Technology Inhibition Modelling: Investigating the Flip Side of TAM

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Research in technology domain since the 1980s has focused on the readiness, adoption and acceptance of new technologies. Negation of technology, driven by consumer inhibitions, has not been investigated into as a full-fledged study. The few studies on inhibition have always been in conjunction with acceptance studies. This study addresses this gap by proposing a Technology Inhibition Model (TIM). The paper hypothesizes Cost, Compatibility, Discomfort, Dissatisfaction and Risk as five inhibitor constructs and studies Technology Inhibition (TI) in the context of e-reader adoption. Of the five proposed constructs, except risk, the remaining four emerge as significant inhibition factors. Additionally, Dissatisfaction partially mediates the relationship between three antecedents (Cost, Compatibility and Discomfort) and TI. Creating a Technology Inhibition Model and identifying Dissatisfaction's role in inhibiting the acceptance of technology are the original contributions of this research.

Keywords: dissatisfaction, cost, compatibility, discomfort, risk, technology inhibition, SEM

INTRODUCTION

Most of the research on technology acceptance in the last three decades has focused on 'what drives sales' rather than on 'what inhibits sales'. The acceptance studies started with the Technology Acceptance Model (TAM) that hypothesized Perceived Usefulness (PU) and Perceived Ease of Use (PEU) as the two determinants of user acceptance (Davis, 1989). With computers making their entry just in the late 1980s, the initial TAM modelling was work-place driven and the constructs studied were utilitarian in character. Measurement scales were developed keeping in mind functional aspects like productivity, control, time-saving, flexibility and performance.

TAM model's parsimony mirrors its strength and weakness (Bagozzi, 2007). Buying decisions across technologies, adoption situations and decision makers cannot be abridged to the simple combination of utilitarian value and freedom from effort, which is what Perceived Usefulness and Perceived Ease of Use stand for. Attempts to extend TAM have only created new models with more predictor variables. Bagozzi argues that TAM and its extensions do not consider thought processes like obstacle management, temptation resistance and uncertainty analysis which are critical to buying decisions.

At the turn of the millennium, Parasuraman (2000) observed that '*customers are dealing with products and services that are becoming increasingly sophisticated from a technology standpoint*'. Offerings like Internet of Things, Augmented Reality and Cloud Computing were yet to hit the market at the time of this observation. A challenge that new technologies face in the market is adoption resistance. Acknowledging this reality, technology acceptance research started blending inhibitor constructs along with driver constructs. A pioneering work in this area is the Technology Readiness Index (TRI) model (Parasuraman, 2000). TRI explores the behavioral side of an individual's readiness to embrace new technologies. Along with driver constructs like Optimism and Innovativeness, TRI presents two of the earliest inhibitor constructs – Discomfort and Insecurity.

TRI understood the customer's frustration before a technology buy and introduced words like embarrassment, hassles and complications into their measurement scales. Customers are more bothered about negative outcomes than they are motivated by positive and their tendency to avoid 'bad' is stronger than their initiative to pursue 'good' (Baumeister et al, 2001). When expected outcomes are coded as gains or losses relative to any referral point, the losses tend to loom larger than the gains (Kahneman and Tversky, 1979). Transposing this thought to a technology buying scenario, negatively oriented antecedents (inhibitors) tend to play a more important role than positively oriented antecedents (drivers) in determining the acceptance, adoption and usage of technology. This philosophy provides the foundation for the proposed Technology Inhibition Model (TIM) of this paper.

Inhibitors are distinct constructs that have evolved through independent investigations. They are not antonyms for driver constructs (Cenfetelli and Schwarz, 2011). Individuals hold perceptions of enablement and inhibition simultaneously (ERP - the gain and the pain). The decision of buy-or-not-buy is driven by which of these perspectives looms larger than the other immediately before the buy. Negative beliefs get more cognitive attention, remain etched more in the memory and require a corrective action for survival (Kahneman and Tversky, 1979). On the contrary, positive beliefs are more benign in character and require no action for survival. This thought further reinforces the requirement for an investigation of the inhibition landscape.

A pan-European study on e-business acceptance posits lack of trading partner readiness as the inhibitor for large scale adoption (Zhu et al, 2003). The acceptance of e-business gets inhibited if trading partners across the value chain are not technology enabled. Buyer frustration driven by complexity and ambiguity of technology is another adoption inhibitor (Strebel et al, 2004). Frustration itself has been further divided into frustration with the buying process and frustration with the speed of technology change. Other studies have modeled simpler inhibitor constructs like cost, risk and compatibility in analyzing the acceptance of Information and Communication Technology (Verdegem and Marez, 2011).

The rest of the paper is organized as follows. Conceptual Framework and Hypotheses Formulation is covered in the next section. Following this, methodology, data collection and analysis are explained. The paper concludes with discussions and suggestions for future research. We now examine specific literature to propose the hypotheses for this study.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Any strategic decision-making process involves a cost-benefit analysis and the decision choice is contingent on cost of the decision process (Johnson and Payne, 1985). Cost for consumer is price set by manufacturer / retailer and the perception of price plays a significant role in consumer buying decisions (Shirai, 2017). Yang and Zhou (2011) have modelled perceived cost as an inhibitor for the acceptance of technology in the context of mobile viral marketing and have hypothesized cost to be a negative predictor for technology usage. Rawassizadeh and Petre (2015) identify battery life and cost as important success factors for the acceptance of smart watches and add that earlier smart watch versions like Intel Microma digital did not find enough customers because the technology was too expensive for that time.

Switching cost has been identified as a reason for the failure of new technology (Kim and Kankanhalli, 2009; Pick and Eisend, 2014). Switching costs are costs perceived and anticipated by buyers when changing relationships and represent a disutility in switching from status quo to new. Switching costs can be broke up into three components of transition costs, uncertainty costs, and sunk costs (Kim and Kankanhalli, 2009). All the three apply to e-reader adoption. The act of e-reader procurement involves a transition cost, lack of its full usability implies an uncertainty cost and current investment in books add up to sunk cost. This paper has refrained from classifying cost as switching cost to preserve the generality of the construct. But the behavior of the cost element in e-reader buying has similarities to switching cost since investment in e-reader happens only when one switches from traditional reading to e-reading.

H1a: *Cost of any specific technology has a positive direct effect on Technology Inhibition.*

Many studies have extended the TAM model (Davis, 1989) by introducing new variables. Gahtani and King (1999) extend TAM by including compatibility. Their study affirms that compatibility with status quo is a critical criterion for new systems to gain market acceptance. Compatibility can be disaggregated into sub-constructs like work style, work practice, prior experience and values and each of them can be modelled as separate antecedents to technology acceptance (Karahanna et al, 2006). Studies have also examined the implications of compatibility in the context of adoption of open standard environments (Chau and Tam, 1997; Chen and Forman, 2006). One recent study has suggested mental modeling as a theoretical tool to facilitate the acceptance of replacement technologies ((Zhang and Xu, 2011). e-reader can be thought of as a replacement technology. A key deterrent for the large scale adoption of e-readers could be its perceived lack of compatibility with different types of e-books and e-platforms (Aaltonen et al, 2011).

H1b: *Lack of compatibility of any specific technology has a positive direct effect on Technology Inhibition.*

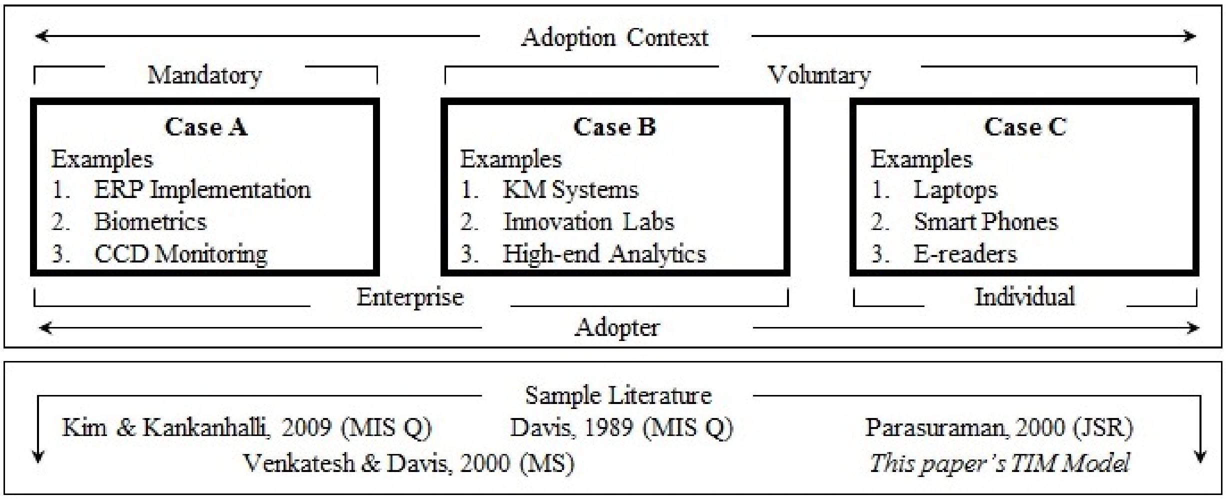
The Discomfort construct, defined as '*a perceived lack of control over technology and a feeling of being overwhelmed by technology*', was first introduced in Technology Readiness Index (TRI) modeling (Parasuraman, 2000). Incidentally, TRI is one of the first models to offer a gestalt of driver and inhibitor constructs. Discomfort along with Insecurity are probably the earliest proposed technology inhibitor constructs. It need to be mentioned here that Insecurity defined as a '*distrust of technology and skepticism regarding its usage*' has not been used as a construct in this paper. The authors feel that in the specific context of e-reader adoption, insecurity is not a relevant inhibitor.

Seven years after TRI, the Technology Readiness and Acceptance Model [TRAM] (Lin et al, 2007) blends system-specific constructs of TAM with individual-specific constructs of TRI. The TRAM model carries forward the Discomfort construct in its blended model. Continuing on blended modeling, Chen et al (2013) blend the TRI model with the Expectation – Confirmation Theory (Oliver, 1980) in explaining the adoption of mobile data services. This model also uses the Discomfort construct to explain user disinclination to adopt new technologies. There are a few papers on the adoption of self-service technologies (Liljander et al 2006; Chen et al 2009) that have explored Discomfort as an inhibitor.

H1c: *Discomfort with any specific technology has a positive direct effect on Technology Inhibition.*

Figure 1 presents the Adopter-Context Continuum with enterprise-mandatory, enterprise-voluntary and individual-voluntary representing three distinct contexts for technology acceptance.

FIGURE 1
THE ADOPTER – CONTEXT CONTINUUM



The TIM model explores the 'individual-voluntary' space. In the context of technology acceptance at the individual level (Case C in Figure 1), this paper is one of the earliest to propose 'D*issatisfaction*' as a standalone, univalent inhibitor construct. Literature quotes apparently similar words like dissonance, disconfirmation, disadoption and dissatisfaction to describe consumer turnoffs in the context of product adoption. The choice of Dissatisfaction as the generic hurdle construct is validated by looking at extant literature.

Dissonance stems from a person's contradictory beliefs or from an inconsistency between belief and action (Festinger, 1957) and is a post-purchase effect (Sweeney et al, 1996). Dissonance does not apply in the context of TIM because it is not as antecedent to adoption. Disconfirmation is a bivalent construct capable of enhancing or subverting value. Expectation and disconfirmation adding up to measure satisfaction has been well studied (Cardozo, 1965 and Oliver, 1980). Expectation, disconfirmation and satisfaction form an evolving platform (Lapre and Tsikriktsis, 2006) for established industries like airlines. Disconfirmation does not apply for TIM since hurdle management looks only at univalent subversion constructs. Disadoption stands for consumers leaving a technology after a short usage (Libai et al, 2009) and hence does not apply for TIM since the model studies pre-adoption markets.

Kano et al (1984) divide satisfaction into 'attractive' quality and 'must be' quality with the former enhancing satisfaction by presence and latter enhancing dissatisfaction by absence. Detienne and Timm (1995) study customer dissatisfaction across service sectors from an institutional turnoff perspective. Zhang and Dran (2000) view website design through the same Kano lens of attractive vs. must be quality. Guo and Zhou (2016) model satisfaction and dissatisfaction as proxies for the bivalent disconfirmation (refer Oliver, 1980) with negative disconfirmation getting the nomenclature of dissatisfaction (similarly positive disconfirmation is named as satisfaction). Going back to the Adopter-Context Continuum of Figure 1, Guo and Zhou model dissatisfaction for enterprise-voluntary adoption (Case B in Figure 1). This paper and its proposed TIM model defines dissatisfaction as '*an amalgam of expectation shortfalls*'. Dissatisfaction is posited as a standalone, univalent, mediating inhibitor construct in the individual-voluntary technology acceptance space.

H1d*: Dissatisfaction with any specific technology has a positive direct effect on Technology Inhibition*.

Mitchell (1999) posits perceived risk as an antecedent to trust building. Reduction of risk enhances trust which in turn augments market adoption, thus establishing risk as an antecedent to adoption. Mu et al (2009) study risk management as an antecedent to new product development and adoption. Oehmen et al (2014) assess risk from a stage-gate approach of decision making, program stability, project success and finally product success. Risk has been modeled as a TAM construct to study purchase intention of Internet users (Maditinos et al, 2010), consumer acceptance of online auction (Stern et al, 2008) and adoption of self-service technology (Curran and Meuter, 2005). Studies have shown that negative influencers hamper technology diffusion and drive down usage intention (Kozinets, 2008).

H1e: *Risk with any specific technology has a positive direct effect on Technology Inhibition*.

Baron and Kenny (1986) define mediator variable as '*a third variable, which represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest*'. In consumer psychology, where individual is the relevant unit of analysis, mediators should represent properties of the person (individual) that transform the input variables in some way. In TIM model, Discomfort, Dissatisfaction and Risk are individual-centric constructs whereas Cost and Compatibility are product-centric constructs. Given that the identification of mediators is a methodological issue (Baron and Kenny, 1986) one needs to focus on constructs whose significance goes beyond the wordings reflected in the scales. For choosing the right mediating variable, MacKinnon et al (2012) identify literature review, prior mediation analysis, common sense and intuition as guidelines.

Adhering to the Baron and Kenny logic of individual centricity and aligning to the MacKinnon guidelines, this study identifies Dissatisfaction and Risk as individual centric constructs and posit them as mediating variables (over and above their direct linkage) in explaining the Technology Inhibition of technology. Dissatisfaction as a mediator is analyzed first. As proposed by Oliver (1980), satisfaction (or the lack of it) is the sum total of a standard expectation modified by a bivalent disconfirmation. Escalation in cost (from an expected cost), ambivalence in compatibility (from a standard compatibility level) and increase in discomfort (from an expected base line of comfort) will all lead to an escalated dissatisfaction. This makes Dissatisfaction a 'natural' mediating variable for Cost, Compatibility and Discomfort and its effect on TI.

Beach and Mitchell (1978) advocate that whenever there is a choice available, markets choose the least investment route to maximize satisfaction, an observation that underscores the link between investment (cost) and its escalation leading to dissatisfaction. Al-Gahtani and King (1999) posit that high system compatibility drives a relative usage advantage which in turn drives end user satisfaction in the context of the usage of computers. If one treats compatibility as a bivalent construct, then the lack of the same can be posited to drive dissatisfaction. Chen et al (2009) posit discomfort along with other TRI constructs as antecedents to customer satisfaction. Since we are doing a technology inhibition study, the satisfaction construct morphs to dissatisfaction. Summing up, there is enough literature support for positing Dissatisfaction as a mediator.

H2a: *Dissatisfaction with any specific technology mediates the relationship between cost and Technology Inhibition.*

H2b: *Dissatisfaction with any specific technology mediates the relationship between compatibility and Technology Inhibition.*

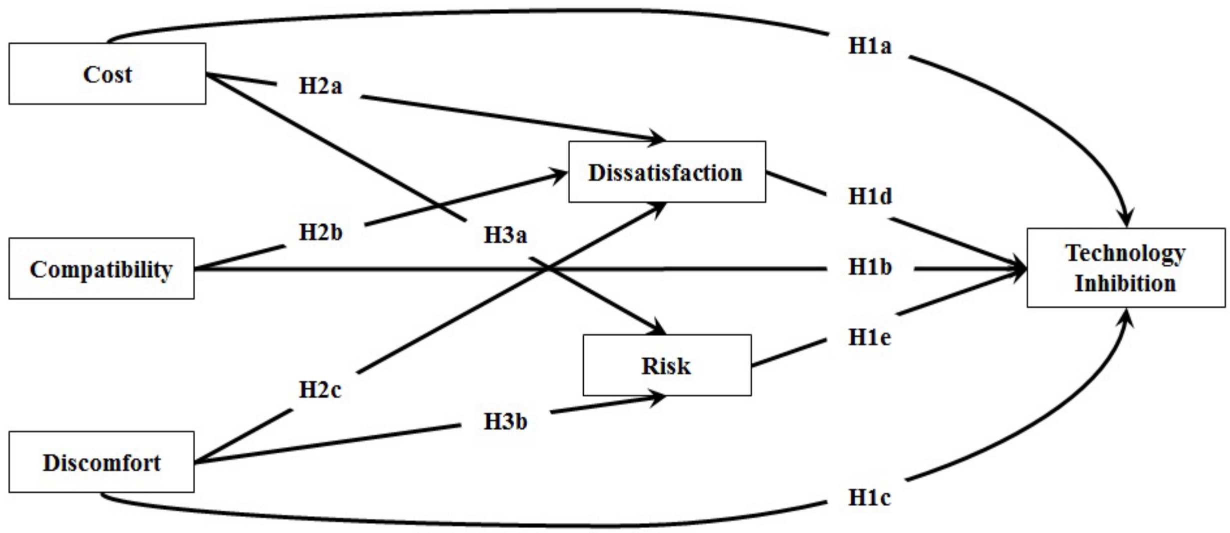
H2c: *Dissatisfaction with any specific technology mediates the relationship between discomfort and Technology Inhibition*.

Any consumer's decision-making process can be split into cost-benefit based decisions (utility paradigm) and risk-returns based decisions (risk paradigm) implying that whenever there is a cost associated with choice, utility maximization is contingent on risk aversion. Upah (1980) studies the risk related to financial aspects of a purchase and highlights the importance of cost justification in the context of industrial buys. The authors of this study feel that compatibility (or the lack of it) does not significantly alter risk perception in the specific context of e-readers. Hence for this paper's study, compatibility is not taken as an antecedent to risk. For completing the risk mediation, the discomfort construct is intuitively mapped to risk. Figure 2 gives the proposed research model.

***H3a**: Risk with any specific technology mediates the relationship between cost and Technology Inhibition.*

***H3b**: Risk with any specific technology mediates the relationship between discomfort and Technology Inhibition.*

FIGURE 2
PROPOSED RESEARCH MODEL



METHOD

Selection of Industry

The proposed Technology Inhibition Model [TIM] is investigated in the individual-voluntary technology acceptance space [refer Figure 1]. The target technology for research validation has to be a technology that is currently facing adoption resistance in the market under study (in this context, the Indian market). Products like laptops and smart phones are entrenched products in the Indian market. Laptops would have aligned well with this study at the turn of this millennium and smart phones would have provided a context for exploration a decade ago. With the study being conducted in 2018-19, e-readers have been chosen as the target technology for study.

Talking of e-readers, the study alludes to the ownership and usage of pure play e-readers like Kindle, Nook and Kobo and not smart phones in the market which can double up as e-readers (like Samsung Galaxy and Apple IPhone). The brand names mentioned above are only for illustration. This study is a category based study and goes above brand level differentiation.

In the Indian context, the pure play e-reader is at its early stage in the product development life cycle (PDLC) and hence is facing a high Technology Inhibition. Of the 260 people who responded to this study, 241 do not currently own a pure play e-reader, indicating a single digit market penetration. Sixteen relevant scale items were tested in this study using a five-point Likert scale of 1-5 (where 5 indicates maximum resistance) and the mean of the 16 individual mean scores is 3.30 (max: 4.42; min: 2.51) [refer Table 4 (In Appendix)]. These two data points endorse e-readers as a 'good-fit' choice of technology for analyzing Technology Inhibition.

Sample Details and Data Collection

For testing the nomological model, established scales and convenient samples were used. The study utilized a cross-sectional time frame to map the inhibition behavior of individuals who have the '*capability*' to adopt an e-reader device. Pilot study was conducted to test the reliability of the scale and a few items were modified to improve readability and comprehension before proceeding to main data collection. The survey was administered with the assistance of three graduate students who were given academic credits for the same. The students were instructed to send questionnaires to a respondent population in the age bracket of 25-35 (final data set has respondents from age 24-36). The survey specifically targeted respondents who were currently working and earning well. Responses were collected through e-mail and social media.

The word '*capability*' used in the previous para needs explanation in the context of sample delineation. People who are in the age bracket below 25 would either be studying or be at the beginning of their careers and hence the financial implication of buying an e-reader would be a deterrent. At the other extreme, people above 35 and who like reading (the target market for e-reader) would have an inertia to move away from the world of books that they have cherished for years. Hence their negation of e-readers would be more due to incumbency and inertia which is not modelled in this study. Thus the well-earning current non-user of e-readers in the age bracket of 25-35 becomes an apt demographic group for validating technology usage negation. The sample demographics data is appended in Table 1 [In Appendix]. 58% of the final respondents were male and 42% were female.

The survey commenced with a primary question regarding ownership of e-reader. Since, the basic objective of the study is to test the Negative Usage Intent of new technology, respondents owning e-readers were excluded from further participation in the survey. As mentioned earlier, the study got responses from 241 non-users of e-readers from the total set of 260 respondents (the remaining 19 owned an e-reader). All the answers were complete ones. The total number of e-mail requests send were a shade over five hundred. Some of the responses came from social media links. The entire data collection took a month for completion and was done using Qualtrics, the software tool that administers online questionnaire surveys.

Operationalization of Research Variables

The research constructs were measured using a 5-point Likert scale with 1 indicating complete disagreement (no technology negation) and 5 indicating complete agreement (full technology negation). The five inhibitor constructs were operationalized using 3-item to 5-item scales. A total of 22 items were proposed across the five inhibiting constructs of which 16 ended up as relevant scale items. There were no reverse coded items. The Cronbach Alpha (CA) values for all the 5 antecedent constructs were above 0.8 indicating good internal consistency for the scales proposed. All the 16 mean values are above the 50% threshold value of 2.5 with the mean of means being 3.30.

For Cost, a 5-point scale was adapted from DelVecchio & Smith (2005). The paper nomenclatures cost as the 'financial risk' behind buys and reports a Cronbach Alpha of 0.827 (this study gets 0.845). Of the 5 proposed scales, 3 make the final cut. For Risk, a 4-point scale was adapted from Hamilton & Biehal (2005) which reports a Cronbach Alpha of 0.850 (this study gets 0.880). Of the 4 proposed scales, 3 make the final cut. For Compatibility, a 3-point scale was adapted from Meuter et al (2005). The Meuter study is on self-service technologies where the product-focused construct of compatibility has a different flavor compared to e-readers. Hence the original scale (which gave a CA of 0.950) was morphed for this study (the CA for this study is 0.819). All the three proposed scales made the final cut. For Discomfort, a 5-point scale was adapted from Parasuraman (2000). The TRI index study of Parasuraman reported a CA ranging from 0.79 to 0.81 (the CA for this study is 0.847). Of the 5 proposed scales, 3 make the final cut. For Dissatisfaction, a 5-point scale is adapted from Guo and Zhou (2016). The original study reports a Cronbach Alpha of 0.872 (this study gets 0.838). Of the 5 proposed scales, 4 make the final cut.

Some of the scales that get dropped have a plausible explanation. Cost 4 (*I could lose a significant amount of money if I ended up with an e-reader that wouldn't work*) shows a Post-Purchase Dissonance Characteristic [Festinger, 1957]. This study is a pre-purchase behavior study. Similarly Risk 4 (*My primary goal is to preserve my books*) is perceived by respondents as unrelated to the actual e-reading experience and its associated risks. Dissatisfaction 1 (*I am not satisfied with the frequent charging required for e-readers*) is related to Perceived Ease of Use (PEU) (Davis, 1989). The remaining 4 selected scale items are related to Perceived Usefulness (PU).

ANALYSIS AND RESULTS

Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was conducted as a preparatory step before doing a full-fledged Structural Equation Modeling (SEM). Tests for normality and multi-collinearity of data was done using SPSS Ver. 21. By individually evaluating the effect of independent variables on TI, linear regression provides significant and superior fit and higher F-statistic when compared to non-linear models. Similarly, Variance Inflation Factor (VIF) values were less than 2.0, indicating no evidence of multi-collinearity. The variable-wise sampling adequacy given by the Kaiser-Meyer-Olkin (KMO) metric and the percentage variance extracted on a construct-by-construct basis is given in Table 2 [In Appendix].

The parameters that EFA checked included KMO measure of sampling adequacy (value > 0.5), Bartlett's test of sphericity, communalities (items containing values < 0.50 to be dropped), Eigen Values (> 1.0) and percentage of variance explained (Malhotra and Dash, 2011). Items with low communalities were removed from the analysis. Summary of the Principal Component Analysis is provided in Table 3 [In Appendix].

Item to total correlations were estimated for all items and reliability measures (Cronbach Alpha) of all constructs were well above the recommended level of 0.70 (Nunnally, 1978). Table 4 [In Appendix] gives the details of the six constructs (five independent variables and one dependent variable), the items used for each construct and descriptive statistics of Mean and Standard Deviation and the Cronbach Alpha values on a construct-by-construct basis.

SEM – Measurement Model

Two stage Structural Equation Modelling (SEM) approach was used to test the nomological model. Evaluation was carried out using SPSS AMOS 21.0. The Measurement Model was completed before proceeding to the Structural Model (Anderson and Gerbing, 1988). Measurement model completes Confirmatory Factor Analysis (CFA) of the constructs determined a-priori through literature review. The measurement model shows a good fit (χ^2=332.598, Degrees of Freedom (df) = 137, χ^2/df=2.428, Root Mean Square Error of Approximation (RMSEA) = 0.077, Comparative Fit Index (CFI) = 0.917) with fit indices meeting acceptable cut-off values for the model – RMSEA < 0.08, CFI > 0.900 (Anderson and Gerbing, 1998; Kline, 1998; Hu and Bentler, 1999).

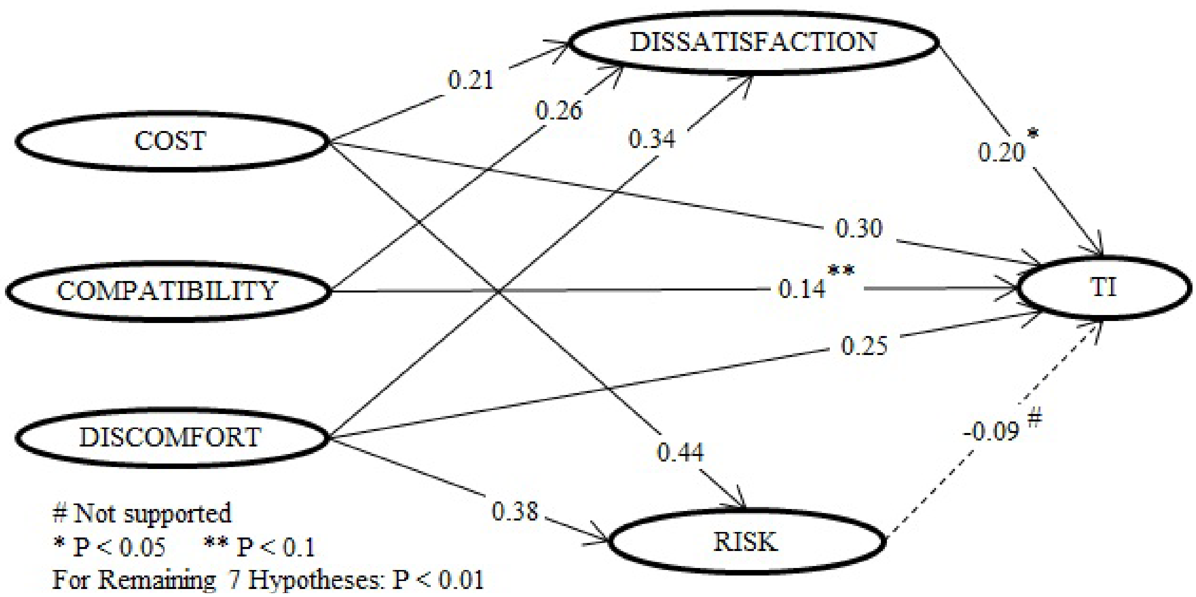
In order to establish convergent validity of measures, standardized factor loading of each item of a construct should be greater than 0.65, Composite Reliability values greater than 0.70 and Average Variance Extracted (AVE) of constructs should be greater than 0.50 (Fornell and Larcker, 1981; Anderson and Gerbing, 1988). Convergent validity was established as most of the estimates were higher than recommended limits. Further, to establish discriminant validity, values of square root of AVE should be greater than inter-construct correlation with all other constructs (Fornell and Larcker, 1981). Discriminant validity was established as square root of AVE was higher than inter-construct correlations for all the constructs. Summary of convergent and discriminant validity estimation is provided in Table 5 [In Appendix].

The study used same source to estimate dependent and independent variables. Therefore, spurious correlation between variables could creep into the response affecting relationship between variables. The impact of Common Method Variance (CMV) should be minimized to ensure variance in the model estimates are not due to method bias. Harman's single factor test is a commonly used test to evaluate common method variance (Podsakoff et al, 2003). Large variance is expected to be present, if the general factor that emerges accounts for majority of covariance amongst measures. Harman's test was conducted and the general factor that emerged explained only 31.05% of variance extracted, indicating no presence of common method variance. Single common-method-factor test is suggested as a superior measure to evaluate presence of common method variance (Lindell and Whitney, 2001; Podsakoff et al., 2003). No data on additional variables was measured to evaluate single-common-method-factor. However, results of Harman's test indicate low variance extracted assuring that the study does not suffer from common method variance. Summarizing, the Confirmatory Factor Analysis confirmed convergent and discriminant validity of constructs with reasonable assurance of absence of common method variance.

SEM – Structural Model

The structural model showed an acceptable fit (χ^2=336.199, df=139, χ^2/df=2.419, RMSEA=0.077, CFI=0.916) compared to the recommended cut-off values. Strength of effects and significance for the model is provided in Figure 3. As hypothesized, cost, lack of compatibility and associated discomfort with technological devices has a significant and positive effect on Technology Inhibition (TI). Additionally, dissatisfaction's effect on TI is significant and positive. However, risk's effect on TI is negative and not significant. To conclude, except risk, all the hypothesized antecedent inhibitor constructs show a significant and positive effect on TI. Table 6 [In Appendix] summarizes the hypotheses.

FIGURE 3
AMOS RESULTS



The research also tested mediation effect of dissatisfaction and risk on TI. Mediating role of dissatisfaction and risk is tested using the method proposed by Iacobucci, Saldanha and Deng (2007). According to this method, relative sizes of the indirect (mediated) versus direct paths are compared by calculating the z-value (Sobel, 1982) using the formula $z = (a*b)/((b^2*s_a^2)+(a^2*s_b^2))^{1/2}$, where a is the unstandardized coefficient for the association between independent variable and the mediator, and s_a is the standard error of a. Similarly b is the unstandardized regression coefficient for the association between the mediator and the dependent variable, when the independent variable is also included as a predictor in the model. s_b is the standard error of b.

Results from testing the data as per above procedure indicate that dissatisfaction partially mediates the relationship between cost, compatibility and discomfort, whereas, the insignificant path coefficient between risk and TI eliminates risk as a possible mediator. Higher cost, lack of compatibility between user and the technological device and associated discomfort result in negative disconfirmation of expectations and leads to dissatisfaction which in turns leads to TI. Analysis reveals a positive and significant effect of cost and discomfort on risk, i.e., higher the cost and higher the discomfort, risk perceptions to usage of technology device should increase and should result in TI. However, data analysis did not support the relationship between risk and TI, thereby eliminating risk as a potential mediator. The results of mediation analysis are summarized in Table 7 [In Appendix].

The overall results of the Technology Inhibition Model [TIM] study can be summarized as follows:

1. The direct effects of Cost, Compatibility, Discomfort and Dissatisfaction on TI is established
2. Risk (the 5th inhibitor construct) shows a negative and non-significant effect on TI
3. Positive and significant effects of Cost, Compatibility and Discomfort on Dissatisfaction is proved
4. Dissatisfaction partially mediates the effect of three independent variables (Cost, Compatibility and Discomfort) on TI
5. Cost and Discomfort have a positive and significant effect on Risk
6. A higher Risk 'should' naturally have a significant and positive effect on TI. However, this hypothesis was not supported by results as the effect of risk on TI was negative and not significant

A comparison chart of the estimates and fit indices of the Measurement Model as well as the Structural Model is given it Table 8 [In Appendix].

DISCUSSION

Summary of Findings

The primary contribution of this study is the modelling of an interrelationship pattern between five inhibitor constructs that enables a superior understanding of negation of technology by individual consumers. The results of the study provide acceptable support for most of the proposed hypotheses, thereby validating the proposed Technology Inhibition Model. A key inference from the study is that while each posited inhibitor stands alone as a separate dimension in independently explaining customer reticence towards technology, there is an interactive behavior between the inhibitor constructs that synergistically enhances the reticence. Of the five proposed variables, risk is the only variable that has no impact on TI. The authors of this study feel that risk is still a relevant inhibiting variable and its non-significant nature is primarily related to the choice of product (e-reader). For technological products whose usage can lead to a possible financial loss (electronic money transfer), personal loss (helmets with Bluetooth) or privacy loss (Internet of Things), risk can play a significant role as an inhibitor.

Identification of the right mediators is a key methodological issue in any business psychology study. Since mediation is a causal approach, it is important to understand the causal sequencing between antecedent, mediator and consequent (MacKinnon et al, 2012). A key takeaway of this study is the emergence of Dissatisfaction as a latent mediating variable in the technology acceptance scenario. Dissatisfaction partially mediates the effect of Cost, Compatibility and Discomfort on Technology Inhibition (TI). In terms of ordering of causal relations, it is evident that the product-centric inhibitors (Cost and Compatibility) will be the causal factors for an individual-centric Dissatisfaction construct (the vice versa does not make any sense). The third causal route (Discomfort to Dissatisfaction) also is logical since Technology Readiness precedes Technology Acceptance. Discomfort is a TRI construct (Parasuraman, 2000). Since TI is the final consequent of the study, the Dissatisfaction to TI causal path is also correct. Thus, the causal effects of TIM have been rightly understood and hypothesized.

Data analysis using Structural Equation Modelling technique has provided acceptable results. A combination of incremental and absolute fit indices should be considered simultaneously to evaluate model fit. According to Hu and Bentler (1999), recommended cut-off criteria is around 0.95 for CFI, 0.08 for SRMR and 0.06 for RMSEA. However, Iacobucci (2010) proposed SRMR as a superior absolute fit index as compared to RMSEA when sample size is less than 250. Although, CFI values in 0.90s are generally accepted as indication of acceptable fit (Bentler and Bonett, 1980), values of 0.95 or above have been recommended. However, Iacobucci (2010) suggests that a sound theoretical model with hypothesized links logically supported, resulting in $\chi 2/df$ values of less than 3.0 is acceptable. In this research, CFI values are 0.916, which does not meet Hu and Bentler's (1999) recommended levels, but RMSEA (0.077) and SRMR

(0.061) indices fall under acceptable limits (Hu and Bentler, 1995). Considering the parsimony and theoretical conceptualization of TIM model, supported by significant path coefficients of individual inhibitors towards TI, and two of the three fit indices confirming to acceptable model fit norms, we can conclude that the proposed TIM model is relevant and acceptable.

Finally, the study establishes the importance of analyzing negation in the broader context of consumer behavior. The mean of respondent scores of all the 16 relevant items tested were above 2.5 (median value of range of measurement), vindicating the negation constructs. In any simple buying ecosystem (say within a mall), the number of times the mind tells a 'No' to itself (negation) is infinitely more than the number of times it tells 'Yes'. This product negation by consumers is driven by two scenarios - non-choice and anti-choice (Hogg, 1998). Non-choice is driven by lack of affordability whereas anti-choice is driven by consumers avoiding the product because of a lack of alignment with current tastes and preferences. The cost construct of the proposed TIM model aligns with the non-choice scenario where as constructs like incompatibility and discomfort explicate the anti-choice scenario.

Theoretical Implications

The study draws insights from Technology Acceptance Modeling, Technology Readiness Indexing, Expectation Confirmation Theory and Prospect Theory to develop a nomological framework that helps marketers to understand customer reticence in the context of a technology buy. The TIM model and its proposed constructs do not technically represent an extension, adaptation or amalgam of any of the above mentioned existing models.

The technology acceptance studies that followed the original TAM Model (Davis, 1989) have either delineated more cognitive and affective drivers (Bruner and Kumar, 2005; Parasuraman, 2000; Anton et al, 2013; Gahtani and King, 1999; Karahanna et al, 2006; Maditinos et al, 2010; Stern et al, 2008; Curran and Meuter, 2005) or conceptualized antecedent constructs to the original PU and PEU constructs (Venkatesh and Davis, 2000; Venkatesh and Bala, 2008; Jahangir & Begum, 2007). Even a unified theoretical framework, proposed by Kulviwat et al (2007) to understand technology acceptance from a holistic perspective, misses out on the technology inhibition perspective. Hence this study consciously avoids the driver space which has been well explored and focusses exclusively on the inhibitor space. Incidentally, the inhibitor constructs have not been divided into cognitive and affective constructs.

Technology acceptance studies have always been at the category level. Some examples of categories that have been well analyzed in the context of acceptance are electronic mail (Davis, 1989), CRM systems (Venkatesh and Davis, 2000; Ventakesh and Bala, 2008) and m-commerce (Bruner and Kumar, 2005). In the context of an acceptance study, category acceptance is logically followed by brand choice in the consumer's mind (needs to buy a car, chooses to buy a Ford; needs to adopt cloud computing, configures an Amazon Cloud). This logical extension from category to brand, which applies to acceptance studies, is absent in a rejection study. In the proposed Technology Inhibition Model (TIM), the study always stops at the category level leading to a generalized axiom that '*consumers choose brands and reject categories*'.

Cognitive effort is a disutility in the context of consumer buying and its reduction will enhance the consumer's ability to internalize the value proposition of the product / brand under consideration (Alba and Hutchinson, 1987). The cognitive effort associated with a product buy is closely related to its category classification. Consumers classify products into caged category structures and have an innate capability to find commonalities within these catalogued classifications (Yamauchi, 2009). It is this capability that helps them to relate to sub-categories (cars to sedans, vegetables to organic vegetables). In the context of e-readers, the utility that it provides (reading) is the same as the utility that traditional books provide. But the category under which an e-reader can fall (say, electronic hand-held devices) is far removed from the category of books / reading materials. It is this misalignment between the two categories (e-readers and books) that increases the cognitive effort required to appreciate the utility of an e-reader, thereby leading to its high Technology Inhibition.

Mental accounting-based modeling, assessment of fungibility and situation-based utility management are approaches superior to the traditional economic utility-based evaluation of consumer behavior (Thaler, 2008; Kahneman and Tversky, 1979). When a new product hits the market (like an e-reader), the purchase process happens over two stages. The first stage is a judgment process of assessing possible gains or losses that can accrue from the product acquisition. The second is a decision process which will happen only when gains outweigh losses. This mental accounting-based arithmetic is not a function of income, surplus, wealth or any other traditional economic measures. This is a situation-based assessment of utility (in this case the utility of buying an e-reader). For someone who is into reading (the target market for an e-reader) the pleasure of reading a book is not (yet) fungible with the pleasure of e-reading the same content. Laptops found acceptance when the computational utility of the desktop and the laptop became fungible. These are broader considerations that get encapsulated in constructs like discomfort and dissatisfaction.

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APPENDIX

TABLE 1
SAMPLE DEMOGRAPHICS

Male Respondents	Female Respondents	Total Respondents
140	101	241
58%	42%	100%

Age 24-28	Age 29-32	Age 33-36	Total Respondents
85	99	57	241
35%	41%	24%	100%

TABLE 2
EFA : VARIABLE-WISE SAMPLING ADEQUACY AND VARIANCE EXTRACTION

Latent Variable	KMO Metric	% of variance extracted
Cost	0.715	68.35%
Risk	0.701	80.68%
Compatibility	0.664	73.52%
Discomfort	0.733	62.05%
Dissatisfaction	0.804	67.34%
Technology Inhibition [TI]	0.693	69.85%

TABLE 3
EFA: PRINCIPAL COMPONENT ANALYSIS WITH VARIMAX ROTATION

Principal Component Analysis with Varimax Rotation [n=241]					
Items	Constructs and Factor Loadings				
	Dissatisfaction	Discomfort	Cost	Risk	Compatibility
Dissatisfaction2	.831				
Dissatisfaction3	.804				
Dissatisfaction4	.748				
Dissatisfaction5	.756				
Discomfort3		.781			
Discomfort4		.831			
Discomfort5		.773			
Cost2			.822		
Cost3			.675		
Cost5			.740		
Risk1				.870	
Risk2				.835	
Risk3				.743	
Compat1					.808
Compat2					.898
Compat3					.823
CA	0.838	0.847	0.845	0.880	0.819
Scale Adapted from	Guo & Zhou 2016	Parasuraman 2000	DelVecchio & Smith 2005	Hamilton & Biehal 2005	Meuter et al 2005
CA in original work	0.872	0.79 to 0.81	0.827	0.850	0.950
Factor-wise Variance	15.348	15.343	14.472	14.453	12.169
Total Variance	71.785 % (> 50%)				
Extraction Method	Principal Component Analysis				
Rotation Method	Varimax with Kaiser Normalization [Rotation converged in 6 iterations]				
KMO	0.816 (> 0.8 indicating high sampling adequecy)				
Bartlett's Sphericity	2695.03 [df = 171 Significance = 0.000]				
n	Number of respondents				
CA	Cronbach Alpha				

TABLE 4
CONSTRUCTS, ITEMS, DESCRIPTIVE STATISTICS AND RELIABILITY TESTS

Constructs, Items, Descriptive Statistics and Reliability Tests [n = 241]			
Constructs and Scale Items		Mean	SD
Cost [CA = 0.845; Number of relevant scale items = 03] (Scale adapted from: DelVecchio & Smith, 2005)			
Cost 1	Considering the investment involved, purchasing an e-reader would be costly	.	.
Cost 2	I worry about the cost of purchasing an e-reader	3.14	1.177
Cost 3	Given the financial commitment, I may regret purchasing an e-reader	2.93	1.228
Cost 4	I could lose a significant amount of money if I ended up with an e-reader that wouldn't work	.	.
Cost 5	Due to the financial commitment, I am unlikely to buy an e-reader	2.93	1.228
Risk [CA = 0.880; Number of relevant scale items = 03] (Scale adapted from: Hamilton & Biehal, 2005)			
Risk 1	Having all my e-books on my e-reader enhances my risk of losing all data	2.99	1.357
Risk 2	I find it risky in having all data on my e-reader	3.13	1.286
Risk 3	I find it risky in having my data on cloud	2.87	1.331
Risk 4	My primary goal is to preserve my books	.	.
Compatibility [CA= 0.819; Number of relevant scale items = 03] (Scale adapted from: Meuter et al, 2005)			
Compat 1	I would like my e-reader to be compatible with my phone	4.26	1.000
Compat 2	I would like my e-reader to be compatible with other e-readers for easy exchange of information	4.42	0.858
Compat 3	My e-reader should be compatible with any type of e-book	4.38	0.901
Discomfort [CA = 0.847; Number of relevant scale items = 03] (Scale adapted from: Parasuraman, 2000)			
Discomfort 1	I worry that e-readers lead to straining of eyes	.	.
Discomfort 2	E-readers have health or safety risks on its users	.	.
Discomfort 3	It is embarrassing when I have trouble using an e-reader while people are watching	2.79	1.390
Discomfort 4	The hassles of getting to know how to use e-readers makes them not worthwhile	2.79	1.310
Discomfort 5	E-readers are too complicated to be useful	2.51	1.262
Dissatisfaction [CA = 0.838; Number of relevant scale items = 04] (Scale adapted from: Guo & Zhou, 2016)			
Dissatisfaction 1	I am not satisfied with the frequent charging required for e-readers	.	.
Dissatisfaction 2	Frequent scrolling on e-reader reduces my satisfaction levels	3.47	1.155
Dissatisfaction 3	Compared to physical books, e-reading is monotonous and this makes me dissatisfied	3.23	1.166
Dissatisfaction 4	Different font sizes of different e-books reduces my reading satisfaction	3.20	1.224
Dissatisfaction 5	Incorrect resolution of "Text with Images" reduces my reading satisfaction	3.76	1.013
Technology Inhibition [TI] [CA = 0.77; Number of relevant scale items = 3] (Self developed Scale)			
TI 1	I am skeptic of buying an e-reader and switch to e-reading	3.18	1.284
TI 2	I am hesitant about switching to e-readers from my physical books	3.24	1.304
TI 3	I am not sure whether an e-reader comes to my mind when I think of reading	3.37	1.297
n = Number of respondents CA = Cronbach Alpha			

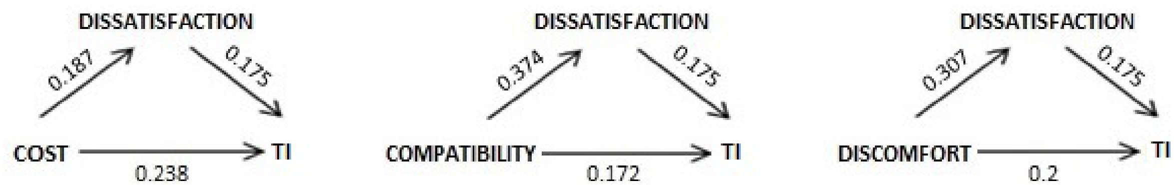
TABLE 5
COMPOSITE RELIABILITY, AVERAGE VARIANCE EXTRACTED AND DISCRIMINANT VALIDITY

Construct	CR	AVE	Compat	TI	Dissat	Risk	Cost	Discom
Compatibility	0.830	0.625	**0.790**					
TI	0.786	0.552	0.121	**0.743**				
Dissatisfaction	0.840	0.569	0.200	0.395	**0.754**			
Risk	0.886	0.723	-0.013	0.306	0.372	**0.850**		
Cost	0.831	0.627	-0.088	0.414	0.334	0.612	**0.792**	
Discomfort	0.856	0.667	-0.141	0.393	0.390	0.577	0.457	**0.817**
CR	Composite Reliability							
AVE	Average Variance Extracted (Square root of AVE displayed in bold along diagonal)							

TABLE 6
HYPOTHESES AND RESULTS

Hypothesis & Relationships								Beta Values	P Values	Result
Direct Paths	H1a			Cost	→	TI	0.302	0.002	Supported
	H1b			Compat	→	TI	0.137	0.064	Supported
	H1c			Discomfort	→	TI	0.25	0.011	Supported
	H1d			Dissat	→	TI	0.198	0.021	Supported
	H1e			Risk	→	TI	-0.093	0.355	Not Supported
Mediating Paths	H2a	Cost	→	Dissat	→	TI	0.209	0.008	Partially Supported
	H2b	Compat	→	Dissat	→	TI	0.261	0.000	Partially Supported
	H2c	Discomfort	→	Dissat	→	TI	0.338	0.000	Partially Supported
	H3a	Cost	→	Risk	→	TI	0.441	0.000	Not Supported
	H3b	Discomfort	→	Risk	→	TI	0.377	0.000	Not Supported

TABLE 7
MEDIATION ANALYSIS RESULTS



Mediation Path	Unstandardized Coefficient			Errors		Sobel's Test Statistic	X --> Y significant	Mediation Effect	Proportion of Mediation (Indirect to Total)
	a	b	c	s_a	s_b				
Cost - Dissatisfaction - TI	0.187	0.175	0.238	0.071	0.076	Significant	Significant	Partial	0.121
Compatibility - Dissatisfaction - TI	0.374	0.175	0.172	0.099	0.076	Significant	Significant	Partial	0.276
Discomfort - Dissatisfaction - TI	0.307	0.175	0.2	0.074	0.076	Significant	Significant	Partial	0.212
Path co-efficient of Risk to TI is negative and not significant Hence Risk does not mediate the relationship between Cost / Discomfort and TI									

TABLE 8
MEASUREMENT MODEL VS. STRUCTURAL MODEL: ESTIMATE & FIT INDICES

Relationships			Measurement Model		Structural Model	
			Standardized Estimate	P Value	Standardized Estimate	P Value
Dissat	←	Cost			0.209	p<0.01
Risk	←	Cost			0.441	p<0.001
Dissat	←	Compat			0.261	p<0.001
Dissat	←	Discomfort			0.338	p<0.001
Risk	←	Discomfort			0.377	p<0.001
TI	←	Risk			-0.093	(ns)
TI	←	Dissat			0.198	p<0.05
TI	←	Cost			0.302	p<0.01
TI	←	Compat			0.137	p<0.1
TI	←	Discomfort			0.25	p<0.01
TI3	←	TI	0.743	p<0.001		
TI2	←	TI	0.818	p<0.001		
TI1	←	TI	0.66	p<0.001		
Dissatisfaction5	←	Dissat	0.665	p<0.001		
Dissatisfaction4	←	Dissat	0.772	p<0.001		
Dissatisfaction3	←	Dissat	0.734	p<0.001		
Dissatisfaction2	←	Dissat	0.836	p<0.001		
Risk3	←	Risk	0.738	p<0.001		
Risk2	←	Risk	0.948	p<0.001		
Risk1	←	Risk	0.852	p<0.001		
Compat3	←	Compat	0.749	p<0.001		
Compat2	←	Compat	0.933	p<0.001		
Compat1	←	Compat	0.665	p<0.001		
Cost5	←	Cost	0.878	p<0.001		
Cost3	←	Cost	0.866	p<0.001		
Cost2	←	Cost	0.601	p<0.001		
Discomfort5	←	Discomfort	0.84	p<0.001		
Discomfort4	←	Discomfort	0.877	p<0.001		
Discomfort3	←	Discomfort	0.725	p<0.001		
$\chi 2$			332.598		336.199	
Degrees of Freedom (df)			137		139	
$\chi 2$/df			2.428		2.419	
CFI			0.917		0.916	
RMSEA			0.077		0.077	
SRMR			0.058		0.061	
CFI	Comparitive Fit Index					
RMSEA	Root Mean Square Error of Approximation					
SRMR	Standardized Root Mean Square Residual					