Unified Theory of Acceptance and Use of Technology (UTAUT)

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MARCH 26, 2015 - METU

Paper Overview

(1) Review user acceptance literature and discuss eight prominent models

(2) Empirically compare the eight models and their extensions

(3) Formulate a unified model that integrates elements across the eight models

(4) Empirically validate the unified model.

(1) Review user acceptance literature and discuss eight prominent models

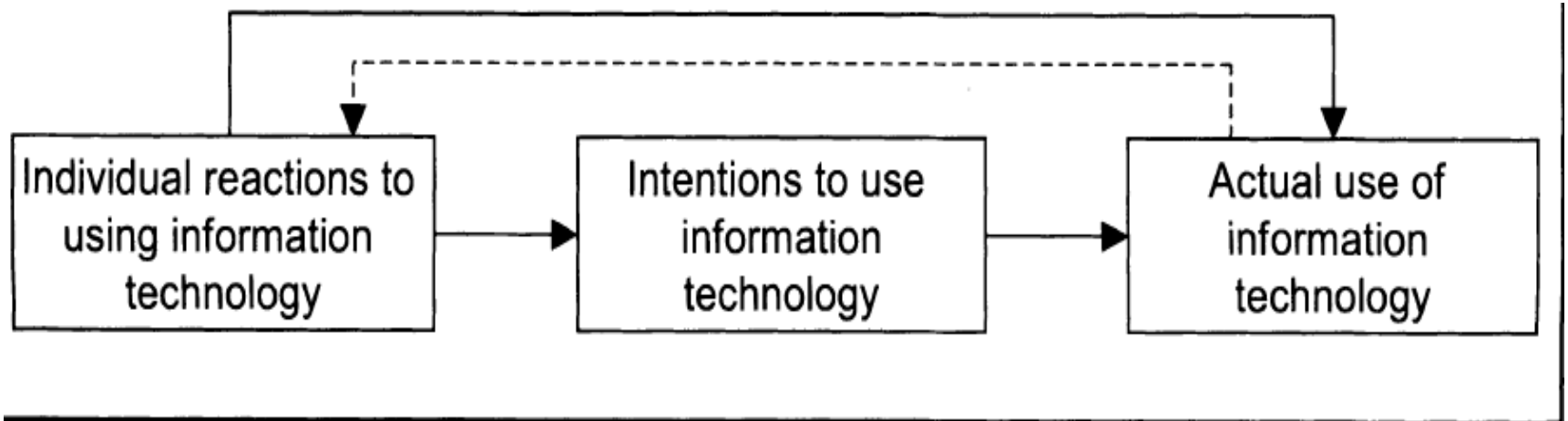


Figure 1. Basic Concept Underlying User Acceptance Models

Technology acceptance models

1963 - Rogers, the Innovation Diffusion Theory (IDT)

1975 - Theory of Reasoned Action (TRA, Fishbein & Ajzen)

1986, 1991 - Theory of Planned Behavior (TPB, Ajzen & Madden)

1989 - Technology Acceptance Model (TAM, Davis)

1991 - Model of PC Utilization (MPCU, Thompson, Higgins, & Howell)

1992 - Motivational Model (MM, Davis, Bagozzi, & Warshaw)

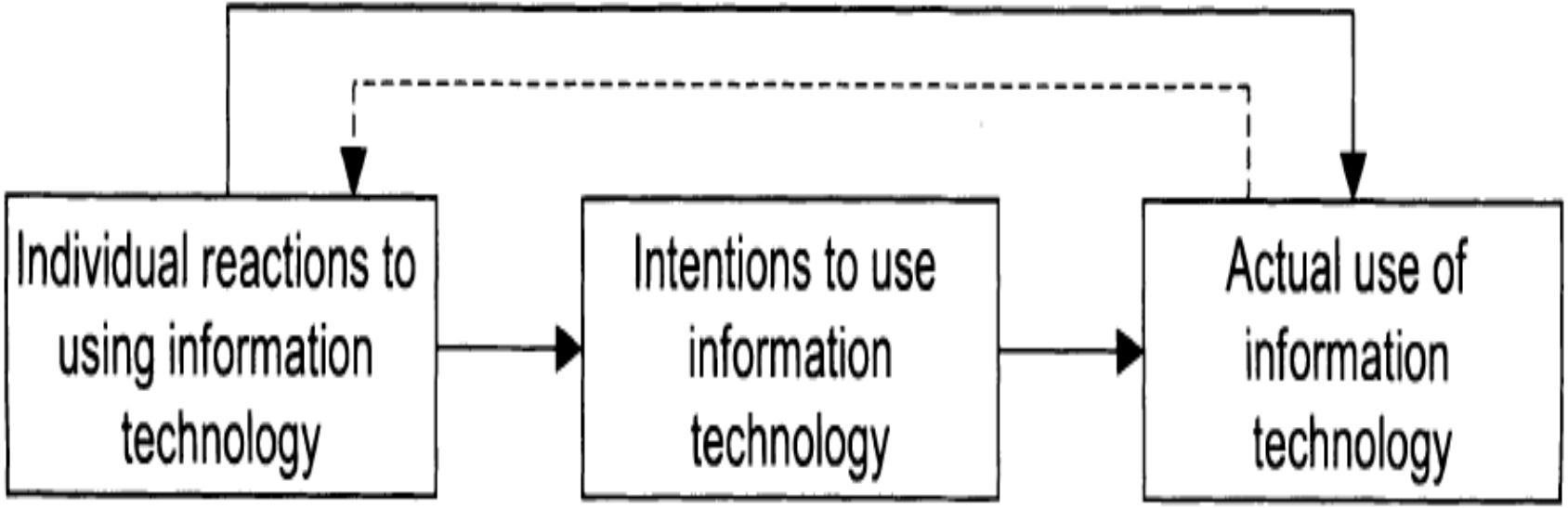
1995 - Combined Theory of Planned Behavior/Technology Acceptance Model (C-TPB-TAM, Taylor & Todd)

1986/1995 - Social Cognitive Theory (SCT, Bandura, 1986; Compeau & Higgins, 1995)

IT acceptance research models

Theory of Reasoned Action (TRA)	**Technology Acceptance Model (TAM)**
Motivational Model (MM)	**Theory of Planned Behavior (TPB)**
Combined Technology Acceptance and Planned Behavior Model (C-TAM-TPB)	**Model of PC Utilization (TMCU)**
Innovation Diffusion Theory (IDT)	**Social Cognitive Theory (SCT)**

Basic Concepts Underlying User Acceptance Models



(2) Empirically compare the eight models and their extensions

Table 2. Role of Moderators in Existing Models

Models/Moderators	Experience	Voluntariness	Gender	Age
Theory of Reasoned Action (TRA)	Yes	Yes	No	No
Motivational Model (MM)	Yes	Yes	No	No
Combined Technology Acceptance and Planned Behavior Model (C-TAM-TPB)	Yes	No	No	No
Innovation Diffusion Theory (IDT)	Yes	Yes	Yes	No
Technology Acceptance Model (TAM)	Yes	Yes	Yes	No
Theory of Planned Behavior (TPB)	Yes	Yes	Yes	Yes
Model of PC Utilization (TMCU)	Yes	No	No	No
Social Cognitive Theory (SCT)	Yes	No	No	No

Longitudinal Data Collection Schedule

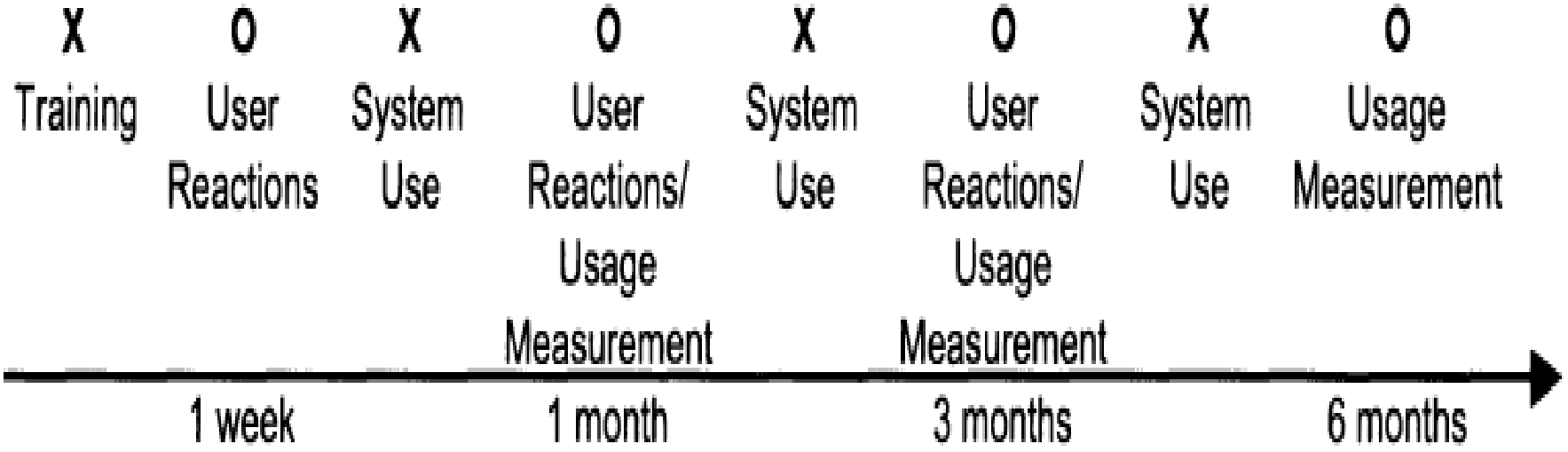


Table 4. Description of Studies

Study	Industry	Functional Area	Sample Size	System Description
Voluntary Use				
1a	Entertainment	Product Development	54	Online meeting manager that could be used to conduct Web-enabled video or audio conferences in lieu of face-to-face or traditional phone conferences
1b	Telecomm Services	Sales	65	Database application that could be used to access industry standards for particular products in lieu of other resources (e.g., technical manuals, Web sites)
Mandatory Use				
2a	Banking	Business Account Management	58	Portfolio analyzer that analysts were required to use in evaluating existing and potential accounts
2b	Public Administration	Accounting	38	Proprietary accounting systems on a PC platform that accountants were required to use for organizational bookkeeping

8 models

In a study of 4 organizations over 6 months, they proved inadequate to explain variances

- Authors cite success as 17-53% for user intentions to use IT
- Prior ***tests*** of models have basic flaws:
  - IT studied were “individual oriented” and simple rather than “organizational” or enterprise oriented and complex in nature
  - In model comparison studies, subjects typically were students, not employees of an organization as in this study
  - Subjects tested well after participant’s decision, not during decision-making process
  - Usage of new system was voluntary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Findings

1. All eight models explained individual acceptance, with variance in intention explained ranging from 17 percent to 42 percent.

2. Voluntary vs. mandatory settings

In mandatory settings (study 2), constructs related to social influence were significant whereas in the voluntary settings (study 1), they were not significant.

3. The determinants of intention varied over time, with some determinants going from significant to non-significant with increasing experience.

Findings

5. With the exception of MM and SCT, the predictive validity of the models increased after including the moderating variables.

6. In addition to intention being a predictor of use, perceived behavioral control became a significant direct determinant of use over and above intention with increasing experience (at T3) indicating that continued use could be directly hindered or fostered by resources and opportunities. (Table-8, next slide)

Predicting Usage

		Use_{12}		Use_{23}		Use_{34}	
	Independent Variables	**R^2**	**Beta**	**R^2**	**Beta**	**R^2**	**Beta**
Studies 1a and 1b (voluntary) (N=119)	Behavioral intention to use (BI)	.37	.61***	.36	.60***	.39	.58***
	Perceived behavioral control (PBC)		.04		.06		.17*
Studies 2a and 2b (mandatory) (N = 96)	Behavioral intention to use (BI)	.35	.58***	.37	.61***	.39	.56***
	Perceived behavioral control (PBC)		.07		.07		.20*

(3) Formulate a unified model that integrates elements across the eight models

UTAUT proposed

Unified Theory of Acceptance and Use of Technology advanced as explaining 70% of observed variances in study

Includes demographic factors ignored in other models

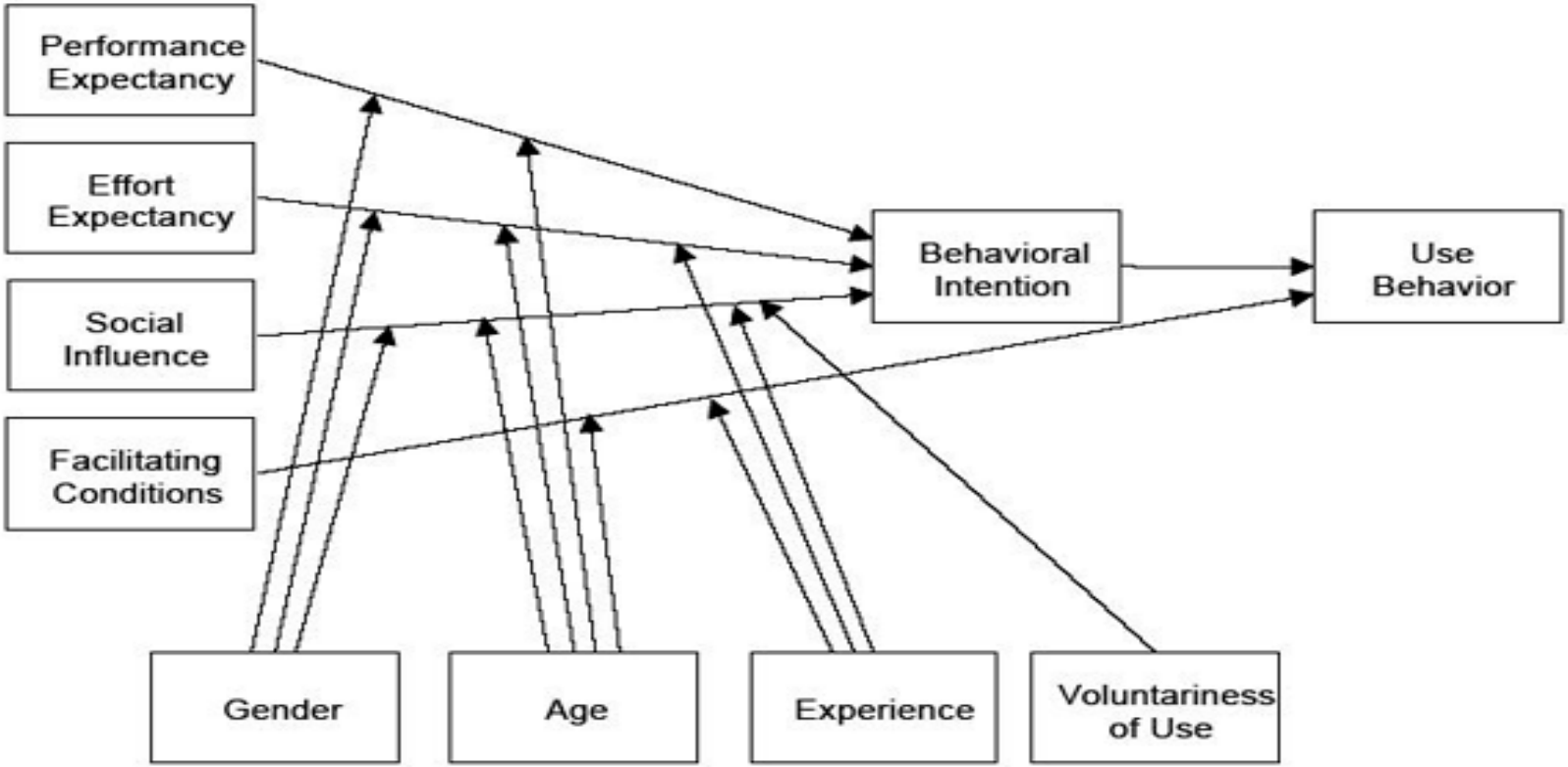
- Age
- Gender

UTAUT test

4 organizations / applications studied:

- Voluntary use:
  - Entertainment / videoconferencing
  - Telcom / standards database
- Required for job:
  - Banking / portfolio analysis
  - Government / Accounting

UTAUT Research Model



Determinant constructs

UTAUT determinant	Definition
Performance Expectancy (PE)	Degree to which an individual believes that using the system will help him/her to attain gains in job performance
Effort Expectancy (EE)	Degree of ease associated with use of the system
Social Influence (SI)	Degree to which an individual perceives that important others believe he/she should use the new system
Facilitating Conditions (FC)	Degree to which an individual believes that an organisational and technical infrastructure exists to support the system

Moderator constructs

Service Length

Service Experience (Position)

Voluntariness of Use

Technology Competence

Hypotheses

H1. The influence of performance expectancy on behavioral intention will be moderated by gender and age, such that the effect will be stronger for men and particularly for younger men.

H2: The influence of effort expectancy on behavioral intention will be moderated by gender, age, and experience, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

H3: The influence of social influence on behavioral intention will be moderated by gender, age, voluntariness, and experience, such that the effect will be stronger for women, particularly older women, particularly in mandatory settings in the early stages of experience.

H4a: Facilitating conditions will not have a significant influence on behavioral intention.

H4b: The influence of facilitating conditions on usage will be moderated by **age and experience**, such that the effect will be stronger for older workers, particularly with increasing experience.

H5a: Computer self-efficacy will not have a significant influence on behavioral intention.

H5b: Compute anxiety will not have a significant influence on behavioral intention.

H5c: Attitude toward using technology will not have a significant influence on behavioral intention.

H6: Behavioral intention will have a significant positive influence on usage.

(4) Empirically validate the unified model

Preliminary Test of UTAUT

Using the post-training data (T1) pooled across studies (N = 215), a measurement model of the seven direct determinants of intention (using all items that related to each of the constructs) was estimated.

All constructs, with the exception of use, were modeled using reflective indicators.

All internal consistency reliabilities (ICRs) were greater than .70. The square roots of the shared variance between the constructs and their measures were higher than the correlations across constructs, supporting convergent and discriminant validity.

Preliminary Test of UTAUT

Inter-item correlation matrices confirmed that intra-construct item correlations were very high while inter-construct item correlations were low.

Results of similar analyses from subsequent time periods (T2 and T3) also indicated an identical pattern.

Cross-Validation of UTAUT

Data were gathered from two additional organizations to further validate UTAUT and add external validity to the preliminary test.

The data were collected on the same timeline as studies 1 and 2.

The data analysis procedures were the same as the previous studies.

The results were consistent with studies 1 and 2.

The items used in the preliminary test of UTAUT were used to estimate the measurement and structural models in the new data.

Preliminary Test of UTAUT

All hypotheses are supported

Cross-Validation of UTAUT

The results were consistent with studies 1 and 2.

Summary of Findings

Hypothesis Number	Dependent Variables	Independent Variables	Moderators	Explanation
H1	Behavioral intention	Performance expectancy	Gender, Age	Effect stronger for men and younger workers
H2	Behavioral intention	Effort expectancy	Gender, Age, Experience	Effect stronger for women, older workers, and those with limited experience
H3	Behavioral intention	Social influence	Gender, Age, Voluntariness, Experience	Effect stronger for women, older workers, under conditions of mandatory use, and with limited experience
H4a	Behavioral intention	Facilitating conditions	None	Nonsignificant due to the effect being captured by effort expectancy
H4b	Usage	Facilitating conditions	Age, Experience	Effect stronger for older workers with increasing experience

Summary of Findings

H5a	Behavioral intention	Computer self-efficacy	None	Nonsignificant due to the effect being captured by effort expectancy
H5b	Behavioral intention	Computer anxiety	None	Nonsignificant due to the effect being captured by effort expectancy
H5c	Behavioral intention	Attitude toward using tech.	None	Nonsignificant to the effect being captured by process expectancy and effort expectancy
H6	Usage	Behavioral intention	None	Direct effect

UTAUT conclusions

Intention to use:

- Performance expectancy strongest factor (use will benefit me)
- Effort Expectancy (should be easy to use)
- Social Influence (complex factor)
  - Gender, age, voluntary participation, experience

Usage Behavior

- Intention
- Facilitating conditions important (I will have help if needed)
  - age / experience

Discussion

The present research set out to integrate the fragmented theory and research on individual acceptance of information technology into a unified theoretical model that captures the essential elements of eight previously established models.

First, we identified and discussed the eight specific models of the determinants of intention and usage of information technology.

Second, these models were empirically compared using within-subjects, longitudinal data from four organizations.

Discussion

Third, conceptual and empirical similarities across the eight models were used to formulate the Unified Theory of Acceptance and Use of Technology (UTAUT).

Fourth, the UTAUT was empirically tested using the original data from the four organizations and then cross-validated using new data from an additional two organizations.

Discussion

These tests provided strong empirical support for UTAUT, which posits three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions).

Significant moderating influences of experience, voluntariness, gender, and age were confirmed as integral features of UTAUT. UTAUT was able to account for 70 percent of the variance (adjusted R2) in usage intention-a substantial improvement over any of the original eight models and their extensions.

Discussion

Further, UTAUT was successful in integrating key elements from among the initial set of 32 main effects and four moderators as determinants of intention and behavior collectively posited by eight alternate models into a model that incorporated four main effects and four moderators.

Questions