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The investigation of the key determinants of behaviour of passengers purchasing tickets via online portals and automated ticket vending machines

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Abstract- India has the 2nd fastest growing travel market globally. Of this, the online travel market is growing at the highest pace. In recent years, Indian Government has taken useful steps in this field. They have introduced IRCTC, online portal for ticket purchasing. Also following the trends of other countries India railway has installed several ATVM in the major stations to introduce digitalization for buying local tickets. As digitalization is trying to implement everywhere, but due to different factors some segment of people are not able to cop-up with this modernization. Also, to increase the use of plastic money and e-wallet these digitalized systems should be adapted quickly. So, the primary focus of this research is to evaluate the factors that influence/restrain the consumer behavior for online ticket purchasing & using ATVM for ticket purchasing in India, thus in the following sections we evaluate the Indian scenario related to it. To determine the factors, some market research has been done. For that, questionnaire has been prepared and sample has been selected.
Keywords –: ATVM, online consumer behavior, India, SEM

I.INTRODUCTION

Electronic ticketing over the Internet is a good example of Internet commerce. The aim is to facilitate the buying or reservation of tickets online, thereby making the process more easily accessible and convenient. Through these services tickets may be purchased from any location and at any time, provided an Internet connection exists. Automatic Ticket Vending Machine (ATVM) was introduced by Indian Railways to reduce passengers queuing up at the Ticket counters at the Railway Stations. By implementing these digitalized systems, it would be pretty much beneficial and acceptable for the people. Still there are some more segments of people are there who are yet to adapt those systems. Also there are some new projects for railways where some improved customer-centric technology or system would be more fruitful. The behavior of on-line customers is central to this study, as it is important to understand the mechanics of purchases made via the Internet. One of the major challenges in studying this channel is to grasp how the consumers will act in this environment, as it cannot be taken for granted that they will behave as in the traditional channel.

Technology Acceptance Model is useful to explain the use of Information Technology by users, adopting a causal relationship based on beliefs, perceptions, attitudes, intentions and behavior. Perceived utility and ease of use are the main factors influencing a person's attitude in the use of information systems. These factors might change the user's behavior, generating either positive or negative motivation. India has the 2nd fastest growing travel market globally. Of this, the online travel market is growing at the highest pace. In recent years, Indian Governmenthas taken useful steps in this field.Government managed entity IRCTC was one of the main websites which started offering online ticketing service. Launched in 2002, it had booked merely 27 tickets on the first day of its commencement of e- ticketing service in the country. Now after 14 years of sparkling journey, it has emerged as a largest in the country with more than 13 lakhs booking per day in terms of online ticketing, leaving behind several high-profile ecommerce sites worldwide. The IRCTC comprises 45% of all visitors to travel websites in India and 19% of total Internet audience. After the internet boom, a lot of new players have come into the market. There are sites like MakeMyTrip, Yatra, ClearTrip etc. which have acquired a major chunk of the online ticketing market.

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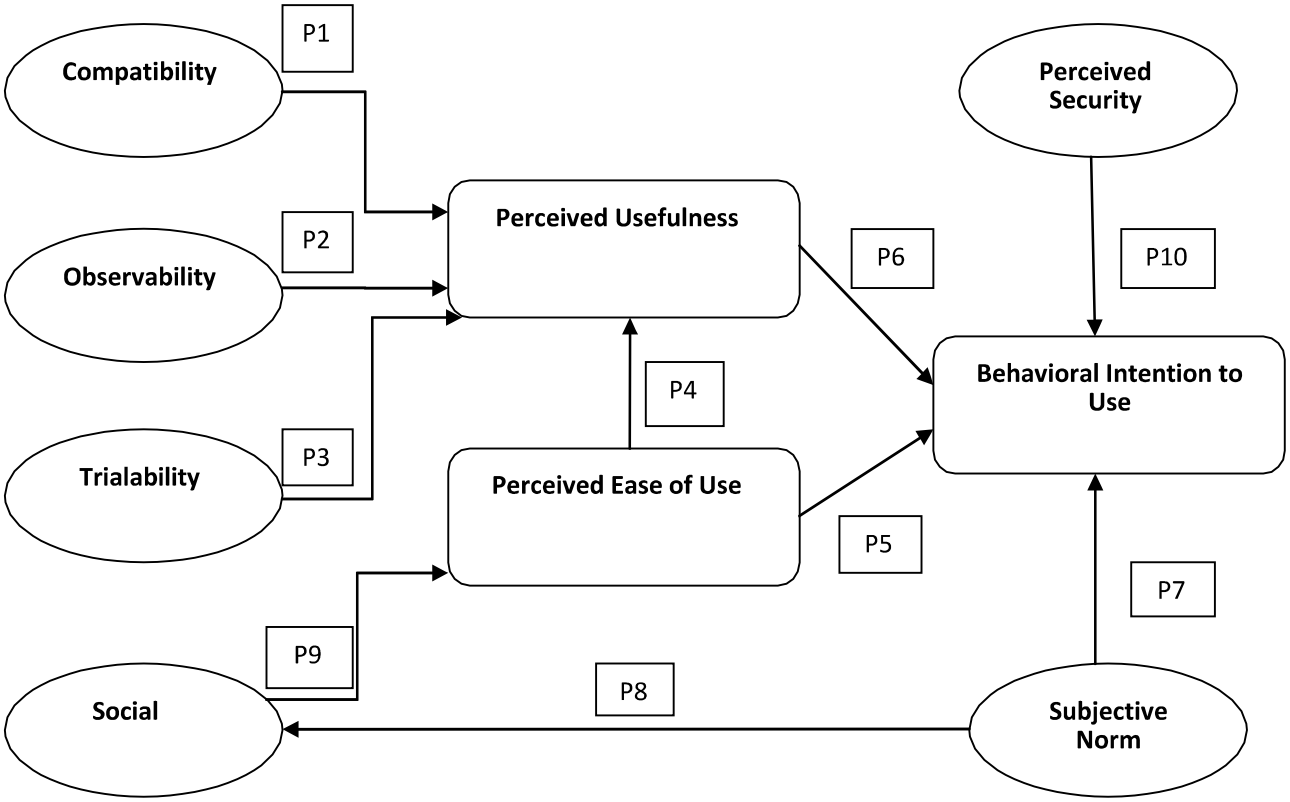
This study uses a theoretical model that integrates relevant components of both TAM and IDT theories. The model is shown in Figure 1 below. The constructs compatibility, trialability and observability are adopted from innovation diffusion theory while the remaining constructs are from the TAM literature. As depicted in Figure 1, three compatibility, trialability and observability, influences consumers' perception of the perceived usefulness and perceived ease of use, which in turn influence consumers' intention to use ATVM machine/online ticketing portal. Further, subjective norms and perceived security affect consumers'intentiontouseATVM machine/online ticketing portalandsubjectivenormsinfluencesocial influence and perceived ease of use whereconsumption pattern influences perceived ease of use. Each of the constructs and relationships shown in Figure 1 is described in more detail below.

II. REVIEW OF LITERATURE

Lee, Hsieh, & Hsu, (2011) states that compatibility refers to the degree to which innovation is regarded as being consistent with the potential end-users' existing values, prior experiences, and needs (Agarwal, (2000) reported a positive relationship between an individual's prior compatible experiences and the new information technology acceptance. They confirmed that the extent of prior experience with similar technologies was positively associated with an information technology use.

Chau & Hu (2001), argued that the effect of compatibility was found to be significant related to perceived usefulness. Later, Wu & Wang (2005) and Change & Tung (2008) found that



compatibility had a significant positive and direct effect on perceived usefulness. Therefore, the following relationship isproposed.

Heidjen (2000)model proposed that perceived utility and ease of use are the main factors influencing a person's attitude in the use of information systems. These factors might change the user's behavior, generating either positive or negative motivation. The user's final behavior therefore determines the success or failure of information system use. The model assumes that all the factors can be measured and are positively associated with the use of the information system, i.e. the 11 more users perceive the utility of the information system, the more they use it, and vice versa. The perceived utility was defined as the expectation a person has about how a particular information system can improve his/her performance.

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(Lee, 2007), found that trialability had a positive effect on the intention to use the system. However, Yang (2007) reported that when the users perceived higher trialability, they also perceived higher levels of usefulness of the system.
Yang (2005) found that perceived ease of use affected the attitude of users towards mobile commerce, coupled with the individual's creativity, past experience, relevant knowledge, technology groups, gender, age, andoccupation.
Hildebrand, (2014) observed that Subjective Norm positively influence intention to use the Internet for purchasing and information management.
Ball, Gaeth, & Jun (2002) contend that 80% of technology purchasers tend to buy technology that is used by others, even at higher cost. Those who have had no prior experience decide to try it on their subjective assessments, which are influenced by social media, family, friends, colleagues, and eventheir leaders .

2.2 Research Objectives:

- To identify major determinants that influence the behaviour of passengers who buy tickets through online portals.
- To identify the major determinants of the behaviour of passengers who use automated ticket vending machines for purchasing journey tickets.
- To collate and evaluate the key factors that determine passengers' behaviour related to buying journey tickets.

III.RESEARCH METHODOLOGY

Conducting customer survey to find out about the major factors leading to their consumption of Automated Ticket Vending Machine & online ticket portal and analyzing those using statistical tools:

1. **Research Study:** Pilot Study
2. **Research Design:** Causality
3. **Research Approach:** Survey approach
4. **Sampling method:** Convenient sampling
5. **Secondary Research:** Research papers, Whitepapers
6. **Primary Research:** Designing Questionnaire, Identifying target users, getting responses from them, finding out the key factors influencing such adoption.

IV. RESULTS AND DISCUSSIONS:

In terms of the SEM analysis, the model was assessed in two steps as recommended by Hair, Ringle and Sarstedt (2011). The first step involves assessing the measurement of outer model fit to determine the reliability and validity of this model. Once the measurement model is assessed to be a good fit with the data, the second step involves assessing the inner or structural model.
Table 1 illustrates the matrix of loadings and cross-loadings of two models with a high degree of significance for each item (average loading > 0.7) on its respective construct. The shaded area shows the cross-loadings of the items with their own construct and un-shaded area shows loadings of the items with the other constructs. As shown in **Table 1**, the item correlations of the respective constructs satisfy this condition, so we conclude that the measurement model demonstrate adequate convergent validity. As presented in **Table 2**, the square root values displayed on the diagonal of the matrix are larger than the correlation values presented in the same row and the same column. Thus, we conclude that there is adequate discriminant validity among the constructs.

Table 1: Matrix of Loadings and Cross Loadings

	CO	OB	TR	PEU	SI	PU	SN	PS	CP	BI	EX
CO1	0.785	0.595	0.712	0.612	0.502	0.666	0.251	0.716	0.586	0.677	0.911
CO2	0.936	0.629	0.723	0.631	0.625	0.798	0.365	0.787	0.712	0.736	0.785
OB1	0.673	0.828	0.534	0.586	0.414	0.686	0.403	0.775	0.576	0.778	0.623
OB2	0.386	0.777	0.597	0.463	0.48	0.468	0.564	0.491	0.456	0.548	0.781
TR1	0.46	0.621	0.729	0.502	0.538	0.542	0.672	0.509	0.518	0.543	0.318
TR2	0.707	0.557	0.811	0.591	0.593	0.612	0.616	0.572	0.643	0.677	0.699

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PEU1	0.525	0.552	0.643	0.783	0.582	0.544	0.317	0.611	0.527	0.576	0.85
PEU2	0.517	0.522	0.601	0.849	0.636	0.577	0.296	0.56	0.654	0.491	0.922
SI1	0.442	0.461	0.687	0.629	0.786	0.528	0.283	0.505	0.55	0.418	0.9
PU1	0.65	0.529	0.633	0.677	0.697	0.912	0.435	0.606	0.741	0.502	0.774
SN1	0.719	0.708	0.623	0.668	0.573	0.346	0.825	0.8	0.653	0.735	0.585
PS1	0.713	0.621	0.601	0.562	0.604	0.689	0.493	0.833	0.64	0.666	0.793
CP1	0.596	0.817	0.676	0.567	0.622	0.632	0.806	0.472	0.867	0.712	0.738
BI1	0.866	0.732	0.619	0.634	0.701	0.745	0.758	0.428	0.685	0.923	0.572
BI2	0.723	0.711	0.572	0.621	0.719	0.77	0.739	0.419	0.674	0.914	0.544
EX1	0.71	0.665	0.749	0.587	0.597	0.417	0.664	0.467	0.764	0.55	0.878
EX2	0.919	0.659	0.632	0.644	0.573	0.481	0.625	0.339	0.685	0.545	0.832

CO = compatibility; OB = Observability; TR = Trialability ; PEU = Perceived ease of use; SI= Social Influence; PU = Perceived usefulness; SN = Subjective norm; PS = Perceived Security; CP = Consumption Pattern; BI = Behavioral intention; Ex = External Factors

Table 2: Average Variance Extracted and Inter-Construct Correlations

	CO	OB	TR	PEU	SI	PU	SN	PS	CP	BI	EX
CO	0.898										
OB	0.629	0.818									
TR	0.608	0.661	0.919								
PEU	0.584	0.643	0.57	0.951							
SI	0.594	0.74	0.606	0.671	0.853						
PU	0.642	0.771	0.652	0.613	0.752	0.834					
SN	0.718	0.734	0.502	0.745	0.801	0.675	0.891				
PS	0.614	0.79	0.574	0.677	0.808	0.802	0.756	0.844			
CP	0.61	0.415	0.597	0.672	0.461	0.432	0.473	0.445	0.868		
BI	0.539	0.428	0.662	0.682	0.593	0.614	0.532	0.526	0.491	0.898	
EX	0.611	0.796	0.489	0.734	0.606	0.701	0.466	0.57	0.438	0.537	0.874

Table 3 presents the internal consistency of the constructs, which are measured the constructs composite reliabilities and Cronbach's Alpha. The **Table 3** also shows the AVE of the constructs in our models. For adequate reliability, both the composite reliability (CR) and Cronbach's Alpha must exceed the minimum threshold of 0.70 (Nunnally, 1978). The values displayed in **Table 3** exceed these thresholds by substantial margins. Thus, we conclude the constructs demonstrate adequate reliability andvalidity.

Table 3: Reliability and Convergent Validity of Model Constructs

	AVE	Composite Reliability	Cronbach's Alpha
Compatibility	0.61	0.822	0.712
Observability	0.9	0.949	0.893
Triability	0.81	0.892	0.761
Perceived Ease of Use	0.7	0.82	0.565
Social Influence	0.73	0.842	0.626
Perceived Usefulness	0.71	0.881	0.8
Subjective Norms	0.75	0.86	0.674
Perceived Security	0.79	0.92	0.869

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Consumption Pattern	0.81	0.917	0.833
Behavioral Intention of Use	0.81	0.892	0.759
External Factors	0.85	0.916	0.817

Table 4 represents the R^2 values of the endogenous constructs of the model. Based on the preceding rules of thumb, it is concluded that the models have substantial explanatory since they are close to or exceed the 0.75threshold.

Table 4: Model R-Square

	R-Square
Compatibility	NA (Exogenous)
Observability	NA (Exogenous)
Triability	NA (Exogenous)
Perceived Ease of Use	0.646
Social Influence	0.694
Perceived Usefulness	0.827
Subjective Norms	NA (Exogenous)
Perceived Security	NA (Exogenous)
Consumption Pattern	NA (Exogenous)
Behavioral Intention of Use	0.778
External Factors	NA (Exogenous)

The results are presented in **Table 5**. In order for a path to be deemed significant, the t-value≥ must be 1.96 and the p value ≤0.05. Based on these criteria, it is observed that four of the paths are not statistically significant and thus the associated hypotheses are rejected. The remaining parts are statistically significant and therefore support our hypothesized relationships.

Table 5: Path Coefficients and Hypothesis

Hypothesis (Model Paths)	**Co-efficient**	**T**	**p-value**	**Hypothesis**
Compatibility -> PU	0.112	0.746	0.484	Rejected
External Factors -> BI	0.173	0.594	0.606	Rejected
Observability -> PU	0.160	0.369	0.741	Rejected
Social Influence -> PEU	0.731	7.131	0.000	Supported
Perceived Ease of Use -> BI	0.456	5.583	0.000	Supported
Perceived Ease of Use -> PU	0.371	5.022	0.000	Supported
Perceived Usefulness -> BI	0.449	5.471	0.000	Supported
Perceived Security -> BI	0.526	6.120	0.000	Supported
Subjective Norms -> BI	0.132	1.481	0.167	Rejected
Subjective Norms -> SI	0.475	5.894	0.000	Supported
Trialability -> PU	0.521	6.092	0.000	Supported
Comsumption Pattern -> PEU	0.324	9.770	0.000	Supported

These results show that two of the four non-significant paths relate to the construct perceived usefulness. That is, compatibility and observability do not seem to influence consumers' perceptions of the usefulness of mobile wallets. This suggests that these features of the mobile wallets have very little impact on consumers' perception of its usefulness in their lives.

Table 6 illustrates the matrix of loadings and cross-loadings of two models with a high degree of significance for each item (average loading > 0.7) on its respective construct. The shaded area shows

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the cross-loadings of the items with their own construct and un-shaded area shows loadings of the items with the other constructs. As shown in **Table 7**, the item correlations of the respective constructs satisfy this condition, so we conclude that the measurement model demonstrate adequate convergent validity. For this purpose, the square root of Average Variance Extracted (AVE) is compared with the calculated correlations. As presented in **Table 2**, the square root values displayed on the diagonal of the matrix are larger than the correlation values presented in the same row and the same column. Thus, we conclude that there is adequate discriminant validity among the constructs.

Table 6: Matrix of Loadings and Cross Loadings

	CO	OB	TR	PEU	SI	PU	SN	PS	CP	BI	EX
CO1	0.752	0.601	0.701	0.315	0.242	0.315	0.8	0.37	0.307	0.463	0.759
CO2	0.772	0.719	0.522	0.579	0.434	0.67	0.371	0.849	0.537	0.772	0.734
OB1	0.638	0.821	0.531	0.671	0.648	0.704	0.348	0.825	0.668	0.626	0.903
TR1	0.386	0.777	0.709	0.463	0.48	0.468	0.564	0.491	0.456	0.548	0.781
PEU1	0.512	0.621	0.729	0.85	0.538	0.542	0.672	0.509	0.518	0.543	0.318
PEU2	0.698	0.557	0.811	0.791	0.593	0.612	0.616	0.572	0.643	0.677	0.699
SI1	0.525	0.552	0.643	0.783	0.882	0.544	0.317	0.611	0.527	0.576	0.85
SI2	0.517	0.522	0.601	0.849	0.906	0.577	0.296	0.56	0.654	0.491	0.922
PU1	0.42	0.461	0.687	0.629	0.786	0.8	0.283	0.505	0.55	0.418	0.9
PU2	0.665	0.529	0.633	0.677	0.697	0.912	0.435	0.606	0.741	0.502	0.774
SN1	0.719	0.708	0.623	0.668	0.573	0.346	0.825	0.8	0.653	0.735	0.585
PS1	0.713	0.621	0.601	0.562	0.604	0.689	0.493	0.833	0.64	0.666	0.793
PS2	0.596	0.817	0.676	0.567	0.622	0.632	0.806	0.724	0.867	0.712	0.738
PS3	0.866	0.732	0.619	0.634	0.701	0.745	0.758	0.842	0.685	0.923	0.572
CP1	0.723	0.711	0.572	0.621	0.719	0.77	0.739	0.419	0.741	0.914	0.544
BI1	0.608	0.665	0.749	0.587	0.597	0.417	0.664	0.467	0.764	0.75	0.878
BI2	0.9	0.659	0.632	0.644	0.573	0.481	0.625	0.339	0.685	0.845	0.832
EX1	0.565	0.589	0.631	0.393	0.447	0.423	0.901	0.427	0.413	0.515	0.812
EX2	0.365	0.576	0.609	0.375	0.416	0.456	0.916	0.438	0.433	0.519	0.753

CO = compatibility; OB = Observability; TR = Trialability ; PEU = Perceived ease of use; SI= Social Influence; PU = Perceived usefulness; SN = Subjective norm; PS = Perceived Security; CP = Consumption Pattern; BI = Behavioral intention; Ex = External Factors

Table 7: Average Variance Extracted and Inter-Construct Correlations

	CO	OB	TR	PEU	SI	PU	SN	PS	CP	BI	EX
CO	0.898										
OB	0.629	0.818									
TR	0.608	0.661	0.919								
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SI	0.594	0.74	0.606	0.671	0.853						
PU	0.642	0.771	0.652	0.613	0.752	0.834					
SN	0.718	0.734	0.502	0.745	0.801	0.675	0.891				
PS	0.614	0.79	0.574	0.677	0.808	0.802	0.756	0.844			
CP	0.61	0.415	0.597	0.672	0.461	0.432	0.473	0.445	0.868		
BI	0.539	0.428	0.662	0.682	0.593	0.614	0.532	0.526	0.491	0.898	
EX	0.611	0.796	0.489	0.734	0.606	0.701	0.466	0.57	0.438	0.537	0.874

Table 8 presents the internal consistency of the constructs, which are measured the constructs composite reliabilities and Cronbach's Alpha and also shows the AVE of the constructs in our

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models. For adequate reliability, both the composite reliability (CR) and Cronbach's Alpha must exceed the minimum threshold of 0.70 (Nunnally, 1978). In addition, the AVE should exceed 0.5 to ensure adequate convergent validity (Fornell & Larcker, 1981; Chin, 1998; Gefen et al, 2000). The values displayed in **Table 8** exceed these thresholds by substantial margins. Thus, we conclude the constructs demonstrate adequate reliability andvalidity.

	AVE	Composite Reliability	Cronbach's Alpha
Compatibility	0.72	0.912	0.732
Observability	0.82	0.823	0.794
Triability	0.87	0.881	0.810
Perceived Ease of Use	0.65	0.865	0.613
Social Influence	0.77	0.920	0.558
Perceived Usefulness	0.7	0.855	0.784
Subjective Norms	0.81	0.813	0.65
Perceived Security	0.63	0.863	0.736
Consumption Pattern	0.72	0.901	0.804
Behavioral Intention of Use	0.83	0.911	0.855
External Factors	0.72	0.88	0.747

Table 9 represents the R^2 values of the endogenous constructs of the model. Based on the preceding rules of thumb, it is concluded that the models have substantial explanatory since they are close to or exceed the 0.75threshold.

Table 9: Model R-Square

	R-Square
Compatibility	NA (Exogenous)
Observability	NA (Exogenous)
Triability	NA (Exogenous)
Perceived Ease of Use	0.712
Social Influence	0.837
Perceived Usefulness	0.884
Subjective Norms	NA (Exogenous)
Perceived Security	NA (Exogenous)
Consumption Pattern	NA (Exogenous)
Behavioral Intention of Use	0.791
External Factors	NA (Exogenous)

In order to assess the significance of the path coefficients, bootstrapping with SmartPLS was performed. Paths that are non-significant or has a sign that is different from what was originally hypothesized mean that the particular hypotheses are not supported.

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Paths that are significant and are in the hypothesized directions support the hypothesized relationships.

The results are presented in **Table 10**. In order for a path to be deemed significant, the t-value≥ must be 1.96 and the p value ≤0.05. Based on these criteria, it is observed that four of the paths are not statistically significant and thus the associated hypotheses are rejected. The remaining parts are statistically significant and therefore support our hypothesized relationships.

Table 10: Path Coefficients and Hypothesis

Hypothesis (Model Paths)	Co-efficients	t	p-value	Hypothesis
Compatibility -> PU	0.158	0.354	0.724	Rejected
External Factors -> BI	0.137	1.544	0.126	Rejected
Observability -> PU	0.112	0.703	0.484	Rejected
Social Influence -> PEU	0.295	10.545	0.000	Supported
Perceived Ease of Use -> BI	0.374	2.879	0.004	Supported
Perceived Ease of Use -> PU	0.417	5.235	0.000	Supported
Perceived Usefulness -> BI	0.406	3.622	0.000	Supported
Perceived Security -> BI	0.424	5.587	0.000	Supported
Subjective Norms -> BI	0.155	1.118	0.266	Rejected
Subjective Norms -> PP	0.804	9.825	0.000	Supported
Trialability -> PU	0.363	3.956	0.000	Supported
Comsumption Pattern -> PEU	0.494	6.135	0.000	Supported

These results show that two of the four non-significant paths relate to the construct perceived usefulness. That is, compatibility and observability do not seem to influence consumers' perceptions of the usefulness of mobile wallets. This suggests that these features of the mobile wallets have very little impact on consumers' perception of its usefulness in their lives.

V. CONCLUSIONS

The present study aims at examining the online consumer behavior in India with respect to buying online travel tickets and also identifying the major determinants of passenger behavior who use automated ticket vending machine. This study uses a theoretical model that integrates relevant components of both TAM and IDT theories. The constructs compatibility, trialability and observability are adopted from innovation diffusion theory while the remaining constructs are from the TAM literature. The results show that the measurement model had adequate convergent validity and discriminant validity among constructs. Also, the results of Average Variance Extracted and Inter-Construct Correlations showed that the values exceeded the threshold value by substantial amount, thereby confirming presence of adequate reliability and validity. In order to assess the significance of the path coefficients, bootstrapping with Smart PLS was performed. Based on these criteria, it is observed that four of the paths are not statistically significant and thus the associated hypotheses are rejected. The remaining parts are statistically significant and therefore support our hypothesized relationships. The results show that compatibility and observability do not seem to influence consumers' perceptions of the usefulness of mobile wallets. This suggests that these features of the mobile wallets have very little impact on consumers' perception of its usefulness in their lives. Similarly, subjective norm, which reflects the influence of others on adoption decisions, does not influence consumers' decision to adopt ATVM machine to transact directly; rather the effects seem to be indirect through social influence. Further, the results indicated that trialability influences perceived usefulness, which in turn influences intention to adopt ATVM machine. Thus, the results confirm the importance of subjective norms, perceived behavioral control and ease of use in adopting the online ticketing system.

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