

# The role of social support network in e-health services for elderly persons

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**Abstract.** Regardless of the abundant literature on the relationship between social support network and health outcomes of the elderly, there are nearly no studies examining them in the online context. In this paper, we explore the role of social support network in e-health services in the context of a European project, whose aim is to develop a multimedia platform providing social e-services for elderly persons and their social entourage. We collect data in three European countries to examine the relationship among the social network, social support, e-service quality, satisfaction, perceived quality of life and health-promotion behavior. This study contributes to the extension of IS service quality research to the context of social networks, and offers IS practitioners some insights to provide better e-health services.

**Keywords:** social network, social support, e-health, service quality

## 1 Introduction

E-health, through the employment of information and communication technology (ICT), offers promising opportunities for improving the quality and efficiency of health care. The World Health Organization defines e-health as being “the cost-effective and secure use of information and communication technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research” [1]. The e-health literature has shown many important benefits of e-health, which include reducing medication errors, lowering health care costs, accessing to quality health care services, supporting user involvement and self-care [2-6]. However, the widespread adoption of e-health technologies is being faced by several challenges, such as concerns about privacy and security, lack of collaboration between different stakeholders, and digital divide issues. Older adults are generally weak users of ICT, thus are difficult to obtain, process, and understand health information and services, which is referred as e-health illiteracy [7]. This makes it challenging to provide high quality e-health services for the elderly population.

Abundant studies have found that social networks and the social support offered by them are significantly associated with elderly health [8-10]. Berkman et al. [11] consider social networks as the social structure that provides connection and potential support for individuals. They develop a model to conceptualize and structure these links, and suggest that there are several pathways for social networks to influence health, such as social support, social influence, social engagement, close personal contact, and access to material resources. While some older persons may maintain extensive social contacts, others are likely to reduce their connections because of physical or emotional reasons, which means they become much less social connected than before. It is found that people with more social ties have lower mortality risks, and increased social support is related to better physical and mental health [12]. In contrast, elderly people who have poor social connections and fewer social interactions have been reported with greater risk of health problems [13]. It is also found that social interaction and relationships are important to individuals living with early-stage Alzheimer's disease, by providing the essential support, cooperation, and encouragement that enabled them to create meaning in life and sustain identity [14].

In this paper, we consider the role of social support network in e-health services for elderly persons. Social networks provide opportunities to improve the social interactions between the older adults and their family members or friends, who can potentially support them in the use of e-health applications and health-promoting behaviors. To our knowledge, the role of elderly-centered social networks has not previously been examined in the e-health literature. We develop a theoretical model in the context of e-health services, to examine the relationships among social network, social support, e-service quality, user satisfaction, perceived quality of life and health-promoting behaviors. We argue that social networks contribute to patient empowerment, by which individuals are encouraged to take an active part in their own health management, and are able to better cooperate with their physicians in delivering high quality healthcare service, as services often involve co-production processes. We conduct an empirical study on a European project, whose goal was to develop an intelligent multimedia platform providing e-health services for European elderly persons and their social entourage. We adopt questionnaires to collect data among the end users of this platform, testify our theoretical model and hypotheses using these empirical data. Finally, we discuss the theoretical and practical implications of this study, and provide the conclusion and future research directions.

## **2 Literature review**

### **2.1 Social network and health**

From a social network perspective, individuals and their social interactions can be represented as nodes and ties, meaning that individuals are embedded in networks of social relationships and interactions. Analysis of social networks is increasingly included into health care research, such as epidemiological studies, patient communication and education, disease prevention, mental health diagnosis and

treatment, and in the study of health care organizations and systems [15]. Plentiful research has found that some properties of social networks are positively associated with both physical and mental health outcomes for older people [9, 10]. For example, Wenger [16] identified five different types of networks of older adults, and the risk levels for particular problems associated with each network type. It was found that elderly with local family-dependent or private-restricted networks tended to have high risk for social isolation, loneliness, depression, and other mental illness, while those positioned in locally integrated networks are at the least risk. Field [17] interviewed eighty-seven older people living in sheltered housing, measuring their physical and mental health, social networks, social support, decision to move in, and how they found living in sheltered housing. The study supported the authors' hypotheses that residents with more limited support networks have worse physical and mental health and less positive experiences of living in sheltered accommodations than those with sufficient networks. Litwin & Shiovitz-Ezra [18] examined the association of social network type and mortality risk in later life among adults aged 60 and older. The survey results showed that respondents embedded in diverse and friend-focused network types, and to a lesser extent those embedded in community-clan network types, had a lower risk of mortality compared to people belonging to restricted networks. The same authors have recently [19] investigated social network types and subjective well-being in a national sample of older Americans. Five social network types were identified: "diverse," "friend," "congregant," "family," and "restricted," and it was found that network type was related to the well-being of the elderly. Respondents located in networks characterized by greater social capital tended to have better well-being in terms of less loneliness, less anxiety, and greater happiness.

## **2.2 Social support**

Social support, the psychosocial function generated by social networks, is an important aspect of social connection that contributes to health behaviors and health condition [11]. The studies on the relationship between social support and health outcomes are largely evolved from the field of mental health, with the findings that emotional support provided by relatives and friends was associated with improved well-being and mental health [20, 21]. House et al. [22] distinguished four different types of support, including emotional support, appraisal support, informational support, and instrumental support. The social support could directly influence health outcomes by providing access to information or by improving motivation to engage in adaptive behaviors. It could also indirectly influence outcomes by persuading the individual to comply with treatment recommendations, to maintain health promoting behaviors such as exercise and relaxation, or to provide instrumental support such as a ride to a medical appointment or grocery shopping [23]. It was shown that there were a wide range of benefits associated with good social support, such as higher level of quality of life [24], better compliance with medical treatment [25, 26], and improved abilities to cope with illness-related stress [27, 28]. On the contrary, a lack of social support was linked to negative outcome such as increased risk of mortality [18, 29].

In recent years, researchers have begun to examine social support and health issues in online contexts. McLaughlin [30] examined the factors that could influence the young

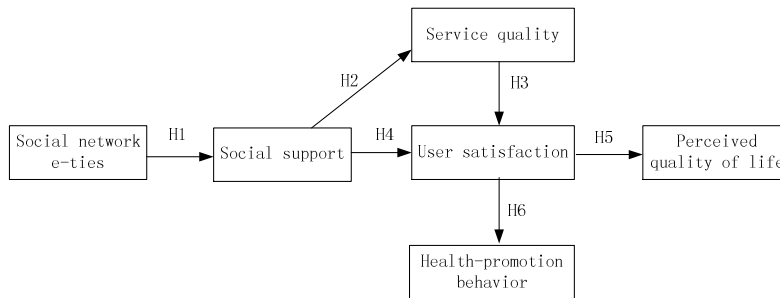
adult cancer survivors' participation in a social networking and video-sharing platform. It was shown that individuals with little social support from friends and family, and weak family interaction participated in the mobile social network more than those with stronger ties and larger bases of support. The implication was that cancer survivors used the social network as a way to fulfill needs that were not being met in their "offline" lives. Some researchers have reported that online support groups are valuable alternatives to face-to-face support groups because of the advantages such as twenty-four-hours access, anonymity and diversity of viewpoints, ethnicity, geography and social status [31-33]. Online support groups have the potential to foster patient empowerment, which can encourage the patients take a more active role in their health and care pathway [34], and improve the quality of consultation with their physician [35], thus the optimal outcomes of the health care interventions can be achieved.

### **2.3 e-service quality**

In order to meet the increasing needs of service orientation in IT industry, researchers in information systems field putted great concerns on the quality of service in the last decade [36-39]. DeLone and Mclean [40] firstly included service quality as a separate dimension to predict the IS success in 2003 [41]. More recently, IS researchers have introduced the SERVQUAL instrument, popularly adopted in marketing research, to measure the service quality construct. SERVQUAL has 22 items categorized into five dimensions including tangible, reliability, responsiveness, assurance, and empathy of service quality [42]. Although with its popularity in measuring Service Quality, SERVQUAL's five dimensional measurement has been challenged in IS field. There are often findings that some of SERVQUAL dimensions did not hold up across different settings. Researchers have also questioned the validity of gap scores that are derived by calculating the difference of user's perceived levels of service and their expectations [43-45]. Some researchers in IS believe that the complexity of user's psychological process in experiencing services would make discrepancy-based measurement less reliable than direct measures [46, 47]. Others argue that such a concern has no empirical ground and the direct measurement approach could incur higher measurement error [36, 37]. Despite the fierce debate on the measurement of service quality, researchers have illustrated the significance of this issue in e-health context [4, 48, 49]. Naidoo & Leonard [50] conducted a survey among users of a financial healthcare firm's website, the finding of which is that service quality has a strong positive influence on e-service continuance. Ivatury et al [2] investigated mobile telemedicine services in some developing countries and found that service quality perceptions are influenced by information systems, interaction between doctors and patients and overall service outcome. Akter [5] developed a service quality model for m-Health services, and the empirical study showed that service quality had a strong positive effect on satisfaction, continuance intentions and quality of life.

### 3 Theory model and hypotheses

**Fig.1.** Research model and hypotheses



We adopt social capital theory and social cognitive theory as the primary theoretical foundations to develop our research model and hypotheses. Social capital has been referred to as the expected benefits derived from the social structures, networks and memberships between individuals and groups, of which the core idea is that social networks have value [51]. Social capital affects health behavior in the pathway that individuals who are embedded in a network or community rich in support, social trust, information, and norms, have resources that help achieve health goals [52]. Social cognitive theory refers human behavior as an interaction of personal factors, behavior, and the environment, and provides a framework for understanding, predicting, and changing human behavior [53, 54]. In IS field, it has ever been used to understand the impact of self-efficacy and outcome expectations on an individual's affective and behavioral reactions to information technology [55].

Based on the above perspective and prior literatures, we state the following hypotheses for empirical testing:

H1: Social network e-ties owned by an individual positively affect the social support level that one perceives in the use of e-health services.

H2: The social support level of an individual positively affects the service quality that one perceives about the e-health services.

H3: Service quality positively affects user's satisfaction in e-health environment.

H4: The social support level of an individual positively affects user's satisfaction.

H5: User's satisfaction positively affects user's perception of quality of life.

H6: User's satisfaction positively affects user's health-promotion behavior.

## 4 Research methods

### 4.1 Setting

This study will be carried out across three European countries, i.e. Italy, France and Germany. We will investigate a European project (HOPES<sup>1</sup>), whose aim is to develop an intelligent multimedia and multi-format platform providing e-care services for European elderly persons and their social entourage. Through the provision of this multimedia platform, and with the help and support from relatives or friends, elderly persons will be allowed to keep in touch with friends and family remotely, to extend their personal network and social interactions, and to exchange best practices for different solutions facilitating everyday life with other users. Social network and social support are key issues in this project[56, 57]. If elderly persons are not familiar with ICT, their social entourage will be enabled to help, educate and tutor the elders. It also provides an efficient solution for these social entourages to better support and look after their elderly family members or friends, keep their parents / elderly relatives or friends in good physical and psychological health.

### 4.2 Sample

Our target population is the elderly users of the HOPES platform. Data is collected from Italy, France and Germany, which are all in the scope that the HOPES project plans to provide services. The questionnaire consists of multiple scales of social network, social support, e-service quality, satisfaction, perceived quality of life and health-promotion behavior. The questionnaire is primarily developed in English, then it is translated into local language (Italian, French and German) respectively.

### 4.3 Measures

**Social network e-ties.** We use the abbreviated version of the Lubben Social Network Scale (LSNS-6), developed by Lubben et al. [58] to measure the social network e-ties between individuals and family members (people who are related either by birth or marriage) and friends (people who are related either as friends or neighbors). The elderly respondents are asked to evaluate the number of family members and friends they are in relation to. For example, (a) how many family members and friends do you see and hear from at least once a month?; (b) how many family members and friends do you feel close to such that you could call on them for help?; and (c) how many family members and friends do you feel at ease with that you can talk about private matters? A higher score indicates more social network ties [59]. We will adapt these questions to the HOPES project context in order to measure social network e-ties in which social interactions are performed online.

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**Social support.** The social support scale in this study is modified from the Perceived Support Scale, developed by Krause and Markides [60]. The original Perceived Support Scale consisted of 41 items measuring both support received and support given. Of these 41 items, Krause [61] used 10 items to measure three kinds of support received from significant others: informational support, tangible help, and emotional support. We will modify the social support scale to be consistent with the HOPES project context. The participants will be asked to score the support they received from family members and friends. For example, “How often have your family members and friends suggested some action you should take in order to deal with problems you were having?” (information support); “How often have family members and friends taken care and been right there with you in a stressful situation or when you got sick?” (emotional support); and “How often have family members and friends taken you to health service, transport urgently to get to the doctor, or taken you on a journey to someplace?” (instrumental support) [59].

**E-service quality.** We will derive our measurement of e-service quality on the base of SERVQUAL constructs which is popularly used in IS context [62]. The service quality construct measures the quality of IT service from five dimensions: assurance, reliability, tangibles, responsiveness, empathy. Assurance deals with customer perceptions of the service provider’s courtesy and ability illustrated by their behavior. Tangibles relate to customer assessments of the facilities, equipment, and appearance of the service providers. Reliability refers to customer perceptions that the service provider is providing the promised service in a reliable and dependable manner, and in the right time. Responsiveness deals with customer perceptions about the willingness of the service provider to help the customers and not shrug off their requests for assistance. Empathy deals with customer perceptions that the service provider is giving them individualized attention and has their best interests at heart.

**User satisfaction.** Satisfaction is a sense of contentment that arises from an actual experience with regard to an expected experience [63]. User satisfaction measures a user’s subjective experience in terms of either a specific service encounter or overall encounters. There are various measurements of satisfaction in literatures, from only one item [64] to multiple items [65]. In this study we use four five-point overall service satisfaction scales dealing with adequacy, effectiveness, efficiency, and overall satisfaction.

**Perceived quality of life.** Quality of life is a uniquely personal perception, a reflection of the way that individuals perceive and react to their health status and to others, nonmedical aspects of their lives. The overall quality of life includes not only health related factors, such as physical, functional, emotional, and mental well-being, but also non-health-related elements, such as family, friends, and other life circumstances. We will adopt the suggestion by Gill & Feinstein [66] to develop the quality of life scales.

**Health-promotion behavior.** This measure will be modified from the Health-Promoting Behavior Measuring Instrument (HPBMI) developed by Yensuchit [59, 67]. The modified health-promotion behavior scale consists of two main dimensions,

which is promoting health and preventing disease and injury. Promoting health dimension deals with self-care management, physical activity, and healthful eating. Preventing disease and injury dimension deals with preventing injuries, home sanitation management, stress management, and absence damaging behaviors.

## 5 Discussion and Conclusions

Social networks and the social support offered by them are linked to a variety of health outcomes in the general public, especially for elderly persons. Despite the plentiful literatures on the relationship between social support network and the health status and behaviors, there are nearly no studies examine them in the online context. In this paper, we explore the role of social support network in e-health services in the context of a multimedia platform providing social e-services for European elderly persons and their social entourage. We believe social networks are significantly valuable in e-health services, which provide great opportunities to improve the service quality by enabling the older adults to be better supported by their family members or friends in the use of ICT and in the health-promotion behaviors. The empirical study of the relationship between social support, service quality and user satisfaction will contribute the extension of IS service quality research to the context of social networks. We hope this research will build up a bridge between these two important areas. For IS practitioners providing online healthcare services, the findings of this study would provide them some insights to improve the quality of services by incorporating social support networks in the solutions.

## References

1. WHO 2005: WHA (World Health Assembly) Resolution 58/28 on eHealth, World Health Organization, Geneva, 2005.
2. G. Ivatury, J. Moore & A. Bloch, "A doctor in your pocket: health hotlines in developing countries", *Innovations: Technology, Governance, Globalization*, vol. 4, no. 1, pp. 119–153, 2009.
3. M. J. Ball, J. Lillis, "E-health: transforming the physician/patient relationship", *International Journal of Medical Informatics*, Vol. 61, no.1, pp. 1-10, 2001.
4. U. Varshney, "Pervasive healthcare: applications, challenges and wireless solutions. *Communications of the Association for Information Systems*", vol. 16, no. 3, pp. 57–72, 2005.
5. S. Akter, J. D'Ambra, and P. Ray, "Service quality of mHealth platforms: development and validation of a hierarchical model using PLS," *Electronic Markets*, vol. 20, no. 3–4, pp. 209-227, Nov. 2010.
6. P. D'Urso, L. De Giovanni, P. Spagnoletti, "A fuzzy taxonomy for e-Health projects", *International Journal of Machine Learning and Cybernetics*, vol. 4, no. 6, pp.1-18, 2013.
7. X. Bo, "Effects of an eHealth Literacy Intervention for Older Adults," *Journal of Medical Internet Research*, vol. 13, no. 4, pp. e90, 2011.



8. K. L. Fiori and J. Jager, "The impact of social support networks on mental and physical health in the transition to older adulthood: A longitudinal, pattern-centered approach," *International Journal of Behavioral Development*, vol. 36, no. 2, pp. 117-129, Mar. 2012.
9. M. P. Gallant, G. D. Spitze & T. R. Prohaska, "Help or hindrance? How family and friends influence chronic illness self-management among older adults. *Research on Aging*," 29, 375-409, 2007.
10. L. Levy-Storms & J. E. Lubben, "Network composition and health behaviors among older Samoan women", *Journal of Aging and Health*, vol. 18, 814-836, 2006.
11. L. F. Berkman, "Social support, social networks, social cohesion and health," *Social work in health care*, vol. 31, no. 2, pp. 3-14, Jan. 2000.
12. T. E. Seeman, T. M. Lusignolo, M. Albert, & L. Berkman, "Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging." *Health Psychology*, 20, 243-255, 2001.
13. M. V. Zunzunegui, A. Kone, M. Johri, F. Beland, C. Wolfson & H. Bergman, "Social networks and self-rated health in two French-speaking Canadian community dwelling populations aged 65", *Social Science & Medicine*, vol. 58, pp. 2069-2081, 2004.
14. H. MacRae, "Self and other: The importance of social interaction and social relationships in shaping the experience of early-stage Alzheimer's disease", *Journal of Aging Studies*, Vol. 25, no. 4, 445-456, 2011.
15. B. A. Pescosolido & J. A. Levy, "The role of social networks in health, illness, disease and healing: the accepting present, the forgotten past, and the dangerous potential for a complacent future." In L.A. Levy, & B.A. Pescosolido (Eds.). "Social Networks and Health," Vol.8, pp 3-25, Boston: Elsevier Science Ltd, 2002.
16. G. Wenger, "Social networks and the prediction of elderly people at risk," *Aging & Mental Health*, vol. 1, no. 4, pp.311-320, Jun 2010.
17. E. M. Field, M. H. Walker, and M. W. Orrell, "Social networks and health of older people living in sheltered housing," *Aging & mental health*, vol. 6, no. 4, pp. 372-86, Nov. 2002.
18. H. Litwin and S. Shiovitz-Ezra, "Network type and mortality risk in later life.," *The Gerontologist*, vol. 46, no. 6, pp. 735-743, 2006.
19. H. Litwin and S. Shiovitz-Ezra, "Social network type and subjective well-being in a national sample of older Americans.," *The Gerontologist*, vol. 51, no. 3, pp. 379-388, 2011.
20. R. J. Turner, "Social Support as a Contingency in Psychological Well-Being," *Journal of Health and Social Behavior*, vol. 22, no. 4, pp. 357-367, 1981.
21. C. J. Holahan and R. H. Moos, "Social support and psychological distress: a longitudinal analysis.," *Journal of Abnormal Psychology*, vol. 90, no. 4, pp. 365-370, 1981.
22. J. S. House, C. Robbins, and H. L. Metzner, "The association of social relationships and activities with mortality: prospective evidence from the Tecumseh Community Health Study.," *American Journal of Epidemiology*, vol. 116, no. 1, pp. 123-140, 1982.
23. J. Bloom, "The relationship of social support and health," *Social Science & Medicine*, vol. 30, no. 5, pp. 635-637, 1990.
24. V. S. Helgeson, "Social support and quality of life", *Quality of Life Research*, vol. 12(1), pp. 25-31, 2003.
25. J. J. Guidry, L. A. Aday, D. Zhang & R. J. Winn, "The role of informal and formal social support networks for patients with cancer", *Cancer Practice*, vol. 5, no. 4, pp. 241-246, 1997.

26. M. R. DiMatteo, "Social support and patient adherence to medical treatment: A meta-analysis", *Health Psychology*, vol. 23, no. 2, pp. 207–218, 2004.
27. C. L. Decker, "Social support and adolescent cancer survivors: A review of the literature", *Psycho-oncology*, vol.16, no. 1, pp. 1-11, 2006.
28. N. Bolger & D. Amarel, "Effects of social support visibility on adjustment to stress: Experimental evidence", *Journal of Personality and Social Psychology*, vol. 92, no. 3, pp. 458–475, 2007.
29. C. H. Kroenke, L. D. Kubzansky, E. S. Schernhammer, M. D. Holmes & I. Kawachi, "Social networks, social support, and survival after breast cancer diagnosis", *Journal of Clinical Oncology*, vol. 24, no. 7, pp. 1105–1111, 2006.
30. M. McLaughlin et al., "A videosharing social networking intervention for young adult cancer survivors," *Computers in Human Behavior*, vol. 28, no. 2, pp. 631-641, Mar. 2012.
31. K. B. Wright, S.B. Bell, "Health-related support groups on the internet: linking empirical findings to social support and computer-mediated communication theory", *Journal of Health Psychology*, vol. 8, pp. 39–54, 2003..
32. E. Im, W. Chee, "The use of internet cancer support groups by ethnic minorities", *Journal of Transcultural Nursing*, vol. 19, pp. 74–82, 2008.
33. N.S. Coulson, "Receiving social support online: an analysis of a computer-mediated support group for individuals living with irritable bowel syndrome", *Cyber Psychology Behavior*, vol. 8, pp. 580–584, 2005.
34. Y. K. Bartlett, N. S. Coulson, "An investigation into the empowerment effects of using online support groups and how this affects health professional/patient communication", *Patient Education and Counseling*, Vol. 83, no. 1, pp. 113–119, 2011.
35. L. Bos, et al. "Patient 2.0 empowerment", *Proceedings of the 2008 international conference on semantic web & web services SWWS08*, pp. 164–167, 2008.
36. W. Kettinger and Choong C. Lee, "Zones of tolerance: Alternative scales for measuring information systems service quality," *MIS Quarterly*, vol. 29, no. 4, pp. 607-623, 2005.
37. L. Pitt, R. Watson, and C. B. Kavan, "Service quality: a measure of information systems effectiveness," *MIS quarterly*, vol. 19, no. 2, pp. 173-187, 1995.
38. R. Watson, L. Pitt, and C. B. Kavan, "Measuring information systems service quality: lessons from two longitudinal case studies," *MIS quarterly*, vol. 22, no. 1, pp. 61-79, 1998.
39. J. Jiang, G. K. Klein, and Christopher L. Carr, "Measuring information system service quality: SERVQUAL from the other side," *MIS quarterly*, vol. 26, no. 2, pp. 145-166, 2002.
40. W. H. DeLone and E. R. McLean. "Information System Success: The quest for the dependent variable." *Information Systems Research*, vol. 3, no. 1, pp. 60-95, 1992.
41. W. H. DeLone and E. R. McLean. "The DeLone and McLean Model of Information System Success: A Ten-Year Update." *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9-30, 2003.
42. A. Parasuraman, V. A. Zeithaml, et al. "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality." *Journal of Retailing*, vol. 64, no. 1, pp. 12-40, 1988.
43. J. M. Carman, "Consumer perceptions of service quality: An assessment of the SERVQUAL dimensions." *Journal of Retailing*, vol. 66, no. 1, pp. 33-55, 1990.

44. J. J. Cronin and S. A. Taylor. "Measuring service quality: an reexamination and extension." *Journal of Marketing*, vol. 56, pp. 55-68, 1992.
45. P. A. Dabholkar, C. D. Shepherd, et al. "A comprehensive framework for service quality: an investigation of critical conceptual and measurement issues through a longitudinal study." *Journal of Retailing*, vol. 76, no. 2, pp. 139-274, 2000.
46. T. P. Van Dyke, L. A. Kappelman, and V. R. Prybutok, "Measuring information systems quality: Concerns on the use of the SERVQUAL questionnaire." *MIS Quarterly*, vol. 21, no. 2, pp. 195-208, 1997.
47. T. P. Van Dyke, V. R. Prybutok, et al. "Cautions on the Use of the SERVQUAL Measure to Access the Quality of Information System Services." *Decision Science*, vol. 30, no. 3, pp 1-15, 1999.
48. J. Buckley, "E-service quality and the public sector," *Managing Service Quality*, vol. 13, no. 6, pp. 453-462, 2003.
49. J. Gummerus, V. Liljander, M. Pura, and A. Van Riel, "Customer loyalty to content-based Web sites: the case of an online health-care service," *Journal of Services Marketing*, vol. 18, no. 3, pp. 175-186, 2004.
50. R. Naidoo and A. Leonard, "Perceived usefulness, service quality and loyalty incentives: Effects on electronic service continuance," *S. Afr. J. Bus. Manage*, vol. 38, no. 3, pp. 39-49, 2007.
51. H. Ali, "Exchanging value within individuals' networks: Social support implications for health marketers", *Journal of Marketing Management*, Vol. 27, Nos. 3-4, pp. 316-335, March 2011.
52. N. Lin, "Building a Network Theory of Social Capital," in *Social Capital: Theory and Research*, vol. 22, no. 1, N. Lin, K. S. Cook, and R. S. Burt, Eds. Aldine de Gruyter, 2001, pp. 3-31.
53. A. Bandura, "Self-Efficacy: Toward a Unifying Theory of Behavioral Change," *Psychology Review*, vol.84, pp. 191-215, 1977.
54. A. Bandura, "Social foundations of thought and action: A social cognitive theory", Prentice-Hall, Englewood Cliffs, NJ, 1986.
55. D. Compeau,, C. A. Higgins and S. Huff, "Social cognitive theory and individual reactions to computing technology: A longitudinal study," *MIS Quarterly*, vol. 23, no. 2, pp. 145-159, June 1999.
56. P. Spagnoletti, A. Resca, V. Russo, F. Taglino, L. Tarantino, "Building theories from IT project design: the HOPES case." In: De Marco, M., Te'eni, D., Albano, V., and Za, S. (eds.) *Information Systems: a crossroads for Organization, Management, Accounting and Engineering*. pp. 451-459. Physica-Verlag, Heidelberg, 2012.
57. P. Spagnoletti, A. Resca, "A Design Theory for IT supporting Online Communities." *Proceedings of the 45th Hawaii International Conference on System Sciences*. pp. 4082-4091, 2012.
58. J. Lubben, E. Blozik et al. "Performance of an abbreviated version of the Lubben Social Network Scale among three European Community-dwelling older adult populations", *Gerontologist*, vol. 46, no. 4, pp. 503-513, 2006.
59. K. Thanakwang & K. Soonthornhada, "Mechanisms by Which Social Support Networks Influence Healthy Aging Among Thai Community-Dwelling Elderly", *Journal of Aging and Health*, vol. 23, no. 8, pp. 1352-1378, 2011.

60. N. Krause & K. S. Markides, "Measuring social support among older adults", *International Journal of Aging and Human Development*, vol. 30, pp. 37-53, 1990.
61. N. Krause, "Assessing change in social support during late life", *Research on Aging*, vol. 21, pp. 539-569, 1999.
62. A. Parasuraman, V. A. Zeithaml & A. Malhotra, "E-S-QUAL: a multiple-item scale for assessing electronic service quality", *Journal of Service Research*, vol. 7, no. 3, pp. 213-233, 2005.
63. F. Gallo, "The effects of social support networks on the health of the elderly.," *Social Work in Health Care*, vol. 8, no. 2, pp. 65-74, 1982.
64. F. Selnes and H. Hansen, "The Potential Hazard of Self-Service in Developing Customer Loyalty," *Journal of Service Research*, vol. 4, no. 2, pp. 79-90, 2001.
65. H. Lin and Y. Wang, "An examination of the determinants of customer loyalty in mobile commerce contexts," *Information & Management*, vol. 43, no. 3, pp. 271-282, 2006.
66. T. M. Gill and A. R. Feinstein, "A critical appraisal of the quality of quality-of-life measurements," *Journal of the American Medical Association*, vol. 272, no. 8, pp. 619-26, 1994.
67. K. Yensuchit, "The development of instrument for measuring health-promoting behavior among Thai elderly", Doctoral dissertation, Mahidol University, Bangkok, Thailand, 2000.