DETERMINANTS OF THE INTENTION TO USE TELEMEDICINE: EVIDENCE FROM PRIMARY CARE PHYSICIANS

ABSTRACT

Background While most studies have focused on analysing the results of telemedicine use, it's crucial to consider the determinants of its use in order to fully understand the issue. ***Introduction*** This article presents aims to provide evidence on the determinants of telemedicine use in clinical practice. ***Materials and Methods*** The survey targeted a total population of 398 medical professionals from the MútuaTerrassa group, Spain. The study sample was formed by the 93 healthcare professionals who responded. Using an extended Technology Acceptance Model and microdata by the 93 healthcare physicians, binary logistic regression analysis was carried out. ***Results*** The model's goodness-of-fit was confirmed by the values and levels of significance reached by the Chi-square statistic and the Hosmer-Lemeshow test. Likewise, the value of Nagelkerke's statistic indicated that the model obtained explained 48.1% of the dependent variable's variance. ***Discussion*** The outcomes revealed that MútuaTerrassa's physicians placed greater importance on telemedicine's potential to reduce costs, and on its usefulness to the medical profession. The perception of medical information security and confidentiality and the patients' predisposition towards telemedicine were the second explanatory factors in order of importance. While a third set of moderating effects would appear to corroborate the importance of the physicians' own opinions. **Conclusions** These results have revealed the need for a dynamic approach to the design of telemedicine use, especially when it targets a variety of end-users. Hence the importance of conducting studies prior to using telemedicine, and attempting to identify which of the above-mentioned predictors exert an influence and how.

KEYWORDS

Health care, Community of practice, Telemedicine, teleconsulting, Technology Acceptance Model (TAM), Binary logit regression

1. Introduction

In recent years, telemedicine has become the focus of increasing attention in clinical practice research. Understood as the use of information and communication technologies (ICTs) to enable the transfer of medical information for diagnostic, therapeutic and educational purposes [1], it has created rising expectations for healthcare services. These include better management and increased quality, effectiveness and efficiency of clinical practice [2, 3, 4]. However, available evidence suggests that telemedicine use is relatively limited [5, 6]. There is general consensus that its slow, arduous implementation can be attributed to the lack of definitive scientific evidence supporting its positive impact on clinical practice (improved quality and effectiveness) and economic outcomes (improved cost-benefit) [7, 8, 9, 10, 11, 12].

While most studies have focused on analysing the results of telemedicine use (effectiveness, improved healthcare services and quality, etc.) [4], it is crucial to consider the determinants of its use in order to fully understand the issue. In other words, it is necessary to perform an ex-ante analysis of the determinants of telemedicine use, rather than an ex-post analysis of the determinants of the outcomes of telemedicine use. This article therefore presents an ex-ante analysis and aims to provide evidence on the determinants of telemedicine use.

In order to understand the drivers of e-health adoption, a range of methodological and disciplinary approaches have been employed. Technology-oriented research has noted that Roger's diffusion of innovations theory and Davis's technology acceptance model (TAM) have been successfully used to understand the factors that explain ICT use by healthcare professionals [13, 14]. Information systems and social-oriented research has highlighted that clinical practice may be intimately interconnected to a range of digital devices and forms of information [15, 16, 17], and to the ways that users use them in their private lives. Organisation-oriented research has shown that the structure of healthcare organisations, tasks, people policies, incentives and decision-making processes play a major role in explaining how medical professionals overcome barriers to ICT use [18]. Ethical and legal-oriented research has suggested that changes in the nature of the doctor-patient relationship, the status of health informatics and the role of hardware/software providers tend to have an effect on ICT use by medical professionals [19]. Finally, usability-oriented research has shown that compatibility between clinical ICT systems and physicians' tasks, ICT support for information exchange, communication and collaboration in clinical

practice, and interoperability and reliability also explain the success of ICT use in healthcare [20].

Taking the above into account, this study analyses the determinants of MútuaTerrassa's medical staff's intention to use telemedicine. By doing so, the intention was to attain a two-fold objective. Firstly, to characterise and develop a typology of medical professionals according to their ICT use and expectations, and to identify the factors that foster or hinder telemedicine use in the healthcare organisation where they practise. And secondly, to determine the factors that have a greater capacity to explain the intention to use telemedicine.

1.1. Hypothesis and model

TAM is the theoretical proposal most widely applied to research into the acceptance of new information technologies in the professional sphere [21, 22, 23, 24, 25, 26, 27]. In particular, the model has the capacity to robustly explain variance in the intention to use ICTs and ICT use behaviour, taking into account the individual's perceptions of technology. Specifically, these are (1) perceived usefulness and (2) perceived ease-of-use [28, 29]. However, some studies conducted in the field of healthcare have shown that ICT use has a two-fold usefulness. Firstly, it improves the quality of clinical practice [30, 31], and secondly, it reduces the economic, time and human costs associated with clinical practice [32, 33].

> *H1. The perceived usefulness of telemedicine has an influence on the physician's intention to use it.*
>
> > *H1.1. The perception of improved quality has an influence on the physician's intention to use telemedicine.*
> >
> > *H1.2. The perception of reduced costs associated with clinical practice has an influence on the physician's intention to use telemedicine.*

Regarding the second variable, TAM shows how the perceived ease-of-use of ICTs has a two-fold effect on the individual. Firstly, a greater intention to use technology; and secondly, greater perceived usefulness of it. In this respect, Davis *et al*. [22] argued that improved ease-of-use could be instrumental in contributing to an increase in medical professionals' efficiency.

H2. The perceived ease-of-use of ICTs in clinical practice has an influence on the physician's intention to use telemedicine.

Despite its widespread acceptance, this model has a series of limitations that mainly stem from the fact that it does not take the influence of other types of variables into account. Bagozzi [34] and Venkatesh *et al*. [35] underscored the need to increase the explanatory power of this model by incorporating additional variables. According to Davis, identifying variables like these in TAM can increase the explanatory power of the system users' acceptance [23, 36]. This is particularly important to the development of TAMs in the field of healthcare, where the consideration of variables relating to information security and protection, for example, constitutes one of the main incentives for or barriers to technology acceptance [37, 38].

H3. The perception of information security and confidentiality offered by telemedicine use has an influence on the physician's intention to use telemedicine.

In addition to the determinants identified above, we should stress the importance of the geographical, legal, social, cultural and economic contexts of the territory [39] to the acceptance of telemedicine. Together, they have the potential to determine people's predisposition towards using new technologies. By taking into account the contributions made by models tending to stress the importance of the user profile and of social influence (subjective norm), such as the theory of reasoned action (TRA) and the theory of planned behaviour (TPB), we were able to expand our model to include the influence of the professional environment or subjective norm [40, 41, 42]: the patients, the medical staff and the healthcare centre's board of directors. With regard to the incentives offered by the healthcare centre's board of directors, it should be noted that, in addition to the effect that they have on the medical staff's intention to use telemedicine, they generate a moderating effect on the medical staff and the healthcare centre.

H4. The subjective norm (understood as the influence exerted by the patients, the medical staff and the healthcare centre's board of directors) has an influence on the physician's intention to use telemedicine.

H4.1. The patients have an influence on the physician's intention to use telemedicine.

H4.2. The medical staff has an influence on the physician's intention to use telemedicine.

H4.3. The incentives offered by the healthcare centre's board of directors with regard to telemedicine use has an influence on the physician's intention to use telemedicine.

H4.4. The existence of public incentives to use telemedicine exerts a moderating effect on the medical staff's interest in using telemedicine.

Some empirical studies have also noted the moderating effect that the subjective norm has on the user's perceived usefulness of ICT use [28, 43, 44]. While there is no consensus on the moderating effect that the subjective norm has on perceived usefulness, we assumed that this effect on clinical practice was positive. Robinson studies' [45] showed how the opinions of the patients, the medical staff and the healthcare centre's board of directors had a positive influence on the physician's perceived benefits of ICT use.

H5. The physician's perception of how the patients, the medical staff and the healthcare centre's board of directors value telemedicine has an influence on the physician's perceived usefulness of telemedicine.

H5.1. If the physician perceives that the patients value telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.

H5.2. If the physician perceives that the patients value telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.

H5.3. If the physician perceives that the medical staff values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.

H5.4. If the physician perceives that the medical staff values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.

H5.4. If the physician perceives that the healthcare centre's board of directors values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.

H5.6. If the physician perceives that the healthcare centre's board of directors values telemedicine positively, a moderating effect is exerted on

the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.

Finally, it should be noted that physicians use ICTs in their professional and personal lives. As ICT users, physicians may use technology with differing degrees of intensity and frequency. When it comes to defining the profile of an ICT user, cultural and social aspects clearly have a role to play [2], as do other circumstantial variables such as experience and training [46]. The development of mixed-approach models comprising elements that refer to both the user profile and to technology, such as Parasuraman's theory of technology readiness (TR) [47], allowed us to consider the need to incorporate elements that refer to the user profile and the user's relationship with ICTs.

H6. The ICT user profile of the physician – as an individual, in his or her personal life – has an influence on the intention to use telemedicine.

In short, we considered that the medical staff's intention to use telemedicine depended on three major groups of variables: a) the physician's perception of telemedicine; b) the subjective norm; c) the physician's relationship with ICTs as a user in his or her personal life. The proposed model is shown in the figure below.

2. Materials and Methods

2.1. Study design and sample selection

The research presented in this article is the result of a collaboration between MútuaTerrassa and the Open University of Catalonia (UOC), Spain. As an exploratory study focusing on the analysis of a single healthcare institution, a mixed qualitative and quantitative methodology was used, and a questionnaire was designed to serve as the data collection instrument.

The final questionnaire was organised into five blocks of questions: (a) Sociodemographic and professional background; (b) Degree of ICT and Internet use in general; (c) Degree of IT-system, ICT and Internet use at work; (d) Opinions about ICT and Internet use in the field of healthcare; and (e) Opinions about telemedicine use in clinical practice. The questionnaire had 7 theoretical sections and 36 variables. The survey was anonymous and optional.

2.2. MútuaTerrassa

The survey targeted a total population of 398 medical professionals from the MútuaTerrassa group. The group manages nine primary care centres (Sant Cugat, Valldoreix, Turó de Can Mates, Rubí, Olesa de Montserrat, Rambla, Terrassa Sud, Oest and Can Trias), which have the MútuaTerrassa University Hospital as their reference. These centres serve 240,000[1] inhabitants.

The study included the answers given by 96 professionals who had agreed to take part, who worked for MútuaTerrassa between April and June 2012.

2.3. Study variables and measurement scale construction

Table II shows the variables used in the study.

The variable *Perceived usefulness* of telemedicine has two dimensions: usefulness measured in terms of a) improving the quality of clinical practice and b) reducing costs associated with clinical practice (Table II). Both dimensions were obtained by performing a Principal component factor analysis (see Table III). The Crombach's Alpha values confirm the reliability of the scales. Additionally, the content and construct scales' discriminant, convergent and nomological validity were also addressed. With regard to the content, the scales were developed following a major review of the literature.

The ICT user profile was obtained by performing a hierarchical cluster analysis. Table IV shows the final centroid values for the three different clusters found. Table V shows the ANOVA values obtained by taking the groups defined by the clusters as a factor, and each variable in the analysis as a dependent variable.

Table VI shows the characteristics defining the different profiles. The first group, referred to as 'intermediate user', was formed by 63 individuals, the. The second group, referred to as 'basic user', was formed by 16 individuals.

Finally, note that seven multiplicative variables were created to measure different moderators. The first of these variables was **INCENADMON*INTERMEDIC**, which measured the moderating effect that the existence of public incentives had on telemedicine use, by exerting on influence on the medical staff's interest in using this practice. The others were **INTP*UP1**, **INTP*UP2**, **INTM*UP1**, **INTM*UP2**, **INADMON*UP1** and **INADMON*UP2**, which indicated the moderating effect that the subjective norm had on perceived usefulness.

---

[1] Data from Idescat, the Statistical Institute of Catalonia:
http://www.idescat.cat/territ/BasicTerr?TC=5&V0=1&V1=08205&V3=669&V4=446&ALLINFO=TRUE&PARENT=1&CTX=B

3. Results

In order to test the hypotheses proposed in the study and, therefore, to establish the direct and moderating effects that the above-mentioned variables have on the physicians' decision to use telemedicine, a logistic regression analysis was performed. The model's goodness-of-fit was confirmed by the values and levels of significance reached by the Chi-square statistic (30.786, 0.013) and the Hosmer-Lemeshow test (17.75, df:8, 0.046). Likewise, the value of Nagelkerke's statistic indicated that the model obtained explained 48.1% of the dependent variable's variance.

Table VII shows the estimated parameters for each independent variable, as well as their level of significance within the model. The results obtained allowed us to accept hypotheses H1.2., H3., H4.1., H4.2., H5.1., H5.2., H5.3, H5.4 and H5.6., and reject hypotheses H1.1., H4.3., H4.4., H5.5. and H6 with regard to the direct and moderating effects exerted by these variables. To sum up, Table VIII shows the final results for the hypotheses proposed in the study.

4. Discussion

The aim of this study was to explain the factors that determine the adoption of telemedicine in clinical practice by MútuaTerrassa's medical staff. To that end, a theoretical model based on a modified TAM was used as the analysis tool.

Our study revealed four main results. Firstly, it confirmed that a) perceived usefulness for reducing costs associated with clinical practice (β=1.324, p=0.020) and b) the medical staff's interest in using telemedicine (β=1.005, p=0.091) were the explanatory factors that had the biggest impact on the probability of using telemedicine. As the TAM suggests, the statistical significance of these two determining factors refers back to the importance of perceived usefulness when the use of a technology needs to be explained. Specifically, MútuaTerrassa's physicians placed importance on telemedicine's potential to reduce costs, and on its usefulness to the medical profession. The need to optimise costs in a context of economic crisis, healthcare cost containment, health service cutbacks, and the fact that MútuaTerrassa is a nonprofit private foundation may explain the significance of reducing costs associated with clinical practice. At the same time, the result relating to the medical staff's interest in telemedicine could also be attributed to network effects, which are crucial to the adoption of any technology [48].

However, neither telemedicine's perceived usefulness for improving the quality of clinical practice, nor the perceived ease-of-use of ICTs in clinical practice were found to be significant. In this respect, telemedicine was perceived as a technology that serves to reduce costs rather than increase quality. Given that the physicians in the study sample had a mean age that did not exceed 40 years, and that they had been in post for a mean of 13 years, the most plausible explanation is that perceived usefulness in terms of quality was not significant because they had a more realistic view and more reasonable expectations of issues connected with the adoption of telemedicine.

In the explanation of telemedicine use by MútuaTerrassa's physicians, second in order of importance were the perception of medical information security and confidentiality (β=0.768, p=0.017), and the patients' predisposition towards telemedicine (β=0.583, p=0.084). While there is empirical evidence of the significance of medical information security and confidentiality, much of the research has concluded that the lack of a privacy and confidentiality policy represents a considerable barrier to telemedicine use. In the explanation of the intention to use telemedicine, the positive effect of the patients' influence could be attributed to the specific nature of MútuaTerrassa.

In the explanation of telemedicine use by MútuaTerrassa's physicians, a third group of results demonstrated the statistical significance of a set of moderating factors. Albeit with lower coefficients/probabilities than those noted previously, telemedicine use can be explained by the fact that: 1) the patients' positive assessment of telemedicine use by the physicians exerts a moderating effect on the physicians' perceived usefulness of telemedicine for improving their clinical practice (β=0.347, p=0.084) and 2) for reducing the costs associated with their clinical practice (β=0.462, p=0.004); 3) the medical staff's positive assessment of telemedicine use exerts a moderating effect on the physicians' perceived usefulness of telemedicine for improving their clinical practice (β=0.366, p=0.046) and 4) for reducing the costs associated with their clinical practice (β=0.488, p=0.044); and 5) the healthcare institution's positive assessment of telemedicine use exerts a moderating effect on the physicians' perceived usefulness of telemedicine for reducing the costs associated with their clinical practice (β=0.571, p=0.022). In the explanation of the intention to use telemedicine, this set of moderating effects would appear to corroborate the importance of the physicians' own opinions. The physicians would moderate their perceptions of usefulness when the patients' and the institution's opinions of telemedicine use were favourable.

Finally, in the explanation of telemedicine use, the intensity of the physicians' ICT use in their personal lives was not significant. Despite being a professional group that did not use ICTs intensively, it perceived that ICT applications in the field of healthcare were secure, not too difficult to use, and also offered significant benefits in terms of reducing costs, all of which prevailed in the physicians' intention to use telemedicine.

These results have revealed the need for a dynamic approach to the design of telemedicine use, especially when it targets a variety of end-users. Hence the importance of conducting studies prior to using telemedicine, and attempting to identify which of the above-mentioned predictors exert an influence and how.

Beyond these preliminary results, the authors believe that future research should include a) a comparison of the results with other samples of physicians who use telemedicine, particularly a comparative study of the public and private sectors, and b) an extension of the ex-ante model to an ex-post model in order to analyse how the determinants of telemedicine use affect the outcomes of clinical practice.

Acknowledgements

The authors would like to thank the physicians who agreed to participate in this study; Dolors Ruiz Morilla who implemented the survey and collected the data in MútuaTerrassa group; and Núria Giménez for her support.

The English version of this work has been reviewed by a native professional and thanks to the support of the eLearn Center at the Open University of Catalonia.

Statement on conflicts of interest

Non-competing interests.

References

1. Norris AC. *Origins and development. En: Essentials of telemedicine and telecare*. Chichester: John Wiley & Sons, Ltd, 2002, p. 2

2. Ammenwerth E, Graber S, Herrmann G, Burkle T, Konig J. Evaluation of health information systems—problems and challenges. *International Journal of Medical Informatics* 2003; 71: 125–135

3. European Commission. *eHealth for Safety Report*. Office for Official Publications of the European Communities, Luxembourg. 2007

4. Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Ann Intern Med* 2006; 144(10): 742-752

5. Broens TH, Huis in't Veld RM, Vollenbroek Hutten MM, et al. Determinants of successful telemedicine implementations: a literature study. *J Telemed Telecare* 2007; 13:303–309.

6. de BA and Bal R. Telemedicine in interdisciplinary work practices: on an IT system that met the criteria for success set out by its sponsors, yet failed to become part of every-day clinical routines. BMC Med Inform Decis Mak 2008; 8:47.

7. Grigsby J, Brega AG, Devore PA. The evaluation of telemedicine and health. services research. *Telemed J E Health* 2005; 11:317–328.

8. Poon E, Jha A, Christino M, Honour M, Fernandopulle R, Middleton B, et al. Assessing the level of healthcare information technology adoption in the United States: a snapshot. *BMC Med Inform Decis Mak* 2006; 6:1.

9. Jha AK, Doolan D, Grandt D, Scott T, Bates DW. The use of health information technology in seven nations. *Int J Med Inform* 2008; 77(12):848-854.

10. Roig F and Saigí F. Difficulties of incorporating telemedicine in health organizations: analytical perspectives. *Gac Sanit* 2009; 23, 147.e1-4

11. Christensen MC and Remler D. Information and communications technology in U.S. health care: why is adoption so slow and is slower better? *J Health Polit Policy Law* 2009; 34(6):1011-1034

12. Ekeland AG, Bowes A, Flottorp S. Effectiveness of telemedicine: a systematic review of reviews. Int J Med Informat 2010; 79:736–771.

13. Masters K. For what purpose and reasons do doctors use the Internet: a systematic review. *Int. J. Med. Inform*. 2008; 77(1): 4-16

14. Jimoh L, Pate MA, Lin L, Schulman KA. A model for the adoption of ICT by health workers in Africa. *Int. J. Med. Inform* 2012; 81 (3): 773-781

15. Berg M and Toussaint P. The mantra of modeling and the forgotten powers of paper: a Sociotechnical view on the development of process-oriented ICT in health care. *Int. J. Med. Inform* 2003; 69 (2-3): 223-234

16. Al-Gahtani SS and King M. Attitudes, satisfaction and usage: factors contributing to each in the acceptance of information technology. *Behavior and Information Technology* 1999; 18 (4): 277–297

17. Gagnon MP, Pluye P, Desmaris M, Car J, Pagliari C, Labrecque M, Frémont P, Gagnon J, Njoya M, Légaré F. A systematic review of interventions promoting clinical information retrieval technology (CIRIT) adoption by healthcare professionals. *Int. J. Med. Inform*. 2010; 79: 669-680

18. Lluch M. Healthcare professional's Organisational barriers to health Information technologies: A review literature. *Int. J. Med. Inform*. 2011; 80 (2): 849-862

19. Kluge E-HW. Ethical and legal changes for health telematics in a global world: Telehealth and the technological imperative. *Int. J. Med. Inform*. 2011; 80: eI-e5

20. Viitanen J, Hyppönen H, Lääveri T, Vänskä J, Reponen J, Winblad I. National questionnaire on clinical ICT systems proofs: Physicians suffer from poor usability. *Int. J. Med. Inform*. 2011; 80: 708-725

21. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q*. 1989; 13: 319–340

22. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology. *Manage. Sci*. 1989; 35: 982–1003

23. Davis FD. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int. J. Man-Machine Studies* 1993; 38: 475–487

24. Davis FD and Venkatesh V. A critical assessment of potential measurement biases in the technology acceptance model: three experiments. *Int. J. Human-Comput. Studies* 1996; 45: 19–45

25. Ma Q and Liu L. The technology acceptance model: a meta-analysis of empirical findings. *J. Org. End-User Comput*. 2004; 16 (1): 59–72

26. Lee Y, Kozar KA, Larsen KRT. The technology acceptance model: past, present and future. *Comunications of the Association of Information Systems* 2003; 12: 752-780,

27. Venkatesh V and Morris MG. Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MS Quartely* 2000; 24(1): 114-139

28. Venkatesh V and Davis FD. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Manag Sci* 2000; 46/2: 186-204

29. McKechnie S, Winklhofer H, Ennew C. Applying the technology acceptance model to the online retailing of financial services. *Intern J Retail & Distrib Manag* 2006; 34/4: 388 -410.

30. Palmas W, Shea S, Starren J. et al. Medicare payments, healthcare service use, and telemedicine implementation costs in a randomized trial comparing telemedicine case management with usual care in medically underserved participants with diabetes mellitus (IDEATel). *J Am Med Inform Assoc* 2010; 17:196-202

31. Wu S, Chaudhry B, Wang J, et al. Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Annals of Internal Medicine* 2006; 144.(10): 742-752

32. Ball MJ and Lillis J. E-health: transforming the physician/patient relationship. *International Journal of Medical Information* 2001; 61(1):1-10

33. Jennett PA, Hall A, Hailey D, Ohinmaa A, et al. The socio-economic impact of telehealth: a systematic review. *J Telemed Telecare December* 2003; 9:311—320

34. Bagozzi RP. The legacy of the technology acceptance model and a proposal for a paradigm shift. *J Assoc Inf Sys* 2007; 8/4: 244-254

35. Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: towards a unified view. *MIS Quarterly* 2003; 27, n. 3: 425-478

36. Venkatesh A and Davis FD. A model of the antecedents of perceived ease of use: development and test. *Decisions Sci.* 1996; 27: 451–481

37. Angst CM and Agarwal R. Adoption of electronic health records in the presence of privacy concerns: the elaboration likelihood model and individual persuasion. *Management Information Systems Quarterly* 2008; 33 (2): 339–370

38. Dünnebeil S, Sunyaev A, Blohm I, Leimeister J, Krcmar H. 2010. Do German physicians want electronic Health Services? A characterization of potential adopters and rejectors in German Ambulatory Care. *Third International Conference on Health Informatics* (HealthInf 2010), Valencia

39. Fitgeral G, Piris L, Serrano A. Identification of Benefits and Barriers for the Adoption of E-Health Information Systems Using a Socio-Technical Approach. Proceedings of the *ITI 2008 30th Int. Conf. on Information Technology Interfaces,* June 23-26, 2008,Cavtat,Croatia. 601-606

40. Pavlou PA and Fygenson M. Understanding and predicting electronic commerce adoption: an extension of the theory of planned behaviour. *MIS Quarterly* 2006; 30 n. X: 1-38

41. Schepers J and Wetzels M. A meta-analysis of the technology acceptance model: investigations subjective norm and moderation effects. *Information & Management* 2007; 44: 90-103

42. Wang Sh-M and Lim JCh-Ch. The effect of social influence on bloggers´usage intention. *Online Information Review* 2011; 35 n. 199: 50-65

43. Limayem, M., Khalifa, K.; A. Frini, A. What makes consumers buy from Internet? A longitudinal study of online shopping. IEEE Transactions on Systems, Man and Cybernetics-Part A: Systems and Humans ,v.30 n. 4 July p. 421-432, 2000

44. Taylor S and Todd PA. Understanding information technology usage: a test of competing models. *Inform Sys Res* 1995; 6/2: 144-176

45. Robinson E. *E-health and the Internet: Factors that Influence Doctors' Mediation Behaviors with Patients*. Communication Theses. Paper 46, 2009.

46. Agarwal AR and Prasad J. Are individual differences germane to the acceptance of new information technologies? *Decision Sciences* 1999; 30 (2): 361–391

47. Parasuraman A and Grewal D. The Impact of Technology on the quality –value – loyalty chain: A Research Agenda. *Journal of the Academy of Marketing Science* 2000; 28(1): 168-174.

48. Torrent J. Knowlege products and networks externalities: Implications for the business strategy. *Journal of the Knowledge Economy* 2013; 2(2). [DOI: 10.1007/s13132-012-0122-7].