

Use of health technologies: Tam-based tools for assessing acceptance by users

Sandra Morelli¹, Giuseppe D'avenio¹, Mirko Rossi¹ & Mauro Grigioni¹

Various socio-psychological theories were developed to explain the individuals' behavior with respect to a new technology (*behavioral theories*) analyzing what are the factors (*determinants*) that can determine its adoption. These determinants are *predictive factors* of the adoption and use of a technology. Technology acceptance theories are based on abstract concepts used in psychometrics, more properly called *constructs* or “psychological variables” not directly observable, so also called “*latent variables*”. Constructs are measured through a set of *observable indicators* (simpler concepts linked to a general construct) formulated in questionnaires with stimulus phrases (*items*), to which the “respondent” expresses his agreement degree on a Likert scale.

A theory, investigating on the acceptance of the personal computer (the technology) introduced in work contexts, was proposed as “Technology Acceptance Model” called TAM (Davis, 1989). This model is a *quantitative motivational cognitive predictive model*: from the constructs “Perceived Usefulness”, “Perceived Ease of Use” and “Attitude Toward Using” (independent variables), the model is able to predict the “Behavioral Intention to Use” (dependent variable). After the TAM, similar acceptance models have been proposed, by modifying and adding constructs respect to the original TAM, for example UTAUT, acronym of Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003) and UTAUT2 (Venkatesh, Thong, & Xu, 2012).

TAM-based models allow investigating on different “behavioral

© 2020 Associazione Oasi Maria SS. – IRCCS

¹ Italian National Institute of Health, National Center for Innovative Technologies in Public Health (ISS, TISP), Rome, Italy.

Correspondence to: Sandra Morelli. E-mail: sandra.morelli@iss.it.

contexts”: *technological context* (perceived usefulness and ease of use), *individual context* (user attitude and experience) and *organizational context* (not only professional environment organization, but also social influences). These models can be used with different target users: healthcare professionals; decision makers; patients and caregivers. Many examples of applications in healthcare are present in literature (Jen & Hung, 2010; Gagnon, Orruño, Asua, Abdeljelil, & Emparanza, 2012; Yan & Or, 2018; Chávez, Borrego, Gutierrez-Garcia, & Rodríguez, 2019).

As part of research project “High-end and Low-End Virtual Reality Systems for the Rehabilitation of Frailty in the Elderly”, funded by Italian Minister of Health, the authors have the task of investigating acceptance of “Virtual Reality” technology in rehabilitation programs, by older patients. We used a model based on the UTAUT2, named VR-TAM (Fig. 1, left), with some differences: the construct “Price Value” was not considered, because the patient does not have to “buy” the technology; moderators were not considered, given the specificity of the sample and the not high size (Fig. 1, right).

Figure1 – Framework of the UTAUT2 model (on the left) and the VR-TAM model (on the right)

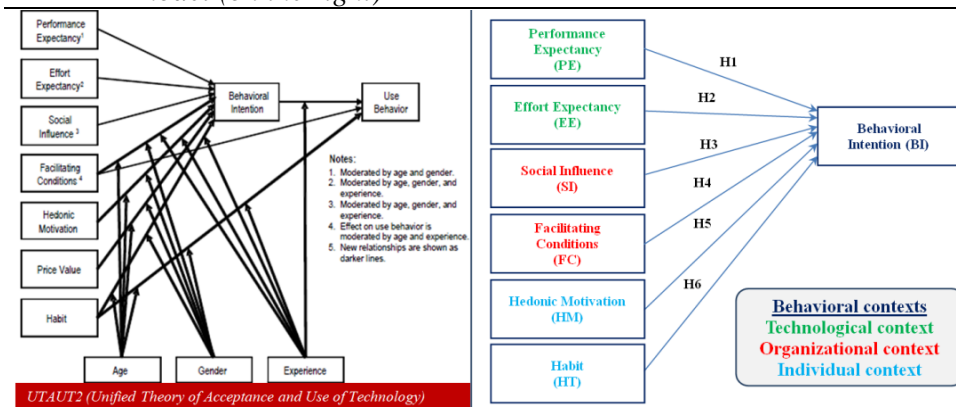


Table 1 shows an extract of the constructs and measurement items used in the VR-TAM questionnaires.

Table 1 – An extract of the constructs and measurement items used in the proposed questionnaires

| Construct | Measurement Items |
|---|---|
| <p>Performance Expectancy (PE) (similar to “<i>Perceived Usefulness</i>”)</p> <p>Definition: In Venkatesh <i>et al.</i> (2003), PE “<i>is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance</i>”. The PE construct is similar to the “<i>Perceived Usefulness</i>” construct of the first TAM model.</p> <p>Extended definition for the context: PE is the feeling that patients hold toward the improvement in their condition/health status by using the <i>VR system</i>.</p> | <p>PE1: I find the <u>VR system</u> useful in managing my health.</p> <p>PE2: Using the <u>VR system</u> help me to accomplish my rehabilitation process more quickly.</p> <p>PE3: Using the <u>VR system</u> increases my effectiveness in managing my rehabilitation.</p> <p>PE4: If I use the <u>VR system</u>, I will increase my chances of improving the quality of my life (my health status).</p> |
| <p>Social Influence (SI) (similar to “<i>Subjective Norm</i>”)</p> <p>Definition: In Venkatesh <i>et al.</i> (2003), SI is “<i>the degree to which an individual perceives that important others believe he or she should use the new system</i>”. SI was already represented as “<i>Subjective Norm</i>” in the TAM2 model (Venkatesh & Davis, 2000) and the original definition of <i>subjective norm</i> is in Fishbein and Azjen (1975, p. 302): a “<i>person’s perception that most people who are important to him think he should or should not perform the behavior in question</i>”.</p> <p>Extended definition for the context: SI refers to the degree to which patients perceive that important people (doctors and family) for them think that they should use the <i>VR system</i>.</p> | <p>SI1. People who are important to me think that I should use the <u>VR system</u>.</p> <p>SI2. People who influence my behavior think that I should use the <u>VR system</u>.</p> <p>SI3. People whose opinions that I value prefer that I use the <u>VR system</u>.</p> |

Understanding and measuring user acceptance of healthcare innovative technologies is crucial for the success and diffusion of these technologies for the disabilities, because acceptance and awareness are the key factors for

eliciting users' adherence to the technology-mediated therapeutic or rehabilitative interventions.

References

Chávez, A., Borrego, G., Gutierrez-Garcia, J. O., & Rodríguez, L. F. (2019). Design and evaluation of a mobile application for monitoring patients with Alzheimer's disease: A day center case study. *International Journal of Medical Informatics*, *131*: 103972. doi: 10.1016/j.ijmedinf.2019.103972.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quartely*, *13* (3), 319-339.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Gagnon, M. P., Orruño, E., Asua, J., Abdeljelil, A. B., & Emparanza, J. (2012). Using a modified technology acceptance model to evaluate healthcare professionals' adoption of a new telemonitoring system. *Telemedicine Journal and E-Health*, *18* (1), 54-59.

Jen, W. Y., & Hung, M. C. (2010). An empirical study of adopting mobile healthcare service: The family's perspective on the healthcare needs of their elderly members. *Telemedicine Journal and E-Health*, *16* (1), 41-48.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46* (2), 186-204. <https://doi.org/10.1287/mnsc.46.2.186.11926>.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quartely*, *27* (3), 425-478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quartely*, *36* (1), 157-178.

Yan, M., & Or, C. (2018). Factors in the 4-week Acceptance of a Computer-Based, Chronic Disease Self-Monitoring System in Patients with Type 2 Diabetes Mellitus and/or Hypertension. *Telemedicine Journal and E-Health*, 24 (2), 121-129.

Copyright of Life Span & Disability is the property of Associazione Oasi Maria SS and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.