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A Culturally-Sensitive Approach to Technology Acceptance: The Process of Applying the UTAUT2 Model in the Philippines

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Abstract

Digital health can enrich care in developed healthcare systems but is increasingly also being proposed as a valuable healthcare option in developing countries. While differences in culture, literacy and infrastructure can influence digital health design, acceptance and implementation, most theories and tools insufficiently take this into account. This work presents processes and concrete actions that were undertaken to develop a tailored strategy for applying and extending the Unified Theory of Acceptance and Use of Technology (UTAUT2) for the Philippines. It illustrates workflows and underscores the importance of critically evaluating models, instruments and strategies before transferring them to a different context.

Keywords: Technology acceptance; Digital health; Digital health design; Healthcare systems; Cross-cultural research; Implementation research

1. Introduction

Digital health can enrich care in developed healthcare systems, but is increasingly also being proposed as a valuable healthcare option in developing countries. At times, it can even be the sole feasible healthcare option due to geographical challenges, reduced medical resources or limited availability of medical and paramedical personnel [1,

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2, 3]. However most theories and tools insufficiently seem to capture differences in culture and infrastructure across countries and continents. Such differences can nevertheless influence digital health design, acceptance and implementation. Focusing on the Philippines, health resources are concentrated in urban centers, despite about half of the population residing in remote areas [4]. Leochico and colleagues have identified certain challenges for the use of telerehabilitation in developing countries, including the Philippines [5]. These challenges can be of a technical nature (e.g., internet coverage), related to organizational factors (e.g., lack of regulations), or be situated in the field of human factors (e.g., attitudes). While the Philippines already have the 2020 E-Health and Telemedicine Development Act, challenges and implementation requirements are often context-specific, with local government struggling to make evidence-based policies for healthcare provision [3].

Digital health has the potential to substantially extend the current healthcare system, if users and healthcare providers are willing and able to use it. Several models have already been developed to predict technology acceptance and Venkatesh and colleagues compared and combined multiple existing models into one theory, the Unified Theory of Acceptance and Use of Technology (UTAUT) [6]. The theory was developed to predict technology acceptance in the workplace but the model was extended to the UTAUT2 for mobile internet use in a consumer context [7]. The predictors in the UTAUT models are the following:

- Performance Expectancy: the individual's expected benefits of technology implementation
- Effort Expectancy: the expected efforts required to make use of the technology
- Social Influence: the opinions of significant others regarding the technology
- Facilitating Conditions: the availability of technology, as well as the know-how regarding its use
- Hedonic Motivation (UTAUT2): enjoyment related to technology use
- Price Value (UTAUT2): whether technology is reasonably priced
- Habit (UTAUT2): the extent to which technology use has become automatic

The UTAUT models also include moderators, i.e., gender, age, experience, voluntariness of use (not included in UTAUT2), all of which influence the effect of the predictors on behavioral intentions and actual technology use behavior. Over the years, the UTAUT models have been used beyond the context for which they were originally designed. Secondary data analysis has supported the validity of several UTAUT predictors in the context of internet and mobile-based treatment interventions for different somatic and mental health conditions [8]. However, depending on the context, research has also suggested that some predictors do not always contribute to the predictive power and additional predictors might need to be added [8,9]. This underscores the importance of critically evaluating models, instruments, and strategies before transferring them to a different context, which can for example consist of a different technology, target population or cultural setting.

Our aim was therefore to develop a multi-step process to facilitate adaptation of a technology acceptance model to a novel digital health context. The current activities are part of a VLIR-UOS project ('Promoting Health Equality: Interprofessional Telerehabilitation for Persons with Disabilities in the Philippines') which aims to pave the way for effective interprofessional telerehabilitation for adult persons with disabilities in remote areas in the Philippines. The project intents to determine (so far) unidentified disability profiles of adult persons with disabilities living in a rural region and explore facilitators, barriers and contextual factors contributing to the potential for digital health acceptance and implementation in rural areas in the Philippines. The project also provides capacity-building opportunities for local research, policy and societal stakeholders, enabling them to support and provide effective telerehabilitation services and take up their leadership role in the community. Hereby, the project will allow to design digital health infrastructure and implementation strategies suitable for this context. The current contribution aims to share processes and actions that were implemented to allow to evaluate and adapt the UTAUT models so they can capture relevant barriers and facilitators for telerehabilitation in the Philippines.

2. Multi-step process of model exploration, evaluation and adaptation

A multidisciplinary team of six researchers from the College of Rehabilitation Sciences at the University of Santo Tomas (Philippines) from the fields of Speech- Language Pathology, Physical Therapy, Occupational Therapy and Sports Science collaborated with researchers from Thomas More University of Applied Sciences (Belgium) with

expertise in implementation and technology acceptance. After setting the scene by reviewing the literature on technology acceptance models, cross-cultural adaptations of technology acceptance models, and digital and health literacy (in the Philippines), the UTAUT and its revision (UTAUT2) were proposed as the basis of the tailored technology acceptance model since these are established models with predictors and moderators of intention to use technology and actual use behavior. However, previous research had also made clear that this model cannot be merely transferred to a new context but that a critical evaluation of the suitability for the current context was needed [9]. A multi-step process was used to develop and operationalize a list of predictors of technology acceptance that could serve as a working model to guide the future data collection strategy in the target population. Therefore, the Belgian researchers used their experience in technology acceptance, implementation and user-centered design to prepare activities which contribute to contextualizing technology acceptance theory. During the research visit, these activities were organized and adapted to the actual needs and insights of the local multidisciplinary team, which resulted in the multi-step process presented here (Figure 1). The following paragraphs detail the different actions and activities.

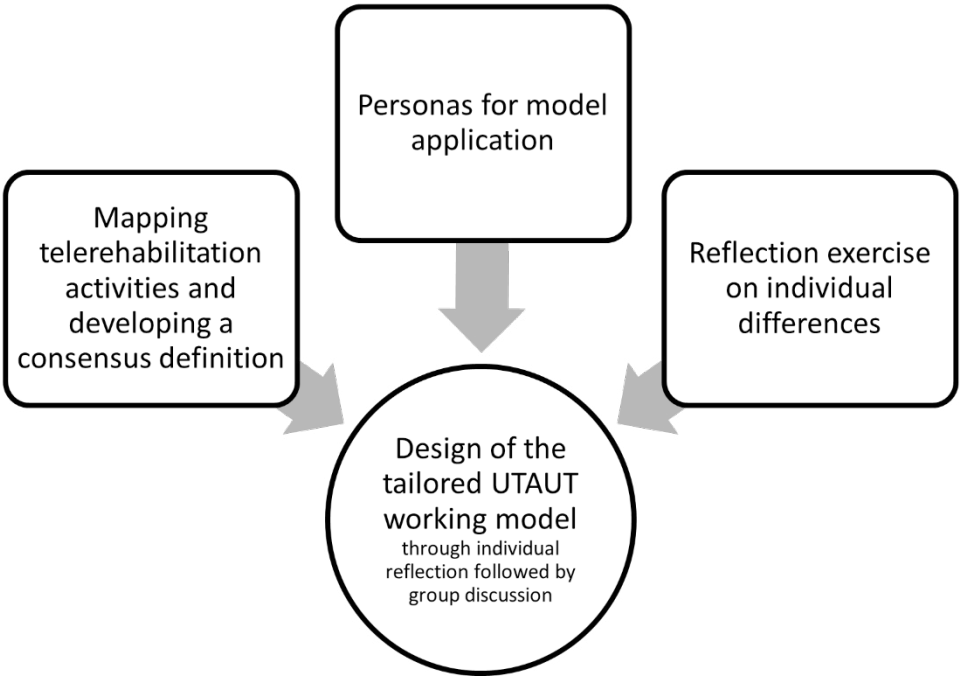


Fig. 1. Visual overview of the development process.

2.1. Mapping telerehabilitation activities and developing a consensus definition

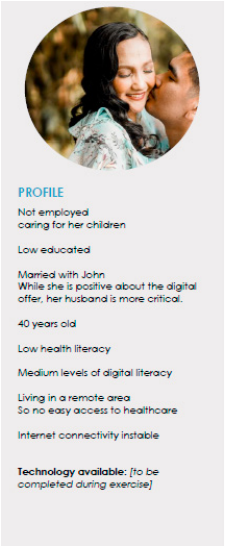
The starting point was a mapping of current and planned telerehabilitation activities. The researchers from the Philippines listed rehabilitation activities and reported for each activity the technological modality (e.g., smartphone, website), the included content or activities, and the target group. This allowed the team to obtain a more detailed insight into the digital health interventions from the different rehabilitation fields that were within the scope. It also provided the basis for definition and goals alignment. The definition of telerehabilitation of Seron et al. [10, p. 2] was put forward as a starting point for discussion, in order to build a consensus on how telerehabilitation could be defined in this context: *"telerehabilitation, considered a branch of telehealth, is set up as a system for the control or monitoring of remote rehabilitation using telecommunications technologies, the purpose of which is to increase accessibility and improve continuity of care in vulnerable, geographically remote populations with disabilities with the potential for saving time and resources in health care."*. Three elements of the definition were critically inspected and compared to the current context in the Philippines: (1) the content of telerehabilitation, (2) the target population, and (3) the goals of telerehabilitation. Several differences in operationalization between the existing definition and context were identified. For example, in the Philippines, the main goal consisted of offering technology to increase

accessibility of healthcare. Saving time and resources was not central to the current operationalization and was therefore removed from the definition.

The consensus definition of telerehabilitation was the following: *"a system for the control or monitoring of remote rehabilitation using telecommunication technologies, the purpose of which is to increase accessibility and improve continuity of care. Activities and target populations can range from general educational initiatives to a broad audience (e.g., free content on social media) to specific tailored interventions in individuals from vulnerable, geographically remote populations with disabilities and their networks (e.g., online consultations)."*. This was an operationalization to facilitate a common understanding for following discussions and activities and could still be adjusted or updated when needed.

2.2. Personas for model application

To assess the applicability of the UTAUT models to the current context and evaluate how the predictors could translate into specific barriers and facilitators, personas were used. The concept of a persona is derived from the field of user-centered design and refers to a profile of a hypothetical user and situation representing a user group for an innovation [11]. Four personas were created based on the telerehabilitation target population and the mapping of telerehabilitation activities (Figure 2). These personas were a telerehabilitation provider, a woman from the general population wanting to improve her health, a mother of a child with a disability (since informal carers were identified as an important additional target population), and an elderly man who suffered from a stroke. The six local researchers partnered up in three duos and selected a persona they deemed relevant. The first three personas were selected (the fourth persona was provided to the researchers in case they wanted to repeat the exercise for this hypothetical user at a later stage). They received post-its and templates to identify potential barriers and facilitators for telerehabilitation according to UTAUT2 predictors and moderators. Additionally, they were asked to report any other barriers or facilitators, which were not included in the UTAUT2 model but could be relevant for their context. The exercise was subsequently discussed in group.



PROFILE

Not employed
caring for her children

Low educated

Married with John
While she is positive about the digital offer, her husband is more critical.

40 years old

Low health literacy

Medium levels of digital literacy

Living in a remote area
So no easy access to healthcare

Internet connectivity instable

Technology available: *[to be completed during exercise]*

MARY

TARGET POPULATION

Mother of Evelyn,
Evelyn is a child with special needs

REMOTE ACTIVITIES

UST OT Aruga Clinic

As a mother of a child with special needs she would be eligible to receive the following activities:

1) *[to be completed during exercise]*

2) *[to be completed during exercise]*

Fig. 2. Example of a persona and picture of the persona activity discussion.

2.3. Reflection exercise on individual differences

The UTAUT models propose several moderators (variables that influence the strength and direction of the relationship between a predictor and intention to use technology). For example, the UTAUT model states that gender can moderate the effect of facilitating conditions on behavioral intention since masculine roles are more focused on

goal-pursuit while feminine roles are more focused on the process (and could value external supporting factors more). However, moderator variables and underlying mechanisms can differ between cultures. To return to the example, the characteristics that are present in a masculine and feminine role could be different in the Philippines as compared to a western country. Therefore, an exercise was designed to help the team reflect on how attributes are linked to potential moderating variables in their cultural context. The six researchers from the Philippines each received the same non-exhaustive list of 33 personal attributes (and some blank cards) that could be relevant for telerehabilitation acceptance (e.g., innovative, cooperative, likes to take risks, difficulty trusting technology, low digital literacy, willing to spend money). Subsequently, potential moderators were presented on the table as categorical variables and individuals were asked whether they would link certain attributes to one of these groups of individuals. The presented moderators were gender (woman vs. man vs. other), age (older vs. younger), living situation (rural living vs. urban living), education (highly educated vs. low level of education), and employment (employed vs. unemployed) (Figure 3). The latter was included since there is a substantial part of the Philippine population which is not gainfully employed. After each researcher had placed the cards of the selected attributes, a group discussion followed to expand on how differences in attitudes, characteristics, or behaviors could potentially influence technology acceptance. This exercise helped to set the scene for informed discussions on predictors and moderators in the next step.

Fig. 3. One of the moderator exercises.

2.4. Design of the tailored UTAUT model

After these three interactive exercises, we reiterated previous implementations and adaptations of the UTAUT model in the context of digital health in developing countries. Previous studies have already suggested several additions to the UTAUT and UTAUT2 to fit the needs of certain samples, with varying success in terms of predictive value. Nevertheless, these additions could provide inspiration for the local context. Examples of predictors that have been added to the UTAUT models in developing countries are self-efficacy [12], privacy and security risk [13, 14],

life quality expectancy [13], perceived health threat [13], technology anxiety [15], resistance to change [13, 15], perceived reliability [16], task-technology fit [14], trust [14], and personal innovativeness in information technology [14]. We also briefly discussed previous UTAUT implementations in the Philippines [17, 18] and discussed the impact of digital literacy, health literacy and digital health literacy. Finally, the study of Noceda and colleagues [19] on technology acceptance for telemedicine in the Philippines during the COVID-19 pandemic also indicated some potential facilitators (e.g., convenience, accessibility, privacy) and barriers (e.g., patient-provider relationship, perceived quality, network connectivity).

The final step aimed to bring together all the information we collected through the exercises and literature to design a first draft of a custom technology acceptance model for telerehabilitation in the targeted rural area of the Philippines. To identify predictors of technology acceptance for the Philippine context, the researchers individually reflected on the following question: *"Our aim is to determine to what extent the UTAUT model can be helpful to predict the use of telerehabilitation in the Philippines. Do we need additional predictors from UTAUT2 or elsewhere? Keep (1) professionals as well as (2) patients or other end users in mind."*. Researchers individually identified additional predictors and wrote them down on post-its, which were subsequently discussed in group. Three independent researchers with expertise on technology acceptation and the Implementation Research Logic Model (IRLM; which is also implemented in the current project) classified the post-its as either a potential additional predictor of individual intention to use technology (i.e., an extension to the UTAUT) or other factors relating to technology implementation in a broader sense (e.g., inner and outer setting factors from the IRLM).

While previous work (e.g., Alam et al.[16]) has sometimes removed some predictors from the UTAUT or UTAUT2 since they were not deemed relevant for their context, the researchers agreed that all predictors of the UTAUT models could be relevant for the current case. Four themes emerged from the final exercise as potential further additions to the UTAUT2 model. These themes were discussed in group and operationalized to measurable concepts. The following themes were proposed .

- Resistance to change: Inhabitants of rural areas often like to maintain things as they know it, so resistance to change could hinder intention to use technology. This factor was previously already identified and operationalized by Alaiad et al. [13] and Hoque & Sorwar [15].
- Time value: seeking rehabilitation or healthcare is currently a time-intensive activity for individuals due to the long transportation times which persons with disabilities often have to undertake together with their informal caregiver to access rehabilitation. Therefore, balancing expected rehabilitation outcomes with the time that needs to be invested was deemed important. Operationalization could be similar to the UTAUT2 price value predictor [7].
- Health prioritization (also termed willingness/will power or commitment to health): In rural areas, health is not always viewed as an important priority. Working and earning money is often deemed more important. Additionally, persons (especially an elderly population) can accept reduced health as something that is just part of their lives as opposed to something they need to act upon. For operationalization, Alaiad et al. [13] was identified as a potential inspiration since they already added a concept linked to health prioritization to the UTAUT based on the Health Beliefs Model.
- Education: Differences in how people view technology were expected based on education levels so education could be a potential moderator of effects.

At the end of the workshops, the researchers had drafted a technology acceptance theory with ten predictors and three moderators, which was tailored to the context of telerehabilitation in the targeted region in the Philippines (Figure 4). However, it is important to note that this is not a fixed model but an adaptable instrument. Further stakeholder discussion can lead to the addition or removal of model elements. The model will shape the design of a data collection strategy in the population of persons with disabilities in rural areas of the Philippines and this data collection will help to determine the relevance of each of the proposed model elements.

3. Conclusion

Theories, models, and instruments that work well in one particular context, might need to be extended or adjusted to get a more complete picture of what factors are at play in a different context. Intensive interactive multidisciplinary workshops and discussions allow to develop a common understanding of how a technology acceptance model can be

applied to and extended for a specific context. The current workflow and activities allowed the team to (1) learn to apply a technology acceptance model to their context, (2) assess whether predictors from the UTAUT2 could be applied to telerehabilitation in the Philippines and (3) identify additional predictors or moderators for technology acceptance.

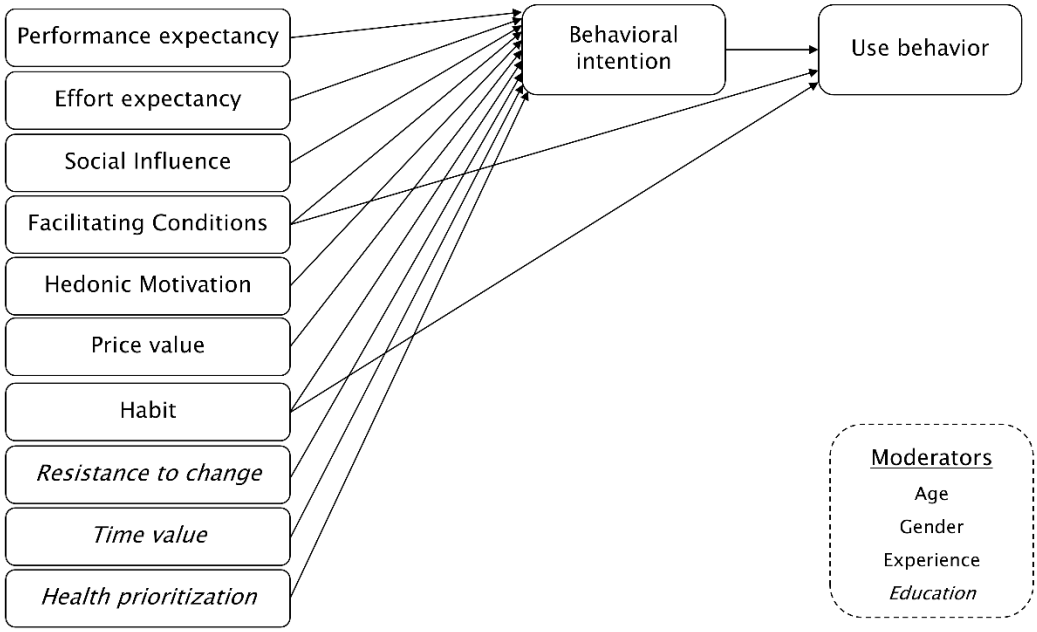


Fig. 4. The adapted UTAUT-2 working model. The newly added elements are presented in italics.

Several lessons were learned during this collaboration. Firstly, intensive collaboration during the on-site workshops provided new insights for all involved collaborators and led to interesting and relevant discussions about the target population and implementation process. Partners learned a lot from each other's views and were able to make informed decisions on which barriers and facilitators might be at play in the context of interest. Secondly, instead of adhering strictly to a predetermined and protocol of activities, it is beneficial to allow for some flexibility to adapt the order and content of activities to the context and needs of the local researchers. New needs tend to arise once a project or task has started, even when everything was prepared thoroughly in advance. Thirdly, it is important to emphasize that these workshop do not aim to design a fixed and final model for technology acceptance in the Philippines. The outcome is a working model that can be updated with new insights and can guide upcoming data collection. New insights at a later time (e.g., due to input from other stakeholders) can result in model changes. It is a limitation that the workshops were conducted with a limited number of local experts and the model will also need to be validated. While the described process facilitates to adapt the UTAUT models to a different cultural setting based on input from local experts, predictors (which are currently thought to be relevant for acceptance and utilization) might not have a (pronounced) impact in practice. Nevertheless, the multi-step process greatly aids in mapping the context and determining which factors might be relevant for technology acceptance and hereby contributes to the design of a tailored data collection and intervention implementation strategy.

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