDSs. Multiple stages of the electronic service delivery system process (e-SDSP), including the information searching process, agreement process, fulfilment process, and post-sales

service process, have been proposed by numerous authors (Gupta et al., 2020a; Xu et al., 2017a). AI-based technologies are helping customers during various stages of the e-SDSP such as the use of AI-based deep learning techniques in autonomous drones for last-mile deliveries. Many online service providers are using chatbots as an option to communicate with the customers during search, agreement and after-sales service stages (Hill et al., 2015; Xu et al., 2017b). Brill et al. (2019) looked at consumer satisfaction in service delivery when using AI tools like Siri, Alexa and Google Assistant.

In a study conducted by Aloysius et al. (2018), the authors studied the big data initiatives in service delivery and suggested a research framework that proposes the perception of a service process impacts the service outcomes in retail stores. In their study, they have taken customers' perception of service processes such as technology enablers (ease of use and usefulness) and privacy issues (unauthorised access, secondary use, errors, and collection) and their impact on service outcomes such as repatronage intention, store image and intention to use the medium. Many authors have reasoned that the service process perceptions of an e-service delivery system (e-SDS) influence the customer's satisfaction and intention (Sachan et al., 2018; Wolfinbarger and Gilly, 2003; Zeithaml et al., 2002). There is a dearth of literature research which studies the service process perceptions in an AI-based e-SDS and its effects on the service outcomes such as attitude and intentions.

This study relies on the behavioural reasoning theory (BRT) framework to study the impact of service process perceptions (grouped into 'reason for' and 'reason against') on the customer attitude and intention towards online service providers. This study also aims to find out the mediating effect of customer attitudes towards online service providers on the relationship between service process perceptions and intention towards online service providers. Figure 1 illustrates how this study positions itself to close the conceptual gap that exists in the body of literature on the relationship between service delivery and ICT use. The e-retailing industry, which is a subset of online services, is considered as the research context and Indian customers as the sample for the study. The study (Halvorsrud et al., 2016) presents seven theory-driven constructs covering three domains, namely belief, attitude, and intention about technology-mediated SDS from a customer's perspective. The goal of this study is to determine whether perception about e-SDS and intention towards the service provider are associated in a way that is mediated by attitude towards the service provider's website.

The study model and developing hypotheses are discussed in Section 2 using background information from the literature review. The methodology and results are covered in Sections 3 and 4 respectively. Sections 5 and 6 have been devoted, respectively, to the discussion and implications. Section 6 discusses the conclusion, the research's shortcomings, and its future directions.

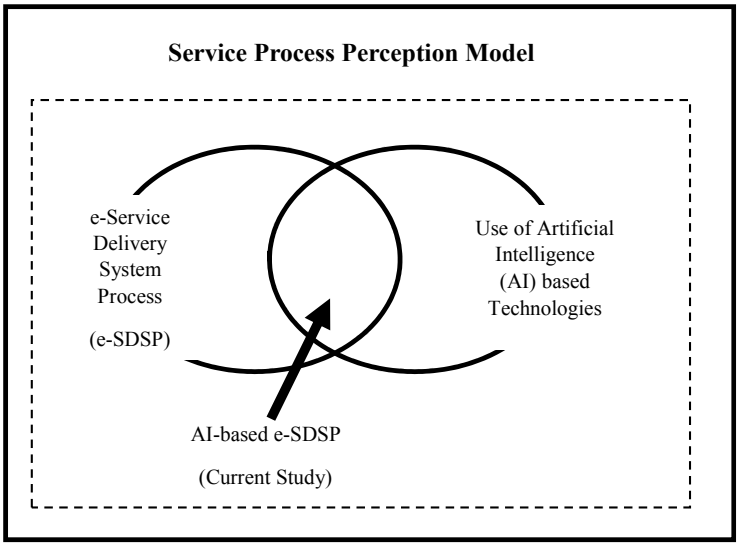
## 2 Theoretical background and development of hypothesis

### *2.1 Behavioural reasoning theory (BRT) framework*

Behavioural reasoning theory (BRT) is considered one of the important frameworks for understanding the customer's decision-making process in a given context. BRT framework suggests a linkage of values or beliefs, reasons, motives, intentions and behaviour (Sivathanu, 2018). BRT offers an advantage over other theories such as theory

of reasoned action (TRA) and theory of planned behaviour (TPB) by providing rich contextual information. BRT offers two measures of 'reasons', i.e., 'reason for' and 'reason against' which helps to well appreciate the human decision-making process by providing not only the opposite but also two different perspectives, context-specific information, role of beliefs/values in predicting reasons and cognitive routes through reasons (Sahu et al., 2020).

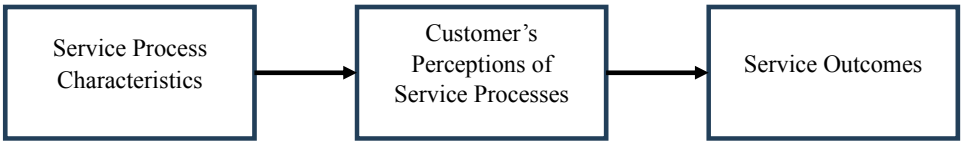
**Figure 1** Research gap area




## *2.2 Service process perception model*

Aloysius et al. (2018) have put forth a service process perception model and authors propose that customers' assessments of service process features shape their opinion of the service process, which may then influence outcome judgements (Figure 2). Gupta et al. (2020a) have studied the impact of service process beliefs on service outcomes such as customer attitude and customer intentions. Ba and Johansson (2008) investigated the role of the perceived online services process on customer satisfaction in a technology-enabled online service. Kumar et al. (2020) have observed the impact of process perception in internet banking services on customer satisfaction and behavioural intention. Many authors have highlighted the importance of e-service from the process perspective (Gupta and Sachan, 2018, Gupta et al., 2020a, 2020b, 2021a, 2021b; Gupta et al., in press a, b; Kumar et al., 2021; Tsung et al., 2008).

**Figure 2** Service process perception model (see online version or colours)




*Source*: Aloysius et al. (2018)

## *2.3 Hypothesis development*

### *2.3.1 'Reason for' service process perceptions in e-SDS*

#### *2.3.1.1 Perceived usefulness (PU)*

The extent to which interaction between a consumer and a service provider in a technology-mediated service satisfies the customer's perceived requirements and desires is referred to as perceived usefulness. Prior studies have shown that when a consumer receives benefits or draws value from the service provider's SDS, their behavioural intention to continue using that service provider will increase (Gokmenoglu and Hesami, 2020; Kaurav and Gupta, 2022; Kumar et al., 2021; Hadi and Besra, 2022; Wilson et al., 2021). Perceived usefulness is seen as a key indicator of attitude and intention to use the technology acceptance model (TAM) (Davis et al., 1989; Mou et al., 2017; Wilson et al., 2021; Hadi and Besra, 2022). It provides the estimated value a customer derives from the SDS using the cost-benefit method (Heskett et al., 2010; Roth and Menor, 2003). Therefore, the following hypothesis is proposed:

*H1a: Perceived usefulness (PU) in AI-based e-SDS positively influences customer attitude towards online service providers.*

*H2a: Perceived usefulness (PU) in AI-based e-SDS positively influences customer intention towards online service providers.*

#### *2.3.1.2 Perceived ease of use (PEOU)*

The degree to which an encounter between a customer and a service provider in a technology-mediated service is seen as free of effort from the customer's point of view is referred to as perceived ease of use. Numerous earlier studies suggest that when less effort is needed during the SDS, behavioural intention to use the same service provider would increase (Gupta et al., 2021a; Taherdoost, 2018). Perceived ease of use is regarded as a crucial indicator of usage in the future in the TAM (Davis et al., 1989). Customers found perceived ease of use to be a key consideration when choosing the SDS of another online retailer (Prastiawan et al., 2021; Setiawan and Setyawati, 2020; Wilson et al., 2021). Customers' concerns regarding the work needed and the process complexity apply to SDSs. In terms of attributes of perceived ease of use, these two qualities–effort and complexity–are significant (Davis et al., 1989). Therefore, the following hypothesis is raised:

*H1b: Perceived ease of use (PEOU) in AI-based e-SDS positively influences customer attitude towards online service providers.*

*H2b: Perceived ease of use (PEOU) in AI-based e-SDS positively influences customer intention towards online service providers.*

#### *2.3.1.3 Perceived flexibility (PF)*

Heim and Sinha (2002) created a classification for the service process in e-retailing using the level of flexibility and proposed that greater flexibility has a favourable correlation with attitudes (satisfaction) and intentions (loyalty) towards electronic retailers. Due to decisions made in the electronic retail process, the service process now offers greater customisation along flexible dimensions. In three stages (pre-purchase, purchase, and

post-purchase) of the customer activity cycle, Jin and Oriaku (2013) talked about the experience a person is having as a result of the flexibility of e-services and proposed that this experience could aid service providers in boosting customer attitude (satisfaction) and intention. Therefore, we hypothesised:

*H1c: Perceived flexibility (PF) in AI-based e-SDS positively influences customer attitude towards online service providers.*

*H2c: Perceived flexibility (PF) in AI-based e-SDS positively influences customer intention towards online service providers.*

#### *2.3.1.4 Perceived control (PC)*

The control belief in the delivery process acts as an agent to produce attitude results (like dis/satisfaction) and behavioural consequences (like loyalty) in the service context (Joosten et al., 2016). Langeard et al. (1981) suggested that perceived control is the perception of control a customer feels they have on the process in a technology-based online services interaction. Numerous authors have hypothesised that the perception of control affects the attitude, i.e., dis/satisfaction in many types of service situations (Deng et al., 2010; Hui and Bateson, 1991; Lee and Allaway, 2002; Proshansky et al., 1970; Wathieu et al., 2002). A properly created and executed service capability can give customers more control over the way they search for a specific product or navigation, enable them to complete purchases using the service provider's internet site and allow them to select the best channel to buy products in a technology-mediated environment like e-commerce (Rust and Kannan, 2003). Therefore, the following hypothesis is proposed:

*H1d: Perceived control (PC) in AI-based e-SDS positively influences customer attitude towards online service providers.*

*H2d: Perceived control (PC) in AI-based e-SDS positively influences customer intention towards online service providers.*

### *2.3.2 'Reason against' service process perceptions in e-SDS*

#### *2.3.2.1 Perceived risk (PR)*

Perceived risk, which is significant in e-commerce is the belief of the customer that something unacceptable would happen during SDS (Kim et al., 2008; Nepomuceno et al., 2014). Many researchers investigated the links between perceived risk and online buying satisfaction and intention (Hadi and Besra, 2022; Martin et al., 2015; Sadiq et al., 2022). Intention outcomes such as loyalty and attitudinal outcomes such as satisfaction are negatively correlated with higher risk perceptions (Belanche et al., 2012; Bianchi and Andrews, 2012; Coker et al., 2011; Liu, 2016; Nepomuceno et al., 2014). Some factors that can hurt attitudes include a lack of privacy and security issues, an absence of human engagement, or technological difficulties (Meuter et al., 2000; Shankar et al., 2003). Higher perceived or experienced risk is logically expected to diminish a customer's level of buying happiness. According to Trivedi (2019), who also examined the moderating effects of perceived risk in the baking service, consumer conduct is highly influenced by perceived risk.

Therefore, the following hypothesis is proposed:

*H1e: Perceived risk (PR) in AI-based e-SDS positively influences customer attitude towards online service providers.*

*H2e: Perceived risk (PR) in AI-based e-SDS positively influences customer intention towards online service providers.*

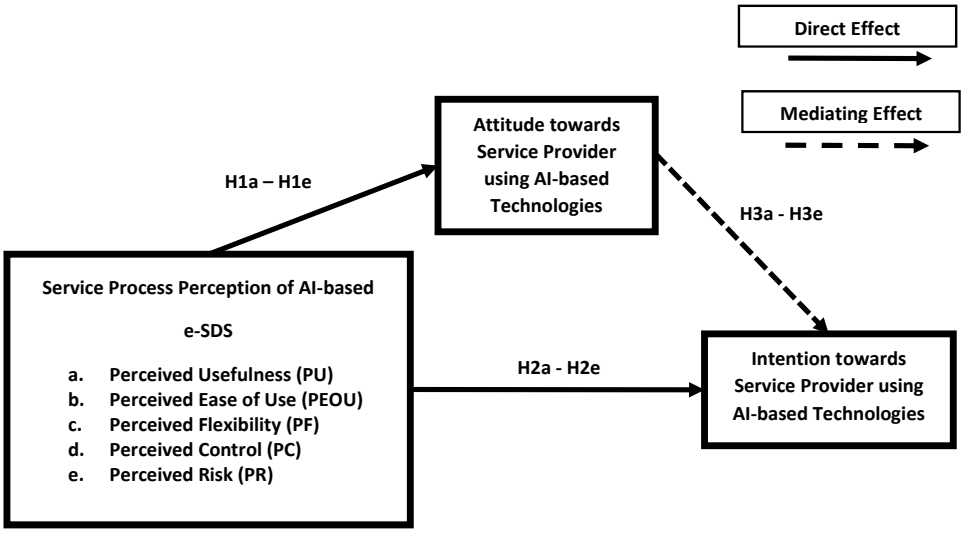
### *2.3.3 Mediating effect of attitude in the relationship between 'reasons' (for and against) and intention towards the online service provider*

It is further hypothesised that attitude (dis/satisfaction) with the service provider mediates the impact of service process perceptions on intention to use the provider afterwards. Pham and Ahammad (2017) investigated the influence of customer satisfaction throughout all phases of e-service delivery on intention. The association between service process perception and intention in online service delivery systems (SDSs) is mediated by satisfaction (Gupta et al., 2020a). According to Rose et al. (2012), customers' cognitive and affective beliefs and their link with intention were found to mediate consumer satisfaction in electronic retailing. In their 2014 study, Pappas et al. (2014) looked at the impact of performance and effort expectancy on satisfaction and intention to use. In numerous research, it was claimed that satisfaction mediates the connection between intentions and reasons (for and against) in a range of services (Sahu et al., 2020; Tandon et al., 2020). To this end, the following hypothesis is proposed:

*H3: The influence of service process perceptions in e-SDS (a) perceived usefulness; (b) perceived ease of use; (c) perceived flexibility; (d) perceived control; and (e) perceived risk on customer behavioural intentions are mediated by customers' attitude towards the service provider.*

A research model has been proposed based on the hypothesis developed as shown in Figure 3.

**Figure 3** Research model – hypothesised constructs



## 3 Methodology

### 3.1 Measurement scale

To ensure reliability, the present research modified and utilised the pre-existing questionnaire items from the body of published work. When possible, single barrel questions, reversed questions, and pre-testing of the questions were utilised to assess every construct, including perceived usefulness, perceived ease of use, perceived flexibility, perceived control, perceived risk, attitude towards the service provider, and intention towards service provider (see Table 1 for more details). There were many different items in the initial set of measurements. A reduced number of items on a seven-point Likert scale (with 1–7 representing strongly disagree to strongly agree accordingly) and seven demographic questions made up the final questionnaire survey. In our survey, we asked participants to rate the claims regarding their experiences with the websites of online retailers by recalling their most recent online transactions with those websites.

**Table 1** Measurement scales

| *Indicators* | *Items* | *Source* |
|---|---|---|
| *Perceived usefulness (PU)* | | |
| PU1 | The flow of information or sequence of pages is appropriate during searching for a product | Adapted and modified from Ba and Johansson (2008) and Arghashi and Yuksel (2022) |
| PU2 | The entire process of searching for a product took a reasonable amount of time | |
| PU3 | On this website, the payment procedure when ordering product is quick | |
| PU4 | Ordering from this website saves a lot of time | |
| PU5 | Using this website makes online shopping easier | |
| PU6 | Using this website for online shopping is useful to me | |
| *Perceived ease of use (PEOU)* | | |
| PEOU1 | This website is convenient to navigate for searching for products | Adapted and modified from Pham and Ahammad (2017) |
| PEOU2 | Order placement and payment process on this website is easy | |
| PEOU3 | In this website, the overall online shopping process is easy | |
| *Perceived flexibility (PFB)* | | |
| PF1 | The website gives me the option to compare different products before ordering | Adapted and modified from Pham and Ahammad (2017) and Bauer et al. (2006) |
| PF2 | The website gives me the option to save products for future transaction | |
| PF3 | The website gives me a choice to pay via different modes of payment (i.e., debit/credit/net banking/pay later/COD, etc.) | |
| PF4 | The website gives me the option to change the delivery address during the fulfilment | |

**Table 1** Measurement scales (continued)

| *Indicators* | *Items* | *Source* |
|---|---|---|
| *Perceived flexibility (PFB)* | | |
| PF5 | The website gives me choices of communication channels (i.e., email/calls/chat, etc.) to connect with customer service representatives | |
| PF6 | The website has the option to choose between a wide variety of products | |
| *Perceived control (PCB)* | | |
| PC1 | I can order any product which the website is offering | Adapted from Ba and Johansson (2008) |
| PC2 | I can order products at any time which suits me | |
| PC3 | I feel in control at each step of shopping and can change the outcome of the online process | |
| PC4 | The website restricts me to do things | |
| *Perceived risk (PRB)* | | |
| PR1 | This website faces errors/crashes while online shopping | Adapted and modified from Parasuraman et al. (2005), Pham and Ahammad (2017) and Liao and Shi (2009) |
| PR2 | By using this website, I feel safe with my security of payment (credit/debit/net banking, etc.) details | |
| PR3 | By using this website, I feel safe with my privacy | |
| PR4 | Upon delivery, my order is damaged | |
| PR5 | During delivery, my order gets misplaced | |
| PR6 | This website fails to facilitate the replacement or refund of my order | |
| *Attitude towards service provider (ATT)* | | |
| ATT1 | Using this site, I feel contented | Adapted from Ba and Johansson (2008) |
| ATT2 | By using this site for online shopping, I feel pleased | |
| ATT3 | Using this website was fun. | |
| *Intention towards service provider (INT)* | | |
| INT1 | I would return to this site to conduct future internet purchases | Adapted from Pham and Ahammad (2017) |
| INT2 | In future, if I wish to do buying things online, I'll use this web page | |

## *3.2 Sample and descriptives*

English was used to design the questionnaires. In an attempt to determine any issues with the items' comprehension the final draft of the questionnaires was subsequently sent to a small group of doctorate students for refinement (Zikmund, 2010). Due to confusion with several items, a few small modifications were made to the item/questionnaires.

In the pilot study, 100 college students were given the survey, and 77 viable responses (i.e., a 77% response rate) were obtained. The pre-test verified that it took about 10 min to finish the questionnaire. After pre-testing, no significant issues about the questions or layout were brought up by respondents who were allowed to remark on the questionnaire form. After that, Indian retail customers with internet shopping experience

received the final questionnaire. Online (email-based) and offline modes (pen and paper-based) were used to deliver surveys. The distribution of 250 surveys via field surveys (pen and paper-based) resulted in 200 usable responses (an effective response rate of 80%), while the distribution of 300 surveys via an online questionnaire resulted in 164 usable responses (an effective response rate of 54%).

Out of a total of 441 usable responses (including the pilot sample), 68% were male, and the rest were female. The majority of respondents were aged between 18–24 years (36.7%) and 25–35 (57.1%) with the remainder shared between above 35 years (5.7%). The largest group of respondents (58.5%) had an undergraduate degree, followed by a master's and above degree (41.5%). Out of the total respondents, 77.8% had more than one year's experience with the service provider. Regarding the frequency of online shopping with the service provider, 15.7% shopped online less than three times, 40.6% shopped three to six times and 43.7% shopped more than six times in the last year (Table 2). Therefore, overall, we believe that the sample is, indeed, representative of the population of online retail shoppers in India.

**Table 2** Sample descriptives

| *Demographic questions* | *Responses* |
|---|---|
| Gender | Male (68%) and Female (32%) |
| Age | 18–24 years (36.7%), 25–35 (57.1%) and >35 (6.2%) |
| Education | Under graduation and below (58.5%) and Masters and above (41.5%) |
| shopping experience | >1 year (77.8%) and <1 year (22.2%) |
| frequency of shopping | <3 times (15.7%), 3–6 times (40.6%) and >6 times (43.7%) |

### *3.3 Reliability test using Cronbach alpha*

Cronbach's alpha has been used in a reliability test to find the internal consistency of the items (see Table 3). The Cronbach's alpha (α) scores for each construct of the perception of the e-service process fell within the permissible bounds (0.70) suggested by Hair et al. (2006). Cronbach's alpha for attitude is 0.82, which is considered satisfactory. The behavioural intention measure's Cronbach alpha value was 0.82, representing a good amount of reliability. Additionally, when any items were deleted, the values did not improve. This demonstrates that constructions have a high level of internal consistency (Hair et al., 2006).

**Table 3** Reliability test

| *Constructs* | *Number of items* | *Cronbach's α* |
|---|---|---|
| Perceived usefulness (PU) | 6 | 0.71 |
| Perceived ease of use (PEOU) | 3 | 0.77 |
| Perceived flexibility (PF) | 6 | 0.73 |
| Perceived control (PC) | 4 | 0.70 |
| Perceived risk (PR) | 6 | 0.73 |
| Attitude towards service provider (ATT) | 3 | 0.82 |
| Intention towards service provider (INT) | 2 | 0.82 |

### *3.4 Correlation matrix*

None of the seven constructs exceeded the 0.80 cut-off value indicated by Hair et al. (2006), according to the correlation matrix among them (see Table 4). Consequently, multicollinearity is not a concern. The proposed constructs are recommended for use in the study based on the reliability test and correlation analysis (Butcher et al., 2002).

**Table 4** Correlation-matrix among constructs

| | *PUB* | *PEUB* | *PFB* | *PCB* | *PRB* | *ATT* | *INT* |
|---|---|---|---|---|---|---|---|
| PU | 1.00 | | | | | | |
| PEOU | 0.69 | 1.00 | | | | | |
| PF | 0.68 | 0.65 | 1.00 | | | | |
| PC | 0.48 | 0.48 | 0.49 | 1.00 | | | |
| PR | 0.42 | 0.47 | 0.45 | 0.49 | 1.00 | | |
| ATT | 0.67 | 0.62 | 0.68 | 0.50 | 0.53 | 1.00 | |
| INT | 0.63 | 0.64 | 0.66 | 0.49 | 0.46 | 0.77 | 1.00 |

### *3.5 Data analysis procedure and methods*

This study adopted mediated regression as a method to examine the direct effects of the e-service process perception constructs on attitude (H1 a–e), on behavioural intentions (H2 a–e), and the mediation of attitude on the relationship between e-service process perceptions in AI-based e-SDS and their behavioural intentions (H3 a–e). This method has been aligned with several past studies in examining the mediation effect (Chang and Polonsky, 2012; Kumar et al., 2020).

This method uses four distinct multiple regression equations (Chang and Polonsky, 2012; Kumar et al., 2020) when considered in a sequential manner followed by four conditions respectively. These conditions determine whether the service process perception in AI-based e-SDS directly influences customers' intention towards service providers in online retailing, or indirectly influences them through the mediation of attitude towards service providers. Four required mediation conditions are provided:

I There is a statistically significant influence of independent variables (perception constructs) on the mediating variable (attitude towards the website of the service provider), i.e., testing H1 a–e.

II There is a statistically significant influence of the mediating variable (attitude towards the website of a service provider) on the outcome variable (behavioural intentions towards the service provider).

III There is a statistically significant influence of independent variables (only those perception constructs which were found to be significantly related to a mediating variable, i.e., attitude in Condition 1) on the dependent outcome variable (behavioural intentions towards service provider), i.e., testing H2 a–e.

IV The relationship between the independent variables (only those perception constructs which were found to be significantly related to the mediating variable, i.e., attitude in Condition 1) and the dependent outcome variable (behavioural intentions) changes as a result of including the mediating variable (attitude) as a predictor variable, i.e., testing H3 a–e.

The mediating effect can be determined by observing condition 3 (equation (3)) and condition 4 (equation (4)) if the independent variable becomes non-significant in equation (4) earlier it was significant in equation (3), then it acts as a fully mediated variable. However, in the case of partial mediation, independent variables remain significant with a reduced influence in equation (4) as compared to equation (3) (Chang and Polonsky, 2012; Kumar et al., 2020). As a result of full or partial mediation, the effect of significant perception constructs is transferred to the mediator variable (i.e., attitude). In multiple regression, equations (3) and (4), the beta coefficient of independent variables is observed to determine the mediating effect. If the beta coefficient of independent variables becomes non-significant, it leads to the conclusion that there is a fully mediated effect. If the beta coefficient value reduces in equation (4) as compared to equation (3), then it is said to be partially mediated.

## 4 Results

As can be seen in Table 5, equation (1), all five constructs of service process perceptions in AI-based e-SDS, 'perceived usefulness' ($\beta = 0.350$, t-value = 5.810, $p < 0.001$), 'perceived ease of use' ($\beta = 0.130$, t-value = 2.560, $p < 0.05$), 'perceived flexibility' ($\beta = 0.350$, t-value = 6.380, $p < 0.001$), 'perceived control' ($\beta = 0.080$, t-value = 2.17, $p < 0.05$), and 'perceived risk' ($\beta = 0.180$, t-value = 5.08, $p < 0.001$), are related to attitude towards service provider. The regression equation indicates that 'perceived usefulness' (H1a), 'perceived ease of use' (H1b), 'perceived flexibility' (H1c), 'perceived control' (H1d), and 'perceived risk' (H1e) impacts attitude towards the service provider, thus satisfying the first requirement for mediation (Chang and Polonsky, 2012; Kumar et al., 2020). Therefore, for all five perception constructs, H1 (H1a to H1e) is supported.

In the second regression equation, the relationship between the mediated variable (i.e., attitude) and outcome-dependent variable intention towards the service provider is tested. The result shows that the relationship between attitude towards the website of the service provider and intention to use the service provider is significant ($\beta = 0.84$, t-value = 25.09, $p < 0.001$). This fulfils the second condition of mediation (however, no particular hypothesis is developed for this relationship).

In the third multiple regression equation, the association between all significant perception constructs as per equation (1) i.e., perceived usefulness, perceived ease of use, perceived flexibility, perceived control and perceived risk, and intention towards service provider is examined. The result indicates that beta coefficient of respective perception constructs i.e., 'perceived usefulness' ($\beta = 0.24$, t-value = 3.43, $p < 0.01$), 'perceived ease of use' ($\beta = 0.30$, t-value = 4.93, $p < 0.001$), 'perceived flexibility' ($\beta = 0.39$, t-value = 6.27 $p < 0.001$), 'perceived control' ($\beta = 0.12$, t-value = 2.69, $p < 0.05$), and 'perceived risk' ($\beta = 0.09$, t-value = 2.18, $p < 0.05$) influence customer's behavioural intentions, thus supporting H2a to H2e. This satisfies the third mediating condition.

**Table 5** Multiple regression equations, $n = 441$

| | | *Standard coefficient* | | | |
|---|---|---|---|---|---|
| | *Independent variable → Dependent variable* | *Beta* | *t-Value* | *Sig.* | *Results* |
| Equation (1) | Constant | –0.400 | –1.610 | 0.108 | |
| | PU → ATT | 0.350 | 5.810 | 0.000*** | H1a: Supported |
| | PEOU → ATT | 0.130 | 2.560 | 0.011** | H1b: Supported |
| | PF→ ATT | 0.350 | 6.380 | 0.000*** | H1c: Supported |
| | PC → ATT | 0.080 | 2.170 | 0.030** | H1d: Supported |
| | PR → ATT | 0.180 | 5.080 | 0.000*** | H1e: Supported |
| | $R^2$ ($R_{adj}^2$) = 0.594 (0.589) | | | | |
| Equation (2) | Constant | 1.12 | 5.720 | 0.000*** | |
| | ATT → INT | 0.84 | 25.090 | 0.000*** | Supported |
| | $R^2$ ($R_{adj}^2$) = 0.589 (0.588) | | | | |
| Equation (3) | Constant | –0.5 | –1.760 | 0.080* | |
| | PU → INT | 0.24 | 3.430 | 0.001** | H2a: Supported |
| | PEOU → INT | 0.3 | 4.930 | 0.000*** | H2b: Supported |
| | PF→ INT | 0.39 | 6.270 | 0.000*** | H2c: Supported |
| | PC → INT | 0.12 | 2.690 | 0.007** | H2d: Supported |
| | PR → INT | 0.09 | 2.180 | 0.030** | H2e: Supported |
| | $R^2$ ($R_{adj}^2$) = 0.55 (0.545) | | | | |
| Equation (4) | Constant | –0.2 | –1.120 | 0.260 | |
| | PU → INT | 0.05 | 0.740 | 0.460 | H3a: Fully mediated |
| | PEOU → INT | 0.23 | 4.190 | 0.000*** | H3b: Partially mediated |
| | PF→ INT | 0.2 | 3.530 | 0.000*** | H3c: Partially mediated |
| | PC → INT | 0.07 | 1.870 | 0.062* | H3d: Fully mediated |
| | PR → INT | –0.01 | –0.250 | 0.800 | H3e: Fully mediated |
| | ATT → INT | 0.55 | 11.200 | 0.000*** | Supported |
| | $R^2$ ($R_{adj}^2$) = 0.651 (0.646) | | | | |

p-value ***<0.000, **<0.05, *<0.1.

In the fourth multiple regression equation, the mediating effect of attitude in the relationship between service process perception in AI-based e-SDS and intention towards service provider is tested. After adding the mediating variable as in condition 4, full mediation exists, when beta coefficients of independent variables (perception constructs) become non-significant while partial mediation exists when values of beta coefficients are reduced. The result shows that after adding a mediating variable, i.e., attitude as an independent variable in equation (3), The beta coefficients in equation (4) suggest that two perception's constructs i.e., 'perceived ease of use' ($\beta = 0.23$, t-value = 4.19, $p < 0.001$) and 'perceived flexibility' ($\beta = 0.20$, t-value = 3.53, $p < 0.001$) still have a statistically significant effect on customer behavioural intentions. The value of beta

coefficients for these two perception constructs are reduced as compared to equation (3), this shows that attitude partially mediates the relationship between these two perception constructs and intention towards the service provider. The beta coefficient in equation (4) indicates that three perception constructs i.e., 'perceived usefulness' ($\beta = 0.05$, t-value = 0.74, $p > 0.05$), 'perceived control' ($\beta = 0.07$, t-value = 1.87, $p > 0.05$), and 'perceived risk' ($\beta = -0.01$, t-value = –0.25, $p > 0.05$) have a statistically non-significant effect on customer behavioural intentions. This suggests that the relationship between three perception constructs, i.e., 'perceived usefulness', 'perceived control' and 'perceived risk' and intention association are fully mediated by the attitude towards service providers. Also, there is a significant influence of attitude towards the website of the service provider on the intention towards the service provider ($\beta = 0.55$, t-value = 11.20, $p < 0.001$) as shown in equation (4). Given the changes in the betas for all five perception's constructs, we can suggest that attitude towards the service provider partially or fully mediates the association between the service process perception and behavioural intentions, that is, H3b and H3c are partially mediated while H3a, H3d, and H3e are fully mediated (Table 5).

## 5 Discussions and implications

The objective of this work is to study the influence of service process perceptions in AI-based e-SDSs i.e., perceived usefulness, perceived ease of use, perceived flexibility, perceived control, and perceived risk on the attitude and intention towards online service providers. Also, this paper attempts to study the mediating effect of attitude on the impact of service process perceptions on the intention towards service providers.

Support for hypotheses H1a–e and H2a–e show that all service process perceptions' construct, i.e., 'perceived usefulness' (H1a), 'perceived ease of use' (H1b), 'perceived flexibility' (H1c), 'perceived control' (H1c), and 'perceived risk ' (H1e) influence customer's attitude (i.e., satisfaction/dissatisfaction) and intention towards service provider which supports and contradicts the findings of Arbaugh (2000), Ba and Johansson (2008), Chang (2008), Kokoç (2019), Namasivayam and Guchait (2013) and Sadiq et al. (2022). Customers evaluate their satisfaction with e-services such as online retail based on the service journey quality provided by the service providers (Jaakkola and Terho, 2021). The evaluation of satisfaction has relied on the service process perceptions of various stages of the SDS. This work proposes five service process perceptions in AI-based e-SDS and the importance of service process perceptions are not the same for different stages of e-SDS. However, at a particular stage of service delivery, a particular process perception rules. For instance, during the e-SDS's information search and agreement stages, ease of use may be crucial. The concept of perceived control may also just apply to individuals at the time of information search and fulfilment. Furthermore, specific service process perceives may predominate in various e-service environments.

Attitude shows a full mediating effect of the impact of service process perceptions such as perceived usefulness, perceived control and perceived risk on intention towards service providers. However, the attitude has a partial mediation role in the case of perceived ease of use and perceived flexibility.

Many authors have found the mediation effect (full or partial) of attitude on the impact of perceived usefulness on the intention which supports and contradicts our

findings (Amoako-Gyampah and Salam, 2004, Hadi and Besra, 2022, Prastiawan et al., 2021 and Wilson et al., 2021). Several studies have found the mediation effect (full or partial) of attitude on the impact of perceived ease of use on the intention which supports and contradicts our findings (Wilson et al., 2021; Amoako-Gyampah and Salam, 2004; Prastiawan et al., 2021; Setiawan and Setyawati, 2020). Setiawan and Setyawati (2020) have taken the mobile payment adoption and found the mediating behaviour of attitude on the effect of perceived ease of use on the intention to use. Our result finds support from the TAM in diverse contexts and applications such as adoption of advanced technologies, e-learning, usage of virtual reality technologies, mobile learning adoption, health informatics and education context (Al-Emran et al., 2018; Alsharida et al., 2021; Ajibade, 2018; Granić and Marangunić, 2019; Mahalil et al., 2020; Rahimi et al., 2018; Rahmawati, 2019). Other factors, such as perceived usefulness, may fully mediate the association between perceived ease of use and intention to use, explaining why attitude is only partially mediated in the case of perceived ease of use belief. For this PEOU-PU-ATT-INT acts as a dominant relationship path.

Numerous authors have argued that flexibility enhances process control (Alaraji and Jusan, 2014; Joosten et al., 2016). The relationship between perceived flexibility and intention may be mediated by perceived control. The link PFB-PCB-ATT-INT may function as a dominating avenue for perceived flexibility. This finding is supported by Joosten et al. (2016), who contend that the degree of control over the service delivery process is dependent on the individual and is not always better. The impacts on attitudes and behaviours, such as dissatisfaction and propensity to employ a specific service provider's service, are shaped by this feeling of control. These results agree with the body of research literature.

Many authors have found the mediation effect (full or partial) of attitude on the influence of perceived risk on the usage intention which supports and contradicts our findings and suggests that perception of risk while undergoing a service process has a negative customer attitude and subsequent intention to use (Hadi and Besra, 2022; Sadiq et al., 2022).

## *5.1 Implications for theory*

The outcome of this work encompasses our knowledge of how service process perceptions in AI-based e-SDS towards different online service providers affect customer behavioural intention to use service providers again in an online retail context. This paper adopts behavioural reasoning theory, technology acceptance model and service process perception model to study the customer journey and suggests a theoretical model in AI-based online service delivery to enhance customer experience by working on the service process perceptions of the customers. This study incorporates the service process perceptions such as perceived flexibility and perceived control in AI-based e-service delivery which needs to be explored by the researchers.

## *5.2 Managerial implications*

In AI-based online service delivery, service process perceptions such as the usefulness of the service delivery process, less complexity of the service process, flexibility of the service process, control over the service delivery process, and limiting the risk during the delivery of service play a significant role. According to the study's findings, online

service providers should concentrate on how customers perceive the service delivery method and features. This study demonstrates how the use of disruptive technology advancements, such as artificial intelligence, can improve the customer journey process and gain competitive advantages. This study demonstrates how customer satisfaction and future service provider use intentions are affected by perceptions of the service process in AI-based e-service delivery. Since the service delivery process is just as essential as the service outcomes, managers may employ the research findings to transform their service offerings more process-centric. Brick-and-mortar establishments, both organised and unorganised, account for a sizable portion of India's retail market. This study will enable service providers to concentrate on certain elements of AI-based e-SDS from the viewpoints of the process and customers. Perceived usefulness typically has to do with the employment of AI features in website design. The control a customer perceives they have over the e-SDS in comparison to a traditional retail experience is known as perceived control. Perceived risk addresses the danger connected to the face-to-screen nature of e-service environments, i.e., environments without human contact. This study demonstrates how a service provider's website's usefulness, level of control, and risk have an impact on customers' attitudes (satisfaction or dissatisfaction). Service providers should concentrate on enhancing the value of websites, integrating more customer control over the process such as convenience of time, and minimising risk including privacy, security, etc. by using artificial intelligence in the delivery mechanism as technology is constantly evolving.

## 6 Conclusion, limitations and future study's scope

This work advances our knowledge of how attitudes and intentions for service providers are affected by views of the service process in an AI-based e-SDS. The theoretical understanding of all five service process perception constructs has wider uses for service, and it has been discovered that the importance given to each perception construct varies depending on the stage of service delivery and the context of the e-service in question. This deviation indicates that the categories of online service environments may have an impact on how customers perceive various process features. To set themselves apart from other service providers, service providers must satisfy these customer's perceptions of the service process in their SDS.

The findings imply that attitude has a mediated influence (completely and partially) on the association between the service process perceptions in digital platforms based on artificial intelligence and intention to utilise service providers. Three service process perceptions, perceived usefulness, perception of control, and perceived risk are associated with intention through attitude (full mediation), while attitude only partially mediates the relationship for the other two service process perceptions, perceived ease of use and perceived flexibility (Bodet, 2008; Rucker et al., 2011). When customers believe that a particular service provider's online service process is useful, simple, flexible, under their control, and risk-free, they will develop favourable intentions towards that provider.

This study has several restrictions. These results may not apply to other e-service environments, such as online banking or e-GOV services, which need to be explored. Due to the sample's exclusivity to Indian e-tail buyers, this study may not be generalisable. It is necessary to evaluate the mediating effects of perceived control and usefulness on the effects of reported ease of use and, separately, perceived flexibility

towards intention. Future studies should examine whether these conclusions hold in various e-service environments. Additionally, similar research can be conducted by expanding the framework of the current study to include additional constructs related to service process perception. Regarding the view of the e-SDS process, additional research is required in other nations. To generalise the findings of this study in various e-service scenarios, further study is required. Future studies can also be conducted with gender-specific samples because male and female clients may have different perceptions of the service process. By dividing up the consumer base based on gender, service managers will be better able to customise their services to each individual. Future studies can also use asymmetric methods such as fuzzy-set qualitative comparative analysis (fsQCA) to validate this outcome.

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