

Measurement of E-Commerce Determinants of Usage Intention through Structural Equation Modelling

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Abstract

This Study investigates the factors that influence the intention to use e-commerce in the context of components drawn from the intentional use model, theory of planned behavior, and technology acceptance model. The Scholar collected data from a field study in some regions of Telangana, India. For this purpose, a structural equation modelling (SEM) analysis was performed using SMART PLS. Questionnaires were adopted from the final study, and a non-probabilistic qualitative sampling method was used to obtain information. This study ensured the usefulness of the data before conducting path analysis and bootstrapping. The results of this study show that the existing TPB constructs emerged as the primary determinants of the e-commerce intention of consumers in Telangana. However, ease of use and usefulness are not as important as the TAM model variables. The study recommends that e-commerce advocates create an environment that allows consumers to build trust, feel secure in transactions, and be exposed to informative campaigns promoting e-commerce. These initiatives will go a long way in addressing the key variables influencing consumer attitudes towards e-commerce and encouraging better usage behavior among consumers.

Key Words: TPB, TAM, E-commerce, Usage Intention, SEM Analysis

1. Introduction

Today's e-commerce offers consumers unparalleled convenience, allowing them to purchase goods and services at any time, and from; anywhere. Additionally, the ability to easily compare prices improves access and enables competition among companies selling goods. E-commerce offers business opportunities with many potential customers, affordable e-commerce cost structures, and enables data analysis for tailored marketing strategies. It is important to note that, accelerates innovation, increases efficiency, and boosts economies worldwide (Bedaduri & Mamilla, 2024a; HAJI, 2021). Many factors determine users' thoughts about participating in e-commerce activities, user engagement, and satisfaction. The TPB and TAM models related to e-commerce include perceived control, perceived ease of use, perceived usefulness, attitude toward e-commerce, and subjective norms, which are generally the influencing factors (Bedaduri & Mamilla, 2024b; Junaid-ur-Rehman, 2022). Attitudes toward e-commerce, perceived control, and subjective norms affect online purchase behaviors and intentions (Roudposhti et al., 2018; Xiao et al., 2019).

By integrating TPB with TAM (Fig. 1), one can see the different aspects that encourage a person to use an application. According to TPB, the intention to purchase goods and services online is influenced by numerous factors, including a person's attitude, the social norms surrounding them, and the beliefs they have about their to perform the task (Kobylińska, 2022; Nugroho et al., 2020a). The ease of use adopted from the TAM Model, e-commerce users will accept it for usage (Bedaduri & Mamilla, 2024b; Junaid-ur-Rehman, 2022). The TPB and TAM combination of the model investigation helps to better understand user experience. E-commerce practices are more attractive to many user groups (Gupta & Rathore, 2021; Hassan et al., 2024).

Additionally, e-commerce users perceive ease of use and perceive usefulness to enhance their intention to use (Junaid-ur-Rehman, 2022). Scholar needs to better understand, how these factors are connected. This will improve e-commerce practices and encourage and more users to use them (Glavee-Geo et al., 2017; Sharma et al., 2023). The present investigation explores TAM and TPB factors that support significant outcome for e-commerce usage and consumer intentions (Jibril et al., 2024; Migiba and Mxotwa, 2024).

Telangana has improved its chances of success and overcome obstacles due to the potential benefits of e-commerce (Gupta and Rathore, 2021). Despite the increasing accessibility of the Internet and the increasing integration of e-commerce into daily life in many parts of the world, where users actively use smartphones to fulfil their online orders, local businesses remain dominant. Local businesses face challenges when expanding globally, primarily due to several obstacles hindering their adoption (Junaid-ur-Rehman 2022; Kasim et al. 2024; Sarfraz et al. 2022). Rates are primarily influenced by a country's digital literacy and logistical infrastructure, with secondary factors such as trust in online transactions and socioeconomic disparities. However, the adoption of e-commerce varies by region. This is due to both differences in infrastructure (Africans consistently face higher mobile data costs than their counterparts worldwide) and levels of digital literacy, with some Arab markets lagging behind the global average. Scholars such as Chen et al. (2022) and Kulathunga et al. (2020) have highlighted the importance of acceptance. Due to their different characteristics, further regional differences could emerge, justifying the need for differentiated policies to address access constraints and promote widespread acceptance.

The current study investigates e-commerce users intention to use or regularly engage in the e-commerce applications (Ndonga, 2012; Roudposhti et al., 2018). This study aims to determine consumers usage intention based on TPB and TAM factors. The study outcome helps policymakers and stakeholders with actionable perceptions of e-commerce applications for accessibility and drives development in Telangana. Gupta and Rathore, (2021); Liang and Li, (2022) examined how attitudes, perceived control, and subjective norms impact e-commerce usage consumer intentions in Telangana, India. Additionally, the perceived ease of use, usefulness, and impact on e-commerce usage intention. This TPB and TAM components are closed to understanding of the e-commerce usage intention in the digital world (Dionysiou et al., 2021; Villa et al., 2018). Other variables covered in the literature include attitude, perceived control, ease of use, and subjective norms, but these are limited to the Telangana context (Aggarwal & Kapoor, 2021; Junaid-ur-Rehman, 2022). Furthermore, no study has examined the integration of TPB and TAM to understand behavioral intentions in Telangana, India (Hsu & Chang, 2013; Lee, 2009; V. Sharma

et al., 2024). By bridging this gap, researchers will be able to provide comprehensive answers to the study's questions and achieve the following positive results: As community acceptance of e-commerce is a critical factor in the success of e-commerce, this study will be of immense value to researchers as it will help them gain insights that are helpful in promoting the adoption of e-commerce by local businesses and customers (Ghandour, 2015; Lee, 2009).

Research Objectives

- To understand the influence of TPB components, including attitudes, subjective norms, and perceived behavioral control, on consumers' intentions in Telangana to engage in e-commerce.
- To examine the connections between the TAM components (perceived ease of use and perceived usefulness) and the intention to engage in e-commerce.
- To recommend to key stakeholders for the betterment of ecommerce usage intention enhancement.

The study's outcome will help policymakers achieve greater e-commerce accessibility and growth in Telangana's unique socio-economic context.

2. Review of literature

The TPB and TAM were used to analyse the intentions to use e-commerce. It examines how the three TPB components predict the intention to engage in e-commerce (YU, 2012). Additionally, this study also examined the connection between TAM variables, namely perceived ease of use and perceived usefulness, and e-commerce behavior (Fedorko et al., 2018; Hsu & Chang, 2013). In this study, to understand the relationship between e-commerce usage and these influencing factors. Consequently, this study provides valuable insights into the determinants of e-commerce behaviour, enhancing our understanding of consumer objectives and offering the formulation of more effective strategies for engaging users in online marketplaces.

2.1. Attitude toward e-commerce usage intention.

Juliana and Djakasaputra (2021) found that the perceived benefits of online transactions positively increased users' behavioral intentions. Sometimes, consumers think it is beneficial to shop online but then resort to and continue using e-commerce systems. Positive perceptions of online purchasing experiences and website transactions influence usage intentions (Ajzen, 1991; Ajzen & Fishbein, 1975). These attitudes, in turn, may be determined by perceptions regarding the benefits and effectiveness of purchasing products via the Internet, which may affect the initial adoption of this modality and the tendency to adopt it later (Nugroho et al., 2020b). Therefore, knowing what constitutes positive beliefs regarding online shopping may be important for stimulating consumers' interest in Internet purchasing and improving consumer satisfaction (Hauff et al., 2024; Jahng et al., 2007).

2.2. Subjective norms for e-commerce usage behavior and intention.

Subjective norms influence consumer intentions because consumers respond to perceived advice from trusted or influential individuals (Ajzen & Fishbein, 1975). The existing literature shows that friend and family recommendations positively influence the intention to purchase products online (Lim et al., 2016a). Hussein et al. (2020) found that social influence affects the adoption of e-

commerce technology, and perceived norms, such as positive feedback from family members, influence online shopping (Dionysiou et al., 2021; Makame et al., 2014b). Perceived behavioral control stems from various sources and subjective norms, with influences from loved ones positively impacting buying intentions. Therefore, social validation activists adopt e-commerce practices. The influence of friends, family, peer members, and colleagues significantly impacts online purchasing intentions (Nugroho et al., 2020b). Additionally, the present study demonstrates that social media and online reviews, acting as normative influences, significantly influence customers' e-commerce behavior. These studies show that customers shop online when their partners do (Xiao et al., 2019).

2.3. Perceived control over e-commerce usage behaviors and intentions.

In TPB, the group assumes that users' intentions to make online purchases are related to their perceived behavioral controls when using the Internet for transactions (Ajzen, 1991). These perceptions include time-use ideas, personal intentions, and self-efficacy. According to researchers (Fitriani et al., 2023), the perception of e-business is an important factor that influencing user behavior. This implies that users have positive intentions toward e-commerce when the perceived transaction times appear short and easy. According to Petko (2012), believing that a person has the tools, information, and skills necessary to work a digital environment increases purpose (Aggarwal & Kapoor, 2021). According to Nugroho et al. (2020b), the levels of perceived control, usefulness, and ease of use of the Internet positively influence perceived behavioral control and business people's engagement in online transactions. It is adopted for the convenience of consumers and their preferences. This convenience is facilitated by the availability of the Internet and mobile access. It transforms to the necessitating the usage intention (Lim et al., 2016b; Zielke & Komor, 2025). E-commerce preferences enhance ease of use, perceived control, resources, and perceived effectiveness (Ramadania et al., 2019; Sarfraz et al., 2022; Xiao et al., 2019). It is an important factor in understanding e-commerce usage intention (Naruetharadhol et al., 2022).

2.4. The perceived ease of use to perceived usefulness.

Jahng et al. (2007) and Lee (2009), investigation results show that, e-commerce perceived ease of use positively significantly influences on perceived usefulness. The study's outcome revealed that; the use of the Internet facilitates the ease of e-commerce application usage. This will enhance the positively perceived usefulness of the technology (Chen et al., 2022; Jovanovic et al., 2020). This effect is based on decision-making when using technology, which requires less working memory to achieve results. For example, if users said that e-commerce platforms were transparent, simple to understand, and straightforward to manipulate, they would perceive them as more beneficial (Fedorko et al., 2018; Roudposhti et al., 2018). Further empirical data are provided to confirm that lower cognitive demand and more control lead to a higher status of perceived usefulness of technology. Consequently, the level of usability of e-commerce determines the user's attitude towards its application, as increased perceived usefulness arises from ease of use and user-friendly interfaces.

2.5. The perceived ease of e-commerce usage patterns and intentions.

According to another study by Hsu and Chang (2013), the perceived ease of the product type under consideration has a direct and significant relationship with consumers' usage intention. Scholar has

proven that the complexity of e-commerce platforms and their ease of navigation drive traffic and usage (Lee, 2009; V. Sharma et al., 2024). Research has revealed positive relationships between various factors, including clear interaction, ease of performing tasks, low mental processing demand, and overall ease of using technology, and the level of e-commerce engagement. As an expert in this field, it is important to consider how the mere integration of an application can have positive overtones to its accessibility and its daily use (Fedorko et al., 2018; Mero (Jarvinen), 2018a; Zhou & Fan, 2019). Usability-related feature should be prioritized for future e-commerce development. This plays a crucial role in achieving these objectives, as it fosters long-term patronage and user satisfaction. Therefore, it is crucial to have a clear understanding of and enhance the perceived ease of use to raise awareness about e-commerce and influence behavioral choices.

2.6. Perceived usefulness of e-commerce usage behavior and intentions.

According to TAM, perceived usefulness influences users' attitudes toward e-commerce and their behavioral intentions to adopt the technology. Hsu and Chang (2013) found that users are highly interested in e-commerce transactions when they feel that e-commerce companies reduce costs and time and increase efficiency. This highlights the importance of perceived usefulness, including factors such as time and cost, in influencing e-commerce usage intention. Other researchers have confirmed this by showing that users have higher behavioral intentions because they believe that e-commerce is more convenient and cheaper than traditional shopping (Hassan, et al., 2024). Therefore, perceived usefulness is considered an ideal predictor of users' behavioral intentions toward e-commerce. This highlights the need to remind customers of the expected benefits of e-commerce practices and campaigns through marketing.

2.7. The relationship between perceived ease of use, perceived usefulness, and intention to use e-commerce

Perceived ease of use refers to the degree to which a person believes that using a particular system is effortless. Previous research generally confirms that perceived ease of use increases perceived usefulness and leads people to perceive interactions with user-friendly systems as beneficial (Fedorko et al., 2018; Hsu & Chang, 2013). For example, users will see the benefits of e-commerce platforms if they can easily understand and mentally process the information. Furthermore, the scholar found that usability influences users' behavioral intentions on e-commerce platforms. Research shows that when users perceive an e-commerce system as simple to use and able to complete tasks with minimal effort, their perceived intention toward the system increases (Makame et al., 2014a; Mutua et al., 2013). Thus, while a relationship is demonstrated between PEOU and PU, the former also influences and shapes the latter's behavioral intentions, reinforcing the importance of user-centered design in improving e-commerce usage (Hassan, et al., 2024). Therefore, it is important to focus on minimizing complexity rather than increasing online shopping usage.

Although some attempts have been made to address this issue, a geographical and empirical gap remains in the literature regarding the correlation between variables and their appropriateness in Telangana, India. A literature review examines previous research to gain insights and understand

needs, ultimately leading to hypothesis development. The scholar plans to expand our understanding of the relationship between key variables and use insights from previous studies to improve hypothesis development. The literature review findings indicate that; emerging investigations on e-commerce user’s intentions are determinants. The current study aims to examine empirical data to provide an in-depth and valid outcome in the context of Telangana, India.

2.8. Hypotheses

The TPB and TAM are components that explore the e-commerce usage intention (Junaid-ur-Rehman, 2022). According to the TPB Model, independent components such as attitude, subjective norms, and perceived behavioral control are highly relevant factors that influence behavioral intention. Additionally, The TAM Model components also support the measurement of intention. Based on this, the following hypothesis is proposed:

- H1: Attitude significantly positively influences the intention to use e-commerce.
- H2: Subjective norms have a positively impact e-commerce usage and intentions.
- H3: Perceived control positively influences the intention to use e-commerce.
- H4: Perceived ease of use has positively affects perceived usefulness.
- H5: E-commerce usage intention is positively correlated with perceived ease of use.
- H6: Perceived usefulness has positively influences e-commerce usage intention.
- H7: Perceived ease of use has a positive relationship with perceived usefulness, boosting users' intention to participate in e-commerce.

The current study investigates the TPB and TAM theoretical components persuading e-commerce consumer usage intentions in Telangana, India. The mixed theoretical model outcomes are improve practical strategies for e-commerce innovation and implementation in Telangana (Hassan, et al., 2024). The seven hypotheses formulated in this study help to understand the intention of consumers.

2.9. Research Framework

Past investigations have linked the TPB and TAM Model components for measuring e-commerce use and behavioral intention (Hawlitshchek and Hodapp, 2024; Neves et al., 2025; Junaid-ur-Rehman, 2022; Lee, 2009; Nugroho et al., 2024).

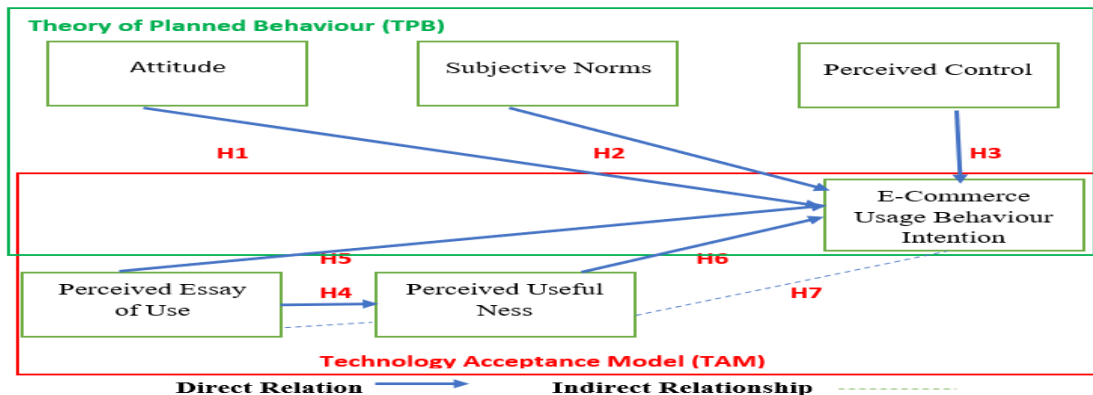


Figure 1: Research Framework Integrating to TPB and TAM Theories

The Indian literature also conforms to the e-commerce usage behavior and intention measurement on the TPB and TAM model components (Hsu and Chang, 2013; Hassan et al., 2024). The literature-supported framework is illustrated in Figure 1.

The formulated research conceptual model enhances our understanding of how variables interact and influence consumer intention and behavior in the evolving digital market (Junaid-ur-Rehman, 2022). This approach provides insights into the direct and indirect effects of intention. The SEM helps to understand the complex relationships between attitudes, subjective norms, and other factors affecting e-commerce intentions. Combining the TPB and TAM models helps us better understand the e-commerce usage intention (Afshar et al., 2020; Junaid-ur-Rehman, 2022).

3. Methodology

The current study adopted a descriptive approach for an in-depth investigation. This study converged on survey study design, sampling, data collection, and statistical analysis (Bedaduri & Pradhan, 2023). Structured questionnaires were used to assess the theoretical components, enabling quantitative analysis. Statistical analysis of the collected data ensured a clear understanding of these results. This methodology ensured a detailed investigation and accurate results, effectively meeting the primary objectives of the study.

3.1. Questionnaire and Measurement Adoption

The scholars used a methodical questionnaire survey to collect primary data from the e-commerce users. The survey instruments are divided into two subsections: like demographics and adopted theoretical components, namely attitudes, subjective norms, perceived behavioral control, ease of use, utility, and behavioral intention (Junaid-ur-Rehman, 2022; Makame et al., 2014a; Roudposhti et al., 2018). These constructs were measured using 20 items derived from previous studies on TPB and TAM. These components were measured using a 5-point Likert scale. A quasi-experimental design is currently being considered for data collection and sample size determination (Hsu & Chang, 2013).

3.2. Sampling and sample size

The survey was conducted according to the guidelines of Hair et al. (2019), with a sample size of 200 respondents (1:10 ratio). Additionally, the target group of 20 (10 percent of 200 sample size) respondents to minimise the possibility of data errors. Finally, the sample size of the data collected was 220 respondents. The study survey adopted convenience sampling and selected cities in Telangana, such as Karimnagar, Warangal, and Hyderabad. The stratified random sampling method was for the respondents' consideration of the study. Primary data were collected using a semi-administrative approach. The primary data collection was planned at two levels, pilot study and a final study for the analysis. The pilot study considering 22 respondents (10 percent of the estimated sample size). The final study considered a sample size of 220 for the measurement of the formulated hypothesis.

3.3. Data Collection and Validation

Primary data were collected in two stages for this study. Initially, BPO and KPO employees were considered as respondents for the pilot study. The pilot study included 22 respondents for primary

data collection from August to September 2024 in Hyderabad. Finally, the questionnaire was distributed to 220 employees employed in private organizations and professions such as BPOs and KPOs from Selected areas in January to March 2025. The scholar personally conducted surveys at restaurants, retail centers, and workplaces in the selected Telangana cities (Hsu & Chang, 2013). Secondary data collected were from the published research articles in peer-reviewed national and international journals. The published articles were retrieved from Journal, website, and Google scholar.

3.4.Data Validity

The collected primary and secondary data were validated for the conformation of the furthered study. The pilot study initially validated whether the 22 respondents fully answered the data validity analysis. After conforming the answers to all questions, the primary data measured Cronbach's alpha validity using SPSS-27. All the items of the variables met the threshold value of 0.7 Cronbach's alpha value, conforming that the adopted structured questionnaire supported to the final study in the selected areas. In the Final study, 220 questionnaires were distributed to respondents, but due to the tight schedule, 12 respondents did not answer fully; they answered only the demographic profile summary. The scholar also eliminated nine deemed negligent answers because they provided undistinguished answers to multiple questions. The scholar ultimately used 199 useful and reliably completed questionnaires for the statistical analysis (Hair et al., 2020).

3.5.Statistical Applications.

The scholar used Cronbach's alpha validity analysis for primary data analysis using SPSS-27 version. In the final study, data were collected, initial screening was performed using MS-Excel, and validity and reliability, path analysis, structure equation model (SEM) fit analysis, and bootstrapping analysis for hypothesis testing were measured using SMART-PLS.

4. Analysis

The scholar conducted a thorough analysis to achieve the research objectives related to e-collaborative usage and behavioral intentions. The researcher began the study by constructing a sociodemographic profile of the respondents to gain a deeper understanding of the target population. The researcher used a measurement model to support the initial dataset, which helped determine the reliability and validity of the constructs used. The researcher then conducted a path analysis to understand the relationships between the variables in e-commerce usage intention. n. This study provides a detailed description of this model. The researcher used bootstrapping as the final step to ensure the validity and robustness of the hypothesis testing. Such organizational analysis enabled detailed engagement with the data, which increased the credibility of this research (Vărzaru et al., 2021).

4.1.Demographic Profile Summary

The demographic distribution of respondents in Table 1 shows the range of variations and notable distribution by category of respondents. According to Vărzaru, Constantin, Bradu, and Vatat (2021), 57.53% of the 199 subjects were male, while 42.47% are female. Regarding marital status, 62.31% of the subjects were married, 26.13% are single, and only 11.56% were divorced.

The level of education tends to be higher: 42.71% of respondents hold a university degree, 38.19% possess education beyond a university degree, and only 8.04% possess an SSC. The employment status shows that more people are employed (43.22%) than unemployed (37.19%) and self-employed (19.60%).

Table-1: Respondent Socio Demographic Profile Summary

Category	Total respondents	Percent of the Respondents
Gender		
Male	111	55.78
Female	88	44.22
Marital Status		
Single	52	26.13
Married	124	62.31
Widow/Diverse	23	11.56
Education		
SSC	16	8.04
Intermediate	22	11.06
Degree	85	42.71
Above Degree	76	38.19
Employment		
Un Employed	74	37.19
Employed	86	43.22
Self-Employed	39	19.60
Social Status		
SC	17	8.54
ST	48	24.12
BC	52	26.13
OC	63	31.66
Not to say	19	9.55
Religion		
Hindhu	68	34.17
Cristan	51	25.63
Muslim	37	18.59
Not to say	43	21.61
City Place		
Karimnagar	45	22.61
Warangal	56	28.14
Hyderabad	98	49.25

Regarding caste/tribe, 31.66% of respondents are OC, 26.13% are BC, 24.12% are ST, 8.54% are SC, and 9.55% do not reveal their caste/tribe. 34.17%, represented Hindu, Christians followed closely, accounting for 25.63% of the total. Muslims, ranked third, accounting for 18.59% of the total. However, what caught the eye was the 21.61% who chose to keep their faith a secret and not reveal anything.

Most of the respondents, 49.25%, came from Hyderabad, 28.14% from Warangal, and 22.61% from Karimnagar. The displayed displays a simple random distribution based on gender, education, and employment status, with a high concentration of participants from Hyderabad.

Because of this feature, the study's results are sufficient to generalize the current status and trends of e-commerce usage and the factors influencing it based on the specified user groups.

4.2. Validity and Reliability

The scholar employed a measurement model based on conceptual model 1. The measurement model evaluates the validity and reliability of the collected primary data on e-commerce consumer behavioral intention in e-commerce usage. The analysis included outer loadings, construct reliability, discriminant validity, HTMT Ratios, and the variance inflation factor (VIF) (Hair et al., 2020; Al-Emran et al., 2019). These assessments strengthened data robustness, enabling an accurate path model analysis. This methodological approach established a foundation for identifying selected TPB and TAM model key factors influencing behavioral intention in e-commerce usage, supported by the primary data collected.

4.2.1. Outer loading

The study in Table 2 examined people's plans to use e-commerce by looking at attitudes, plans to use e-commerce, perceived control, perceived ease of use, perceived usefulness, and subjective norms (Junaid-ur-Rehman, 2022; Lee, 2009).

Table-2: Measurement Model Outer Loading Analysis

	Attitude	Behaviour Intention	Perceived Control	Perceived Essay of Use	Perceived Useful Ness	Subjective Norms
ECA_1	0.893					
ECA_2	0.870					
ECA_3	0.907					
ECA_4	0.907					
ECBI_1		0.93				
ECBI_2		0.919				
ECBI_3		0.924				
ECPC_1			0.939			
ECPC_2			0.911			
ECPC_3			0.943			
ECPEU_1				0.910		
ECPEU_2				0.897		
ECPEU_3				0.903		
ECPEU_4				0.924		
ECPUN_1					0.909	
ECPUN_2					0.883	
ECPUN_3					0.919	
ECSN_1						0.803
ECSN_2						0.836
ECSN_3						0.807

Attitude (ECA) items exhibit loadings between 0.87 and 0.907, indicating strong validity. The E-commerce Usage Behavior Intention (ECBI) items ranged from 0.919 to 0.93, ensuring reliability. Perceived Control (ECPC) shows 0.911–0.943, enhancing dependability (Hair et al., 2011). Perceived Ease of Use (ECPEU) and Perceived Usefulness (ECPUN) ranged from 0.897–0.924 and 0.883–0.919, respectively. Subjective Norms (ECSN) loadings (0.803–0.836) demonstrated acceptable validity (Al-Emran et al., 2019). Outer loadings confirm that construct validity meets

the 0.7 threshold for all measurement points, and validity is accepted based on the outer loading criterion (Hair et al., 2019). This is more stringent than other standards, to provide satisfactory results in further analysis.

4.2.2. Construct Reliability and Validity

Construct reliability and validity are crucial when examining e-commerce using behaviour and intention. The reliability of six constructs-attitude, e-commerce usage intention, perceived control, perceived usefulness, perceived ease of use, and subjective norms-was assessed using Cronbach's alpha, rho_A, composite reliability, and average variance extracted (AVE) (Hair et al., 2020).

Table-3: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Attitude	0.916	0.917	0.941	0.800
E-Commerce Usage Behaviour Intention	0.915	0.917	0.946	0.855
Perceived Control	0.923	0.923	0.952	0.867
Perceived Useful Ness	0.888	0.89	0.93	0.817
Perceived Essay of Use	0.93	0.931	0.95	0.825
Subjective Norms	0.758	0.780	0.856	0.665

The quantitative analysis (Table 3) shows high reliability and validity, with Cronbach's alpha between 0.85 and 0.97 and rho_A values between 0.86 and 0.97. All the values met the threshold value, and the outcome confirmed the reliability of the constructs for further analysis (Hare et al., 2019).

4.2.3. Discriminant Validity Analysis

This study evaluates the formal Luker and HTMT Ratio validity and reliability of constructs related to e-commerce usage behavior and intentions using discriminant analysis (Hair et al., 2017), adhering to Fornell and Larcker's (1981) criterion. The square root of the AVE for each construct outperformed the correlation coefficients between the constructs.

Table-4: Discriminate Validity and HTMT

Construct	Attitude	Behaviour Intention	Perceived Control	Perceived Essay of Use	Perceived Useful Ness	Subjective Norms
Fornel Looker Criteria						
Attitude	0.894					
Behaviour Intention	0.824	0.925				
Perceived Control	0.806	0.789	0.931			
Perceived Essay of Use	0.796	0.720	0.705	0.909		
Perceived Useful Ness	0.331	0.316	0.307	0.275	0.904	
Subjective Norms	0.688	0.717	0.73	0.591	0.303	0.816
HTMT						
Attitude						
Behaviour Intention	0.899					
Perceived Control	0.875	0.858				
Perceived Essay of Use	0.862	0.778	0.760			
Perceived Useful Ness	0.367	0.348	0.338	0.301		
Subjective Norms	0.776	0.820	0.802	0.66	0.353	

Table-4 study analyzed TPB and TAM constructs, including consumer attitude (AVE: 0.894), e-commerce usage behavior intention (0.925), perceived control (0.931), perceived ease of use (0.909), perceived usefulness (0.904), and subjective norms (0.816).

All the constructs secured HTMT Ratio values below 0.9, supporting the threshold value (Hair et al., 2020). According to Hair et al. (2017), the discriminant and HTMT Values criterion was used to ensure the distinctiveness of the construct and strengthen its validity for a reliable analysis.

4.2.4. Collinearity VIF Analysis

The Telangana ECA VIF (collinearity) values in Table 5 ranged from 2.475 to 3.507, indicating moderate multicollinearity. ECPEU and ECBI showed higher VIF values, requiring attention, while ECSN exhibited the least multicollinearity.

Table-5: Collinearity VIF Analysis

S. No	Item	VIF Value	S. No	Item	VIF Value
1	ECA_1	2.977	11	ECPEU_1	3.689
2	ECA_2	2.475	12	ECPEU_2	3.245
3	ECA_3	3.348	13	ECPEU_3	3.091
4	ECA_4	3.251	14	ECPEU_4	4.262
5	ECBI_1	3.507	15	ECPUN_1	2.893
6	ECBI_2	3.106	16	ECPUN_2	2.195
7	ECBI_3	3.067	17	ECPUN_3	2.937
8	ECPC_1	4.173	18	ECSN_1	1.229
9	ECPC_2	2.808	19	ECSN_2	2.384
10	ECPC_3	4.314	20	ECSN_3	2.252

VIF thresholds below 5 ensured discriminant validity. Reliability and validity were confirmed through Cronbach's alpha, AVE, HTMT ratios, and SEM techniques (Bedaduri & Mamilla, 2024b).

ECA VIF values ranged from 2.475 to 3.507, indicating moderate multicollinearity. ECPEU and ECBI showed higher VIF values, requiring attention, while ECSN exhibited the least multicollinearity. VIF thresholds below 5 ensured discriminant validity. Reliability and validity were confirmed using through Cronbach's Alpha, AVE, and HTMT ratios for conducting SEM techniques (Hair et al., 2017; Hassan, et al., 2024).

4.3. Path and Bootstrapping Analysis

To examine the hypothesis, the scholar analyzed the relationship between model fitting and bootstrapping. It assists in achieving the objectives, addressing the research objectives, questions, and bridging the research gap.

4.3.1. Path Analysis

The study conducted path analysis (Figure 2) to examine predictors of e-commerce usage behavioral intention after validating data reliability (Hair et al., 2020). The results (Table 6) show that attitude significantly influences behavioral intention (path coefficient 0.405), supported by an R-squared of 0.746. Following the validation of data reliability (Hair et al., 2020), the study

conducted path analysis (Figure 2) to investigate the predictors of e-commerce usage behavioural intention.

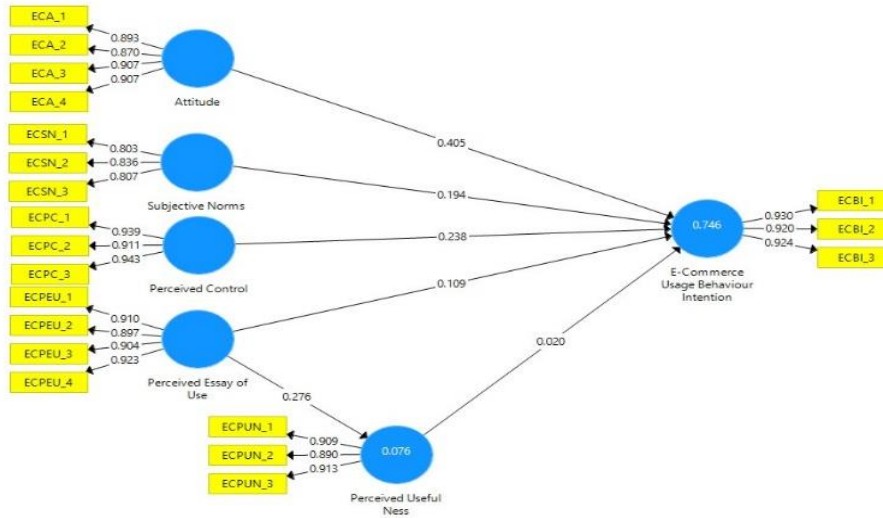


Figure 2: Path Model Measurements

The results in Table 6 show that attitude significantly influences behavioural intention (path coefficient 0.405), supported by an R-squared of 0.746.

Table 6: Path Model

	Perceived Useful Ness	Behaviour Intention	R Square	R Square Adjusted
Attitude		0.405		
Behaviour Intention			0.746	0.739
Perceived Control		0.238		
Perceived Essay of Use	0.276	0.109		
Perceived Useful Ness		0.020	0.76	0.72
Subjective Norms		0.194		

The results show the central role of attitude and highlight the need to integrate various factors when designing e-commerce strategies and engaging consumers (Hsu & Chang, 2013).

4.3.2. Bootstrapping

The current study (Figure. 3) examines the intentions of e-commerce usage behaviour based on several hypotheses (Hsu & Chang, 2013). The Table 7 results revealed that, Direct and Specific indirect relationship measurement with SMART-PLS bootstrapping. Based on the Figure 1, Hypothesis 1 to Hypothesis 6 are measuring direct relationship and hypothesis 7 measuring the indirect relationship in table 7.

Hypothesis 1 (H1) shows that Attitude to E-Commerce Usage Behaviour Intention positive significantly influences intention ($\beta = 0.405$, $T = 5.49$, $p < 0.001$). The H1 is acceptable. H2 outcome of the Subjective Norms to E-Commerce Usage Behaviour Intention ($\beta = 0.198$, $T = 3.6$, $p = 0.0001$) positively significant, The Hypothesis 2 is accepted. Conversely, Hypothesis 3 (H3)

concludes that Perceived Control to E-Commerce Usage Behaviour Intention has positive significant ($\beta = 0.238$, $T = 3.321$, $p = 0.001$). Based on the results accept the hypothesis 3.

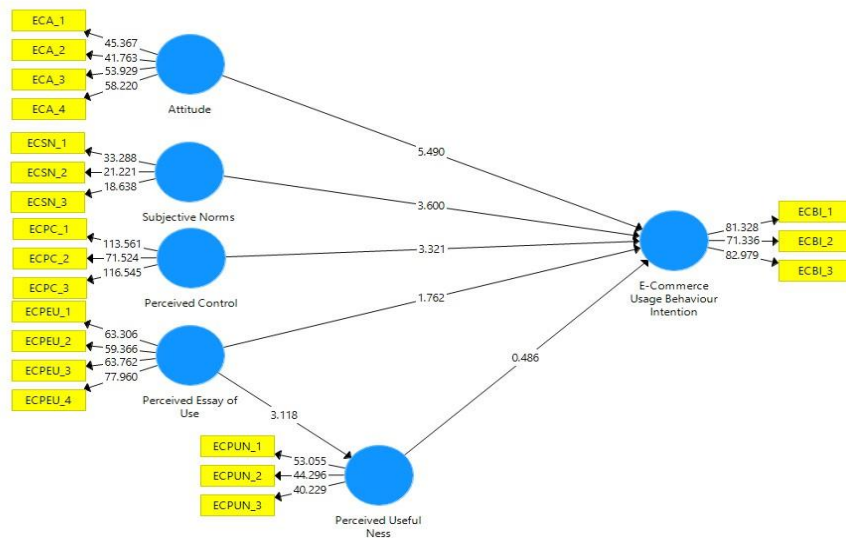


Figure 3: Bootstrapping path Measurements

Hypothesis 4 (H4) supports Perceived Essay of Use to Perceived Useful Ness has a positive effect on perceived usefulness ($\beta = 0.276$, $T = 3.118$, $p = 0.002$). The hypothesis 4 is accepted.

Table-7: Bootstrapping Analysis

Hypothesis	Path	B	STDEV	T Values	P Values	Results
Direct Effect						
H1	Attitude -> E-Commerce Usage Behaviour Intention	0.405	0.074	5.49	0.000	Accept
H2	Subjective Norms -> E-Commerce Usage Behaviour Intention	0.194	0.054	3.6	0.000	Accept
H3	Perceived Control -> E-Commerce Usage Behaviour Intention	0.238	0.072	3.321	0.001	Accept
H4	Perceived Essay of Use -> Perceived Useful Ness	0.276	0.089	3.118	0.002	Accept
H5	Perceived Essay of Use -> E-Commerce Usage Behaviour Intention	0.109	0.062	1.762	0.079	Not Accept
H6	Perceived Useful Ness -> E-Commerce Usage Behaviour Intention	0.02	0.04	0.486	0.627	Not Accept
Specific Indirect Effect						
H7	Perceived Essay of Use -> Perceived Useful Ness -> E-Commerce Usage Behaviour Intention	0.005	0.012	0.468	0.64	Not Accept

However, Hypothesis 5 (H5) Perceived Essay of Use to E-Commerce Usage Behaviour Intention ($\beta = 0.109$, $T = 1.762$, $p < 0.079$), and Hypothesis 6 (H6) Perceived Useful Ness to E-Commerce Usage Behaviour Intention show ($\beta = 0.02$, $T = 0.486$, $p < 0.627$) no significant effects. The Hypothesis 5 and Hypothesis 6 are rejected. The indirect effect of Perceived Essay of Use with

Perceived Useful Ness to E-Commerce Usage Behaviour Intention have ($\beta = 0.005$, $T = 0.468$, $p < 0.64$) negative significance. The hypothesis H7 is rejected.

5. Discussion

The analysis of the data reveals significant insights into factors influencing e-commerce usage behaviour intention. The demographic profile of respondents indicates a predominant male majority (55.78%) with a larger share being married (62.31%). The educational background shows that 42.71% hold a degree, and 43.22% are employed, while social status is fairly distributed among different categories.

The measurement model analysis reveals that all constructs show strong outer loadings, with values exceeding the recommended threshold of 0.7. Specifically, the constructs of attitude, e-commerce usage behavior, intention, perceived control, perceived ease of use, perceived usefulness, and subjective norms all demonstrate satisfactory loading values, ranging from 0.803 to 0.924. These findings suggest high reliability in the measurement model.

Reliability and validity analyses further confirm the robustness of the constructs. The values for Cronbach's Alpha, rho_A, CR, and Average AVE are all above the acceptable ranges for most constructs. The only construct with lower reliability (Cronbach's Alpha = 0.758) and AVE (0.665) is Subjective Norms. The discriminant validity is excellent according to the Fornell-Larcker criterion and the HTMT analysis. All constructs also have excellent divergent and convergent validity (Al-Emran et al., 2019). Collinearity analysis reveals that all VIF values are within acceptable limits, indicating that multicollinearity is not a concern for the model.

Path model analysis shows that attitude and perceived control have significant positive impacts on e-commerce usage behaviour intention, with path coefficients of 0.405 and 0.238, respectively. Conversely, perceived ease of use, perceived usefulness, and subjective norms do not show significant direct effects on e-commerce usage behaviour intention, though perceived ease of use positively affects perceived usefulness (Broome, 2016; Naruetharadhol et al., 2022; Nugroho et al., 2024; Xiao et al., 2019).

5.1. Attitude to e-commerce usage behaviour and intention.

The results show that demographic characteristics influence behavior and intentions to use e-commerce, with male respondents (55.78%), married individuals (62.31%), and those with a college degree or higher (80.9%) having a significant share. The employment status also shows that 43.22% are employed, which is consistent with higher adoption of e-commerce. The path analysis shows a strong relationship between attitudes and behavioral intentions for e-commerce usage ($\beta = 0.405$, $p < 0.001$). This suggests that positive attitudes, such as perceiving online purchases as beneficial and enjoyable, significantly increase intention. However, subjective norms and perceived control also influence behavior, highlighting the multidimensional influence of e-commerce acceptance. These insights guide targeted interventions to improve e-commerce engagement.

5.2. Subjective norms to e-commerce usage behaviour and intention.

The analysis shows significant influences of subjective norms on e-commerce usage behavior intentions, as shown by a positive path coefficient ($\beta = 0.194$, $p < 0.001$). The sociodemographic profile highlights diversity in terms of gender, marital status, education, and employment,

reflecting different consumer experiences. Of particular note are women (44.22%) and professionals (43.22%) who emphasize the importance of social influence in their online purchase intentions. Path analysis shows that subjective norms influence behavioral intentions, suggesting that peer recommendations and societal expectations drive e-commerce engagement. Despite a lower representation in certain population groups—self-employed people (19.6%), the results clearly demonstrate that perceived social acceptance motivates behavioral intentions and reinforces targeted digital strategies.

5.3. Perceived control to e-commerce usage behaviour and intention.

The study offers significant insights into the correlation between Telangana users' perceived control and their e-commerce usage's behavioral intentions, which are shaped by their socio-demographic profiles. The demographic profile analysis provides a useful illustration: male respondents showed slightly higher participation (55.78%) in the survey. Higher education (42.71% with a college degree) and employment status (43.22% employed) are consistent with increasing adoption of e-commerce. The path analysis highlights perceived control as a key factor ($\beta = 0.238$, $T = 3.321$, $p = 0.001$) and confirms that access to resources, skills, and knowledge significantly influences usage intention in e-commerce (Aggarwal & Kapoor, 2021). These results highlight the importance of improving digital literacy and accessibility to promote online transactional behavior across diverse demographic segments.

5.4. Perceived ease of use to Perceived usefulness.

The analysis of the hypothesis on the relationship between Perceived Ease of Use (PEU) and Perceived Usefulness (PU) revealed important findings. While the path coefficient from PEU to PU was positive ($\beta = 0.276$) and statistically significant ($T\text{-value} = 3.118$, $p = 0.002$), the indirect effect of PEU on e-commerce usage behavior intentions via PU was not significant ($p = 0.64$). This suggests that while people who perceive e-commerce as simple to use may find it more useful, this perception does not have a significant impact on their intention to use it. The demographic profile showed that factors such as education and employment status influenced perceptions, with employed individuals associating higher perceived ease of use with perceived usefulness.

5.5. Perceived ease to e-commerce usage behaviour and intention.

Analysing hypothesis H5, which investigates the link between Perceived Ease of Utilise (PEU) and the desire to utilise e-commerce, results reveal something fascinating. Though the path coefficient ($\beta = 0.109$) shows a positively, the outcomes are not statistically significant ($p = 0.079$). The perceived ease of use does not significantly influence the desire to use eCommerce. Demographic factors like education and urban location might affect this outcome, as respondents with varying degrees of technical knowledge would see ease of use differently (Afshar Jalili, Y., & Ghaleh, S., 2020; Aggarwal & Kapoor, 2021). Path analysis supports the theory that, e-commerce behavior is more influenced by attitudes and subjective standards than by any other element.

5.6. Perceived usefulness to e-commerce usage behaviour and intention.

The hypothesis, which examines the relationship between perceived usefulness and e-commerce usage behavior and intention, reveals a weak direct effect. Despite the expectation that perceived

benefits (such as time savings, efficiency, and cost-effectiveness of e-commerce) would fully influence e-commerce use intention, the path model shows an insignificant relationship ($\beta = 0.02$, $p = 0.627$). Demographic characteristics such as education and urban location did not significantly moderate this association, as the path analysis demonstrated. This shows that e-commerce adoption in this sample may not be influenced by perceived usefulness alone. Additional research on other elements, like usability and social influence, may shed more light on e-commerce behavior.

5.7. Perceived ease of use to perceived usefulness, and intention to use e-commerce.

The findings from the demographic profile and path model analysis suggest that the relationship between perceived ease of use, perceived usefulness, and e-commerce use intention is influenced by various factors. The path model shows that perceived ease of use significantly influences perceived usefulness ($\beta = 0.276$, $p = 0.002$), consistent with the expectation that easier interaction with e-commerce platforms improves perceptions of their usefulness. The direct relationship between perceived ease of use and e-commerce use intention, however, is not significant ($\beta = 0.109$, $p = 0.079$), suggesting that while ease of use plays a role in perceived usefulness, its impact on actual use intention is minimal. Demographic profile, particularly education and employment status, could moderate these relationships. Individuals with higher levels of education and higher employment status may find e-commerce more useful and thereby increase their intention to use it. These results underscore the importance of simplifying e-commerce interfaces and highlight their utility in improving user adoption, particularly among educated and working individuals.

The PLS -SEM bootstrapping analysis supports the acceptance of formulated hypotheses H1, H2, H3, and H4 have significant relationships. Additionally, hypotheses H5, H6, and H7 are not significantly supported. The author recommends that based on the study perceived ease of use, perceived usefulness, and their indirect effects do not significantly influence e-commerce usage behaviour intention (Hsu & Chang, 2013; Hassan, et al., 2024).

5.8.Recommendations and Implications

This study offers actionable insights into e-commerce consumers behaviors (Roudposhti et al., 2018). Attitude and perceived control have a significant impact on e-commerce intention, suggesting the need for marketing strategies that expand consumer attitudes highlight the benefits of online shopping (Costa & Rodrigues, 2023; Jahng et al., 2007). Giving consumers a sense of control and resources is also critical. While perceived ease of use and perceived usefulness influence usage behavior, their direct effect is less noticeable. Enterprises should focus on developing value-driven features and user-friendly interfaces to increase e-commerce adoption and improve the overall e-commerce usage level experience (Hsu & Chang, 2013).

5.9.Social Implications

The study outcomes have significant impact social implications and highlight the significance level of subjective norms, influencing e-commerce usage intentions. The consumers choosing e-commerce usages primary objectives like time-saving, efficient transactions, and money saving options. Peer members social influence and ease of use also play a significant role in shaping online purchasing behaviors (Jahng et al., 2007). These findings underscore the need for

policymakers and businesses to focus on improving e-commerce accessibility, promoting digital literacy, and taking social factors into account to promote widespread adoption and ultimately contribute to economic growth and digital empowerment within the communities.

5.10. Managerial Implications

The study outcome impacts several business practices implications in the e-commerce service sector. First, attitudes significantly influence e-commerce usage intentions. The scholar suggesting that managers should focus on shaping positive consumer perceptions and leveraging social influence to e-commerce adoption (Al-Jubari, 2019; Junaid-ur-Rehman, 2022). Additionally, perceived ease of use and perceived usefulness are crucial factors in increasing consumer satisfaction and engagement with e-commerce platforms. Managers and government should prioritize simplifying user interfaces and to increase customer loyalty and online sales. Adapting marketing strategies based on these insights is likely to increase consumer acceptance and engagement in day to day life (Hawlitshchek & Hodapp, 2024, Seidu, et al., 2024).

5.11. Practical Implications

The results suggest several practical implications for improving e-commerce adoption. To increase usage intent, companies should focus on improving attitudes toward online shopping and highlighting its time-saving and cost-effective benefits. Reinforcing subjective norms through the use of peer recommendations can further promote adoption. Additionally, improving perceived ease of use and usefulness can increase customer satisfaction and lead to more online transactions. Providing user-friendly interfaces and ensuring efficient, intuitive online experiences will help increase e-commerce usage (Jahng et al., 2007; Liu et al., 2020; Mero Jarvinen, 2018b). These insights are valuable for businesses and policymakers who want to effectively promote e-commerce engagement.

5.12. Theoretical Implications

In this study the significant influence e-commerce usage on TPB components (attitudes, subjective norms, and perceived control). The study results recommend that positive behaviour issue influencing to online (Hassan, et al., 2024). In addition, although perceived ease of use and perceived usefulness have a significant impact on perceived usefulness, they do not directly influence e-commerce usage intention (Junaid-ur-Rehman, 2022; Lee, 2009). There is a need to understand the resource-based theory and strategic application theory investigation. additionally, stakeholder's theory investigation helpful to the managers decision and practices.

5.13. Researchers Implication

The reliability of subjective norms is somewhat lower than other adopted constructs from the TPB and TAM Model, it meets the acceptable threshold for inclusion but may influence the overall results. Researcher should refine this measurement or conduct further analysis with the specific generation of the consumers. The scholars focusing on private sector employees in Karimnagar, Warangal, and Hyderabad provides valuable insights, but escalating the study to different regions, industries, and occupations could provide a more comprehensive understanding of e-commerce

usage. Future research should consider a longitudinal approach to capture dynamic changes in user behavior and improve the generalizability of the results for policymakers and stakeholders.

6. Conclusions

The aim of this study was to understand consumers' intentions to use e-commerce by incorporating TAM and TPB for enhanced consumer performance. The determinants of intention derived from both TPB and TAM components were examined. Primary data was collected through surveys conducted in selected areas of Telangana, India. The results suggest that TPB components, including attitude, perceived control, and subjective norms, significantly influence e-commerce usage intentions. In contrast, TAM components such as perceived ease of use and perceived usefulness were found to be insignificant, except for the relationship between perceived ease of use and perceived usefulness, which showed positive significance. The results suggest that Telangana consumers' e-commerce usage intentions are primarily predicted by TPB components, without perceived ease of use and perceived usefulness having a significant influence. Factors of e-commerce usage intention, such as digital literacy, internet access, socio-economic differences, and local business infrastructure in Telangana, could significantly influence the perceived ease and usefulness of e-commerce. These factors can influence how different user groups interact with and adopt e-commerce platforms in the region. Improving consumer attitudes and trust is crucial for e-commerce promoters as it directly impacts user adoption and satisfaction. By considering these factors, eCommerce promoters/banks/enterprises can create a more positive user experience, leading to greater engagement and long-term success in the competitive electronic market. These efforts will help address key factors influencing e-commerce usage intentions and drive greater consumer engagement in Telangana.

Declaration

All author confirms that, this has not been submitted earlier to any conference, seminar, or national or international journal. We have no conflict of interest to declare.

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