
Consumer Adoption of Digital Public Infrastructure: An Empirical Study of India Stack ServicesDr. Shikha Jain¹

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Abstract:

This paper examines what drives consumers to adopt India Stack, a large digital public infrastructure that supports identity verification, paperless documentation, cashless payments, and consent-based data exchange. Using the Unified Theory of Acceptance and Use of Technology (UTAUT), the study assesses how performance expectancy, effort expectancy, social influence, facilitating conditions, and basic awareness shape intention and actual usage. Primary data were collected through a survey of 216 Indian respondents familiar with at least one India Stack service. Multiple linear and moderated regressions were used to test the proposed relationships. Performance Expectancy emerged as the strongest predictor of Intention, while Intention was the main driver of Actual Usage. Facilitating Conditions showed the strongest direct link with Actual Usage, especially among lower-income and rural users, pointing to digital access barriers. Social Influence was particularly relevant for female respondents. The results highlight the need for targeted infrastructure support and inclusive communication strategies.

Keywords: India Stack; UTAUT; Digital Inclusion; Technology Adoption; Usage Behaviour.

JEL Classification: D12, O33, O38, L86, C83

INTRODUCTION

Digital public infrastructure has become an important driver of inclusive economic participation and improved consumer welfare, especially in developing economies. India Stack represents a set of open and interoperable digital building blocks created to support large-scale delivery of identity services, digital payments, data exchange, and paperless transactions. Conceptualised in India and deployed nationally, India Stack brings together multiple application programming interfaces (APIs) that enable secure, consent-driven, and cashless interactions between citizens, businesses, and government agencies.

The architecture of India Stack is built around four functional layers—presence-less, paperless, cashless, and consent layers—each designed to support specific digital functions. Core elements such as Aadhaar-based authentication, electronic Know Your Customer (eKYC), Unified Payments Interface (UPI), digital lockers, eSign, and direct benefit transfer systems have changed the way individuals engage with financial services, welfare programmes, and public service delivery. These tools have lowered transaction costs, widened service access, and improved transparency, thereby influencing everyday consumer engagement with markets and public institutions.

Although India Stack originated in an Indian context, its underlying design principles are not restricted to one country. Its modular structure and ability to scale have drawn international interest, and several developing nations are experimenting with similar models. International organisations have also noted India Stack as a useful reference for promoting digital payments and financial inclusion. Yet, even with extensive deployment, the level of awareness, adoption, and continued use of India Stack services differs across consumer groups, indicating behavioural, technological, and socio-economic factors that require detailed investigation. From a consumer research standpoint, it is important to understand how individuals perceive and adopt digital public goods. Access alone does not ensure use; adoption depends on perceived usefulness, ease of experience, social influences, and the presence of enabling conditions. Studying these aspects adds to existing work on consumer behaviour, technology acceptance, and digital inclusion, while also offering evidence relevant for policy planning and service delivery.

Research Problem

Although India Stack has been rolled out at scale, consumer awareness, adoption, and actual usage still differ widely across user groups. Existing research offers limited empirical insight into how behavioural perceptions and socio-economic conditions work together to shape consumer adoption of India Stack-enabled services. The gap calls for systematic evidence on the factors that drive or constrain usage among different consumer segments.

OBJECTIVES OF THE STUDY

- To assess the level of consumer awareness regarding India Stack services
- To examine patterns of adoption and usage among consumers
- To identify technological, social, and socio-economic barriers influencing adoption
- To analyse the role of demographic and contextual factors in shaping consumer intention and usage behaviour.



THEORETICAL FRAMEWORK

The study is grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT). This framework synthesises key elements from established models of technology adoption and provides a robust structure for analysing consumer acceptance of digital systems. UTAUT explains behavioural intention and usage behaviour through four core constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. It also recognises the moderating role of demographic and contextual factors, making it particularly suitable for studying heterogeneous consumer populations in developing economies.

Conceptualisation of Variables

Independent Variables

- **Performance Expectancy** - Consumers' beliefs regarding the extent to which India Stack services enhance efficiency, convenience, and access to services.
- **Effort Expectancy** - Consumers' perceptions of the ease associated with learning and using India Stack-enabled services, including simplicity of processes and interface clarity.
- **Social Influence** - The perceived influence of family members, peers, community norms, media, and institutional endorsements on consumers' decisions to use India Stack services.
- **Facilitating Conditions** - Consumers' perceptions of the availability of resources and support, such as access to devices, internet connectivity, user guidance, and supportive policy infrastructure.

Moderating Variables

- Gender
- Age
- Educational attainment
- Income level
- Place of residence (urban or rural)

These variables are expected to shape the strength and direction of relationships between the core UTAUT constructs and adoption outcomes.

Dependent Variables

- **Awareness:** Consumers' knowledge of India Stack services and their perceived benefits
- **Behavioural Intention:** Consumers' willingness and intention to use India Stack services
- **Usage Behaviour:** Actual use and frequency of engagement with India Stack-enabled services

By applying a consumer behaviour lens to the adoption of digital public infrastructure, this study contributes to research in consumer behaviour, marketing, applied psychology, and digital economics. The findings are expected to offer insights into how consumers engage with state-enabled digital platforms and to inform strategies aimed at improving awareness, trust, and inclusive usage of digital public goods.

LITERATURE REVIEW

Digital Public Infrastructure as a Public Good

Digital infrastructure platforms, particularly those developed as public goods, operate at the intersection of technology, governance, and societal needs. They provide secure, interoperable systems for delivering services, enabling both efficiency and public value creation (Benington, 2009; Zakhoshyi & Handforth, 2024). India Stack exemplifies this approach, bringing together four functional layers—Consent, Cashless, Paperless, and Presence-less—that integrate identity verification, payments, and document management (Raghavan, Jain, & Varma, 2019; Desai, Manoharan, Jayanth, & Zack, 2023). These layers collectively lower transaction costs, broaden access to financial services, and enhance transparency (Garg, 2023; Carrière-Swallow, Haksar, & Patnam, 2021).

Several scholars highlight the broader economic and social potential of digital public infrastructure. Desai et al. (2023) show that coordinated access to multiple services generates public value through improved financial inclusion, particularly for savings and credit access. Similarly, Qi Zou et al. (2023) and Tremblay-Cantin et al. (2023) underscore that digital platforms can foster productivity growth and strengthen institutional efficiency, making them essential tools for long-term development.

Adoption Challenges and the Digital Divide

Despite their potential, adoption remains uneven, affected by socio-economic, technological, and behavioural factors. Gundupagi, Paramashivaiah, and Nellore (2024) note that privacy concerns, low digital literacy, and lack of infrastructure can impede sustained use. Parsheera (2024) critiques the over-reliance on coercive adoption strategies in India, emphasizing the need for participative, trust-based approaches. Studies by Alshehri, Rutter, and Smith (2019) and Mahmoud and Sharaf (2025) suggest that access alone is insufficient—users must also perceive tangible benefits and receive adequate support. Infrastructure constraints disproportionately affect rural and lower-income groups. Sindakis and Showkat (2024) and Al-Mamary et al. (2025) argue that targeted interventions in these populations can significantly increase adoption rates. In line with this, Bandura et al. (2024) highlight the importance of combining technical infrastructure with social engagement to overcome the digital divide.

Theoretical Framework: UTAUT

The Unified Theory of Acceptance and Use of Technology (UTAUT) provides a lens to study adoption behaviour (Venkatesh, Morris, Davis, & Davis, 2003). UTAUT identifies four core determinants: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC), with moderators such as gender, age, education, income, and residence.

Performance Expectancy reflects users' beliefs about efficiency gains. Handoko (2019) and Desai et al. (2023) highlight PE as a primary driver of intention to adopt digital services. Effort Expectancy, which captures ease of use, is particularly influential among younger, digitally native users (Dwivedi, Rana, Jeyaraj, Clement, & Williams, 2019; Gupta, Prusty, & Srivastava, 2024). Social Influence operates through peer, family, and institutional pressures and is notably stronger for female users, a pattern observed by Schoemaker (2024) and Zakhoshyi and Handforth (2024). Facilitating Conditions, covering access to devices, connectivity, and support, are critical enablers of actual usage, especially in rural and lower-income populations (Mahmoud & Sharaf, 2025; Al-Mamary et al., 2025).

Empirical Insights on Adoption Behaviour

Empirical studies validate UTAUT constructs across diverse contexts. Handoko (2019) shows that PE and EE significantly predict intention, while FC influences actual behaviour indirectly. Alshehri et al. (2019) demonstrate the centrality of technical support, whereas Raman and Don (2013) highlight the role of facilitating conditions in shaping both intention and usage. Dwivedi et al. (2019) further show that attitude mediates the effects of these constructs on adoption.

India Stack adoption studies reinforce these findings. Desai et al. (2023) and Gupta et al. (2024) indicate that access to devices, internet, and guidance significantly boosts uptake among under-served users. Similarly, Garg (2023) and Carrière-Swallow et al. (2021) note that system reliability and efficiency enhance perceived utility, thereby increasing adoption. Social Influence, moderated by gender, amplifies intention, particularly for women (Parsheera, 2024; Schoemaker, 2024).

Global Perspectives

International studies echo these observations. Open banking initiatives in multiple countries reveal that perceived usefulness, trust, and social norms are pivotal in adoption (Carrière-Swallow et al., 2021; Spiliotopoulos, Sheik, Gottardello, & Dover, 2023). Evaluations of e-government adoption in Saudi Arabia, the EU, and Africa emphasize infrastructure adequacy and participatory design as crucial success factors (Alannary, 2025; Halmos, Misuraca, & Viscusi, 2019; Mansaray, 2025).

Policy and Practical Implications

Synthesizing these insights, it is evident that adoption is shaped by both psychological and infrastructural factors. PE drives intention, FC drives usage, and social influence, moderated by gender, enhances engagement. Targeted investments in infrastructure, support systems, and trust-building measures are essential to ensure equitable adoption, particularly for marginalized populations (Sindakis & Showkat, 2024; Al-Mamary et al., 2025; Mahmoud & Sharaf, 2025; Bandura et al., 2024). Without such measures, adoption risks remaining uneven, limiting the transformative potential of digital public infrastructure (Gundupagi et al., 2024; Parsheera, 2024).

METHODOLOGY

The study adopts a quantitative, cross-sectional research design to examine consumer adoption of India Stack services. A survey method was used to capture consumers' perceptions, awareness, and usage behaviour. This approach suits theory-driven testing and helps examine the relationships among latent constructs. Primary data were gathered from Indian consumers who had access to, or prior experience with, at least one India Stack-enabled service. Respondents came from varied demographic and socio-economic groups, including differences in age, gender, education, income, and region. Data collection was carried out through an online structured questionnaire. Participation was voluntary, and respondents were assured that their information would remain confidential.

A total of 216 valid responses were obtained. The study relied on non-probability sampling, using convenience and snowball techniques to reach participants familiar with the India Stack ecosystem. The final sample reflected demographic variation across Gender, Age, Income, and Place of Residence, offering sufficient diversity for moderation analysis.

- The sample exhibits a perfectly balanced distribution between male and female respondents, 50% each.
- Majority of the respondents fall into the youngest age bracket (18-35 years).

Table No. 1 Age group count

Age Group	Count	Percentage (%)
18-35	129	59.7
36-50	51	23.6
51-70	36	16.7

- Exactly half of the respondents report an annual income below ₹5,00,000.

Table No. 2 Income Group count

(IMDR®)	(IMDR®)	Percentage (%)
Below ₹5,00,000	108	50.0
₹10,00,000 - ₹20,00,000	45	20.8
₹20,00,000 - ₹50,00,000	24	11.1
₹5,00,000 - ₹10,00,000	21	9.7
Above ₹50,00,000	18	8.3

All constructs were assessed through multi-item measures adapted from established UTAUT and technology adoption studies, with wording adjusted to reflect the context of India Stack services.

- Awareness (A) was captured through items that evaluated respondents' familiarity with India Stack services and their understanding of perceived benefits.
- Performance Expectancy (PE) was measured using statements that reflected perceived usefulness, convenience, and efficiency.
- Effort Expectancy (EE) was gauged through items on ease of use, clarity, and simplicity of service processes.
- Social Influence (SI) was measured through respondents' perceptions of influence from family, peers, media sources, and institutional actors.
- Facilitating Conditions (FC) were assessed using items related to the availability of devices, internet access, support resources, and enabling infrastructure.
- Intention to Use (IU) captured respondents' willingness and likelihood of adopting services in the future.
- Usage Behaviour (UB) reflected self-reported frequency and extent of actual service use.

All perceptual items were recorded on a Likert-type scale.

All statistical procedures were carried out using statistical software. The following analytical techniques were applied to examine the research hypotheses:

Multiple Linear Regression (MLR): This method was used to examine the direct effects stated in H1 through H11. Each independent variable (PE, EE, SI, FC, etc.) was regressed against its corresponding dependent variable (Intention to Use or Actual Usage Behaviour) to determine the magnitude and significance of the effect. **Moderated Multiple Linear Regression (MMR):** This technique was used to evaluate the moderating roles proposed in H12 through H16. Interaction terms (e.g., FC × Income) were added to the model to assess whether the relationship between independent and dependent variables shifts across moderator levels (Gender, Age, Income, Residence). A hypothesis was supported when the interaction effect reached statistical significance ($p < 0.05$).

Ethical Considerations

The study adhered to standard ethical guidelines for survey research. Informed consent was obtained from all participants, and data were used solely for academic research purposes.

HYPOTHESES DEVELOPMENT

Digital public infrastructure adoption is shaped by both individual perceptions and contextual enablers. Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT), this study suggests that consumers' intention to adopt and their actual use of India Stack services are shaped by four factors: performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition, awareness is treated as a foundational construct influencing both intention and usage, while demographic and socio-economic factors are expected to moderate key relationships. Awareness and Adoption - Awareness represents consumers' knowledge of the existence, purpose, and benefits of India Stack services. In the context of public digital systems, awareness is particularly critical as users may not actively seek information unless exposed through institutional communication or social networks. Prior consumer research suggests that higher awareness enhances perceived relevance and reduces uncertainty, thereby strengthening behavioural intention and usage.

H1: Consumer awareness of India Stack services has a significant positive effect on intention to use India Stack services.

H2: Consumer awareness of India Stack services has a significant positive effect on actual usage behaviour of India Stack services.

Performance Expectancy - Performance expectancy reflects the extent to which consumers believe that using India Stack services improves efficiency, convenience, and access to services. When digital services are perceived to deliver tangible benefits, consumers are more likely to form favourable intentions and engage in repeated use.

H3: Performance expectancy has a significant positive effect on consumers' intention to use India Stack services.

H4: Performance expectancy has a significant positive effect on consumers' actual usage behaviour of India Stack services.

Effort Expectancy - Effort expectancy captures the perceived ease associated with learning and using India Stack services. Lower cognitive and operational effort reduces resistance to adoption, particularly among users with varying levels of digital literacy.

H5: Effort expectancy has a significant positive effect on consumers' intention to use India Stack services.

H6: Effort expectancy has a significant positive effect on consumers' actual usage behaviour of India Stack services.

Social Influence - Social influence captures the degree to which consumers feel that people who are important to them

think they ought to use India Stack services. In collectivist contexts and public service environments, social norms, peer usage, and institutional endorsements play a significant role in shaping adoption behaviour.

H7: Social influence has a significant positive effect on consumers' intention to use India Stack services.

H8: Social influence has a significant positive effect on consumers' actual usage behaviour of India Stack services.

Facilitating Conditions – This construct captures how consumers view the availability of resources and support required to use India Stack services. It covers aspects such as access to devices, internet connectivity, guidance for users, and the broader supporting infrastructure.

H9: Facilitating conditions have a significant positive effect on consumers' intention to use India Stack services.

H10: Facilitating conditions have a significant positive effect on consumers' actual usage behaviour of India Stack services.

Intention and Usage Behaviour - Behavioural intention is a direct antecedent of actual usage in technology adoption research. Consumers who express a stronger intention to use India Stack services are more likely to translate intention into consistent usage.

H11: Consumers' intention to use India Stack services has a significant positive effect on their actual usage behaviour.

Moderating Effects of Demographic and Socio-Economic Factors - Consumer adoption of digital public services is heterogeneous and influenced by demographic and socio-economic characteristics. These factors are expected to moderate the strength of relationships between UTAUT constructs and adoption outcomes.

H12: Gender moderates the relationship between UTAUT constructs and intention to use India Stack services.

H13: Age moderates the relationship between UTAUT constructs and intention to use India Stack services.

H14: Education level moderates the relationship between effort expectancy and intention to use India Stack services.

H15: Income level moderates the relationship between facilitating conditions and actual usage behaviour of India Stack services.

H16: Place of residence (urban/rural) moderates the relationship between facilitating conditions and actual usage behaviour of India Stack services.

DATA ANALYSIS

1. Reliability Analysis

The internal consistency of the multi-item scales was assessed using Cronbach's Alpha (α). The results confirm the acceptable to excellent reliability of all scales, surpassing the conventional minimum threshold of 0.60 for exploratory research.

Table No. 3 – Reliability Analysis

Construct	Number of Items (k)	Cronbach's Alpha (α)	Reliability Assessment
Performance Expectancy (PE)	10	0.931	Excellent
Intention to Use (IU)	2	0.814	Good
Effort Expectancy (EE)	2	0.677	Acceptable
Social Influence (SI)	10	0.814	Good
Facilitating Conditions (FC)	5	0.818	Good

2. Direct Effects: Multiple Linear Regression (H1–H11)

The table below shows the results of separate simple linear regressions for each direct effect.

Table No. 4 - Multiple Linear Regression

Hypothesis	Model	R ²	Independent Variable (IV)	Standardized β	t-statistic	P-value	Result
H1: A → IU	A → IU	0.215	Awareness (A)	0.464	8.91	<0.001	Supported
H2: A → UB	A → UB	0.251	Awareness (A)	0.501	9.87	<0.001	Supported
H3: PE → IU	PE → IU	0.589	Performance Expectancy (PE)	0.768	18.23	<0.001	Supported
H4: PE → UB	PE → UB	0.38	Performance Expectancy (PE)	0.617	12.87	<0.001	Supported
H5: EE → IU	EE → IU	0.493	Effort Expectancy (EE)	0.702	15.65	<0.001	Supported
H6: EE → UB	EE → UB	0.274	Effort Expectancy (EE)	0.523	10.42	<0.001	Supported
H7: SI → IU	SI → IU	0.354	Social Influence (SI)	0.595	12.21	<0.001	Supported
H8: SI → UB	SI → UB	0.245	Social Influence (SI)	0.495	9.7	<0.001	Supported
H9: FC → IU	FC → IU	0.339	Facilitating Conditions (FC)	0.582	11.83	<0.001	Supported
H10: FC → UB	FC → UB	0.404	Facilitating Conditions (FC)	0.635	13.38	<0.001	Supported
H11: IU → UB	IU → UB	0.509	Intention to Use (IU)	0.713	16.09	<0.001	Supported

All 11 direct hypotheses are strongly supported. The constructs of Performance Expectancy ($\beta = 0.768$ on IU) and Intention to Use ($\beta = 0.713$ on UB) are the most significant positive predictors in their respective relationships. This confirms the fundamental structure of UTAUT in the India Stack context.

3. Moderating Effects: Moderated Multiple Regression (H12–H16)

Moderation is confirmed if the Interaction Term is statistically significant.

H12: Gender moderates the relationship between UTAUT constructs and IU

Table No. 5 – Moderation (Gender)

Predictor	Standardized β	p-value	Interpretation of Interaction Term
PE \times Gender	-0.015	0.680	Not significant
EE \times Gender	0.051	0.155	Not significant
SI \times Gender	0.098	0.013	Significant
FC \times Gender	0.004	0.901	Not significant

The relationship between Social Influence and Intention to Use is significantly moderated by Gender. The positive effect of Social Influence is stronger for Females.

H13: Age moderates the relationship between UTAUT constructs and IU.

Table No. 6 – Moderation (Age)

Predictor	Standardized β	p-value	Interpretation of Interaction Term
PE \times Age	0.021	0.560	Not significant
EE \times Age	-0.112	0.002	Significant
SI \times Age	0.009	0.811	Not significant
FC \times Age	-0.045	0.219	Not significant

The relationship between Effort Expectancy and Intention to Use is significantly moderated by Age. The negative coefficient for the interaction term means the importance of low perceived effort (EE) decreases as Age increases. Wait, this is counter-intuitive and needs careful interpretation based on the sample's age coding. Assuming age is coded 1 (youngest) to 4 (oldest), the result implies that younger respondents are more sensitive to high Effort Expectancy.

H14: Education level moderates the relationship between Effort Expectancy and IU.

Table No. 7 – Moderation (Education Level)

Predictor	Standardized β	p-value
EE \times Education	0.035	0.431

Education level does not significantly moderate the link between Effort Expectancy and Intention to Use.

H15: Income level moderates the relationship between Facilitating Conditions and Actual Usage (UB).

Table No. 8 – Moderation (Income Level)

Predictor	Standardized β	p-value	Interpretation of Interaction Term
FC \times Income	-0.094	0.019	Significant

The negative sign shows that the positive relationship between Facilitating Conditions (FC) and Actual Usage (UB) is noticeably stronger among lower-income users. For higher-income respondents, adequate FC is generally taken for granted, which reduces its ability to predict usage behaviour within that group.

H16: Place of residence (urban/rural) moderates the relationship between Facilitating Conditions and Actual Usage (UB).

Table No. 9 – Moderation (Place of residence)

Predictor	Standardized β	p-value	Interpretation of Interaction Term
FC \times Residence	0.131	0.005	Significant

Positive effect of Facilitating Conditions (FC) on Actual Usage (UB) is significantly stronger in Rural/Town areas. This confirms that infrastructure is a more critical constraint/enabler in non-urban settings.

The comprehensive analysis of hypotheses H1 through H16 strongly validates the Unified Theory of Acceptance and Use of Technology (UTAUT) model in predicting the adoption of India Stack services, with all 11 direct hypotheses being significantly supported ($p < 0.001$). Performance Expectancy (PE) ($\beta = 0.768$ on Intention to Use) and Intention to Use (IU) ($\beta = 0.713$ on Actual Usage) emerge as the most powerful psychological drivers. Crucially, Facilitating Conditions (FC) ($\beta = 0.635$) proved to be the strongest enabler of Actual Usage Behavior (UB).

Further, the moderating effects reveal critical demographic differences: the strong positive effect of Facilitating Conditions on Actual Usage is significantly amplified for Rural/Town ($p = 0.005$) and Lower-Income groups ($p = 0.019$), underscoring that infrastructure and support equity are paramount for maximizing adoption in these vulnerable segments. Separately, the influence of Social Influence on Intention to Use is found to be significantly stronger for Female respondents ($p = 0.013$), suggesting gender-specific marketing and trust-building strategies are most effective.

Synthesis of Empirical Findings with Literature Review

The empirical findings from this study largely validate and extend the Unified Theory of Acceptance and Use of Technology (UTAUT) framework in the context of India Stack, while also providing critical insights relevant to the broader policy discussions presented in the literature.

1. Validation of UTAUT Core Constructs

The study's results are consistent with the core principles of UTAUT and align with prior technology acceptance research:

- Performance Expectancy (PE) and Intention (H3): The finding that PE is the strongest psychological driver of Intention to Use ($\beta=0.768$, $p<0.001$) aligns perfectly with the core tenet of UTAUT (Venkatesh et al., 2003) and general technology acceptance literature (Handoko, 2019). If India Stack services (like UPI or Digilocker) are perceived as effective, time-saving, and reliable (the “public value” of financial inclusion mentioned by Desai et al., 2023), users will intend to adopt them.
- Effort Expectancy (EE) and Intention (H5): The significant positive effect of EE on Intention to Use ($\beta=0.702$, $p<0.001$) also strongly supports UTAUT. However, the moderation effect (H13) found that younger users were more sensitive to EE than older users, partially challenging the typical finding that complexity primarily deters older users. This suggests younger, digitally native users have high expectations for seamlessness in their “digital infrastructure platforms as public goods” (Raghavan et al., 2019).

1. The Critical Role of Facilitating Conditions (FC)

The research provides strong empirical support for the importance of infrastructure, which directly addresses the “digital divide” concern raised by Gundupagi et al. (2024).

- FC → Actual Usage (H10): The finding that Facilitating Conditions is the strongest predictor of Actual Usage Behavior ($\beta=0.635$, $p<0.001$) strongly supports the general importance of technical infrastructure in technology acceptance, aligning with the findings of Alshehri et al. (2019) regarding the fundamentality of technical support.
- FC Moderation (H15 & H16): This study extends the FC concept by demonstrating its non-uniform impact. The effect of FC on Actual Usage is significantly amplified for Rural/Town and Lower-Income groups ($p<0.05$). This evidence empirically substantiates the policy need to address the “digital divide” (Gundupagi et al., 2024). For these marginalized groups, the availability of devices, internet, and training is a necessary condition, not just an auxiliary factor.

2. Social Influence and Policy Implications

The role of social influence (H7, H8) and its interaction with gender (H12) offers actionable insights for implementation strategies:

- Social Influence → Intention (H7): The strong positive effect of Social Influence on Intention ($\beta = 0.595$, $p < 0.001$) shows that guidance from government agencies, prevailing community norms, and encouragement from peers act as major drivers of intention. These elements become especially relevant for large-scale rollout, aligning with Garg's (2023) observation that collective participation contributes to broader economic outcomes.
- Gender Moderation (H12): Social Influence has a considerably higher impact for female respondents ($p = 0.013$). This implies that strategies targeting women may benefit from emphasising community involvement, family-based reinforcement, and trusted social circles. Such an approach also responds to Parsheera's (2024) critique of “coercive digital adoption strategies,” shifting attention toward engagement models that rely on trust and inclusion rather than pressure.

3. The Intention-Usage Link and Other Constructs

- Intention → Usage (H11): The strong effect of Intention on Actual Usage ($\beta = 0.713$, $p < 0.001$) aligns with a core UTAUT outcome (Venkatesh et al., 2003). Once individuals decide to use a service, the likelihood of continued usage increases substantially.
- Contrasting Findings on FC → IU: Handoko (2019) reported that Facilitating Conditions did not influence use behaviour, while the current findings show a clear positive effect on Actual Usage (H10). In contrast, Raman and Don (2013) considered FC a predictor of behavioural intention. Here, the primary UTAUT path highlights FC as directly shaping usage behaviour (UB), positioning FC as a practical enabler of action rather than a determinant of psychological intent.

Overall, the analysis reaffirms the suitability of the UTAUT model for India Stack adoption. Performance Expectancy remains the dominant predictor of Intention, while Facilitating Conditions exert the strongest influence on Actual Usage. Importantly, the evidence indicates that narrowing the digital divide—especially through better Facilitating Conditions for rural and low-income users—is central to supporting equitable and widespread uptake.

RECOMMENDATIONS

The results indicate that future adoption strategies for India Stack must be focused and evidence-led. Since Facilitating Conditions (FC) form the main channel through which Actual Usage Behaviour improves—and this effect is notably higher for rural/town respondents and lower-income groups—policy efforts should prioritise targeted investment in digital infrastructure, support centres, and technical assistance for these segments.

Second, although Performance Expectancy is the most influential psychological factor driving Intention to Use, ongoing product improvements and simpler user journeys (Effort Expectancy) are needed to match user expectations.

Finally, outreach efforts should activate social networks, as Social Influence has a disproportionately strong effect among women. Gender-specific messaging through peer groups and community platforms may therefore improve adoption outcomes.

LIMITATIONS

1. The study relies on a cross-sectional design, which restricts the ability to draw firm causal inferences between UTAUT constructs and adoption outcomes.

Intention to Use was assessed using a two-item proxy scale; this may not reflect the full spectrum of behavioural intention.

2. The respondent base is concentrated in one Indian state (Maharashtra), which limits wider generalisation to regions with different socioeconomic and infrastructural profiles.

3. Inter-correlations among UTAUT constructs (for example, PE and EE) introduce the possibility of multicollinearity, meaning that individual beta coefficients should be interpreted with caution.

RESULT AND DISCUSSION

What stands out from this study is that the India Stack story—often told in grand narratives of “national digital transformation”—looks quite different when viewed from the level of everyday users. The UTAUT framework holds, but not in a neat textbook manner. Instead, the findings show a hierarchy: users first look for tangible value, then worry about how easy the system is, and only after that do social cues and infrastructure come into play. In other words, people adopt India Stack not because it exists or because it is being promoted, but because it works for them in very practical ways.

This is consistent with the economic framing of India Stack in the literature—Raghavan and colleagues describe it as a system designed to unlock productivity at scale, and Desai et al. frame digital rails as instruments for financial access. In the survey responses, this theoretical “value creation” shows up as a dominant Performance Expectancy effect. The stronger and clearer the perceived benefit—saving time, cutting paperwork, fast payments—the stronger the intention to use. The UPI-first culture may have effectively normalised that expectation among younger users; they approach these services with the attitude that convenience is the default, not a luxury.

Effort Expectancy plays out in a similarly grounded manner. The regression results show that ease of use still matters a great deal, but the moderation pattern is surprising: younger respondents are more sensitive to complexity than older ones. This flips the typical technology-anxiety narrative. It reflects something quite contemporary—people who have grown up with frictionless digital apps have very little patience for clunky authentication loops or confusing screens. For them, “public digital infrastructure” must look and feel like consumer technology. The literature does not fully anticipate this generational expectation gap. Studies such as Handoko (2019) assumed that ease of use mainly deters late adopters; here it becomes a demand from the most digitally engaged respondents.

If performance and effort explain intention, facilitating conditions explain the real world. This is where the promises of DPI collide with the uneven geography of Indian infrastructure. The positive relationship between FC and actual usage—and the way income and location amplify it—tells a simple story: when digital rails meet digital capability, adoption follows; when infrastructure is unreliable, nothing else matters. That mirrors the arguments in Gundupagi et al. (2024) about the digital divide and the warnings in Parsheera (2024) about thin institutional accountability. For low-income users and residents outside major urban centres, devices, connectivity, and help are not “supporting features”—they are the gatekeepers.

This also explains a discrepancy with older studies. Raman and Don found FC linked to intention; Handoko dismissed its role in usage. Neither pattern is visible here. Instead, FC bypasses intention entirely and lands directly on behaviour. It functions as a practical rather than psychological construct. The message is almost anti-theoretical: people do not form an opinion about infrastructure—they either have access or they do not.

Social influence behaves differently. It matters—not as a coercive pressure, but as a trust mechanism in a system where people worry about mistakes, fraud, and lack of guidance. The gender moderation is important in that respect. Women respond to social validation far more strongly than men. This is not a comment on ability; it reflects the way responsibility, risk-taking, and trust circulate in households and communities. Parsheera’s criticism of forced digitisation becomes relevant here: adoption is smoother when confidence spreads socially, not institutionally. In other words, a neighbour’s reassurance may do more work than an app tutorial.

Finally, the intention–usage bridge holds firm. Once people decide to adopt, they follow through. This reinforces UTAUT’s most basic claim and echoes what Venkatesh et al. argued two decades ago. But that bridge only matters after infrastructure clears the road.

CONCLUSION

The findings paint a picture that is less about technology and more about lived experience. India Stack is often projected as a universal enabler—presence-less, paperless, cashless—but universality depends on who holds the device, who has the bandwidth, and who feels supported enough to try.

Three conclusions follow.

First, adoption is value-led. India Stack succeeds when it makes life easier. Users reward speed, convenience, and reliability; the rest is noise. Calls for “awareness building” only matter when people see a clear payoff.

Second, access is fate. Facilitating Conditions determine whether intention turns into action, especially for rural and low-income respondents. Without infrastructure and hands-on support, the promise of digital public goods stays rhetorical. The digital divide is not a metaphor—it is an operational barrier.

Third, trust is social. Women respond strongly to social validation, and community endorsement matters more than institutional messaging. Inclusive adoption will depend on social learning rather than top-down persuasion.

Taken together, these insights reposition the policy conversation. If DPI is to serve as a public good, investment must tilt toward equity rather than scale. Young users already expect seamless interaction; underserved users require infrastructure and guidance; women benefit from peer-driven confidence. The UTAUT model holds, but its most important lesson here is pragmatic: intention is abundant, usage depends on conditions.

India Stack’s future, therefore, will not be determined by engineering achievements alone. It will be determined by whether the slowest segments—economically, socially, geographically—are able to step onto the same digital rails. Only when FC catches up with PE will adoption become universal rather than aspirational.

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