
Quality of Life of the Disadvantaged Elderly in China: A Partial Least Squares (PLS) Approach

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Abstract:

With the improvement of the global economy and progress of the medical field, aging has become a worldwide problem. The disadvantaged elderly, which are the foci of public policy due to limited economic capacity, lack of information, weak ability to resist risks, and poor development prospects, were selected as research objects. This study aims to identify the key factors that affect the quality of life of disadvantaged elderly in China. After developing four hypotheses, a quantitative, cross-sectional was devised and used it to collect data about disadvantaged elderly in China. Some 324 usable questionnaires were collected from the disadvantaged elderly in the relevant cooperative community old-age care service centers in various cities of China. The method to test the data and validate the hypothesis is to use a partial least squares structural equation model. The results indicate that physical health and living environment are positively correlated with the quality of life of disadvantaged elderly, mental health and social support have no significant impact on quality of life. The physical health and safety of the living environment are the primary concerns of disadvantaged elderly. If these cannot be met, they have no interest in pursuing or focusing on higher-level needs, such as psychological comfort, neighborhood, leisure and entertainment.

Keywords: *The disadvantaged elderly, Quality of life, Partial least squares regression*

I. INTRODUCTION

With the development of the global economy and progress in the medical field, aging has become a worldwide problem. According to the latest data, in 2018, the Chinese population of ages 65 and above has reached 166 million, accounting for 11.9% of the total population. The elderly population above 80 years of age has approached 28 million, accounting for 17% of the elderly population. Due to the large population base, continuous improvement in life expectancy

and the impact of related policies, China has become the country with the largest elderly population in the world and one of the countries with the fastest population aging development rate. The aging problem will become the main population problem in China in the 21st century, and the core of this problem is the quality of life (QOL) of the elderly groups.

During research investigations on the QOL, it should be noted that due to the differences in social classes, the QOL pursued by various groups often significantly differs. Therefore, attention should be paid to the different needs of various groups when studying QOL. In this study, the disadvantaged groups, which are the foci of public policy due to limited economic capacity, lack of information, weak ability to resist risks, and poor development prospects, were selected as research objects. The academic community generally divides the disadvantaged groups into two categories according to the “weakening” factors: physiologically disadvantaged groups and socially disadvantaged groups. The former generally refers to groups with lower incomes and limited economic capacity; the latter generally refers to groups that are disadvantaged due to physiological defects such as diseases and disability. Combining with the actual situation in China, the population over 60 years of age with minimum living allowance, disability, loss of the single child, mental retardation, living alone and over 80 years of age (referred to as “6 + 1” elderly group) is selected in this study for analysis, trying to put forward suggestions to improve the QOL of disadvantaged groups and reflect on the aging management policy.

Due to the special family planning policy, the aging process in China is accompanied by the miniaturization of family size. Since the 1980s, the decline in the number of children in the family has significantly increased the likelihood that parents will become empty-nesters or even old, solitary people after entering old age. Because of the lack of adult children around, many empty nesters are facing practical difficulties such as lack of care in daily life, spiritual loneliness and so on. Community service for home care of the elderly refers to the provision of professional and social services to the elderly living at home with the family as the core and the community as the basis for solving the various practical difficulties in daily life. Although the accelerated trend of population aging in China has prompted the rapid development of research on community service for the aged, and according to the current research status, most of the existing studies have focused on surveying community pension service needs. There is still a lack of community-based data on the participation of socialized professional old-age care institutions and the effect it has on the QOL of the elderly.

Therefore, the present study conducted a survey on the characteristics and QOL of the elderly in the relevant cooperative community old-age care service centers to explore the following issues: What are the characteristics of “6 + 1” elderly people in community elderly care service centers? What are the features of their QOL? What factors affect their QOL? Improving the physical health and living environment of the “6 + 1” elderly people are key to improving their QOL. As mentioned above, physical health is a significant reflection of QOL, and the improvement of the living environment significantly improves the QOL of the elderly.

However, despite the growing research on QOL, researchers are still calling for investigations on improving our understanding of factors that affect QOL.

II. LITERATURE REVIEW

Personal QOL usually depends on external objective facts and internal subjective feelings. In 1958, the American economist J.K. Calbrith first proposed the concept of "QOL". Since then, research on QOL has focused on three areas: the concept of QOL, the system of evaluation indicators, and research methods. Before the 1960s, the content of the QOL indicators was almost objective; after the 1960s, the subjective level began to receive attention in the QOL indicator system. Some studies have found that objective QOL can only explain the QOL of 15% of residents, while subjective indicators such as self-evaluation of health status, interpersonal relationship and life satisfaction can explain 70% to 80% ^[1]. Therefore, subjective QOL is more important for the evaluation of residents' QOL, and the results of the analysis are more realistic. Life satisfaction is an individual's subjective evaluation of the QOL based on the standards set by himself, and it is one of the important indicators to measure the subjective QOL.

Andrews et al. ^[2] studied the level and structure of subjective satisfaction with life of American residents from 1971 to 1988. The evaluation indicators included self-evaluation, entertainment, health, income and living standards, working conditions, marriage and children, leisure time and social activities, neighborhood and community relations and local and national governments. Fu et al. ^[3] made a comparative study of the life satisfaction of middle-aged men and women in Taiwan Province of China. The main satisfaction measurement areas of the study included health status, sleep and rest, daily activities, work ability, self-evaluation, interpersonal relationship, friend support, living environment, medical and social security, negative emotions, positive emotions, whether respected by others, and social security.

Since then, more Chinese scholars have studied QOL and extended different views on the concept of QOL. Some scholars think it includes physical health, pre-retirement working conditions, family life and social environment; others think it involves self-determination, independent self-care, a certain degree of economic ability and interest and hobbies. Moreover, most commonly, QOL has several dimensions: physical health, family harmony, home security, and chronic disease.

In this study, four dimensions were selected: physical health, mental health, living environment, and social support. With the increase of age, the physiological function of the elderly gradually degenerates and decreases, and their economic ability weakens. The psychological state and social adaptability also change, which affect the QOL of the elderly to a certain extent. Research results at in China and other countries show that the QOL is affected by individual physiological, psychological, and social factors.

Physical condition is significantly related to the QOL of the elderly, which is a significant factor affecting their QOL. Most elderly people receiving professional pension services suffer from deterioration of their physiological functions, declines in disease resistance, poor health, and their tolerance and adaptability to the outside world. At the same time, mental health and

self-rated health play a mediating role between physical health and self-rated QOL of the elderly. Being able to perform normal daily activities is an important factor affecting the QOL of the elderly [4]. Thus, we have the following hypothesis:

H1 Physical health has a positive impact on QOL.

With the progress of the economy and society, more and more attention is paid to the influence of mental factors and mental health on the QOL. Especially for the elderly, spiritual comfort brought by emotional care is the most urgent need. Therefore, the following hypothesis is:

H2 Mental health has a positive impact on QOL.

Good social support plays an active role in improving the QOL of the elderly. With the increase of age, the authoritative role of the elderly in the family has weakened. To create a good family atmosphere and build a harmonious and beautiful family environment for the elderly is an important guarantee to improve their QOL. Therefore, the following hypothesis is presented:

H3 Social support has a positive impact on QOL.

Because of the particularity of the elderly group and the traditional local concept in China, the elderly mostly chooses to "spend their last years" in the residential areas they are familiar with. Therefore, the livable environment of the elderly is an important factor to realize enjoyment during their senior years. Therefore, the following hypothesis is presented:

H4 Living environment has a positive impact on QOL.

Figure 1 exhibits those key factors affecting quality of life, as well as their relationships.

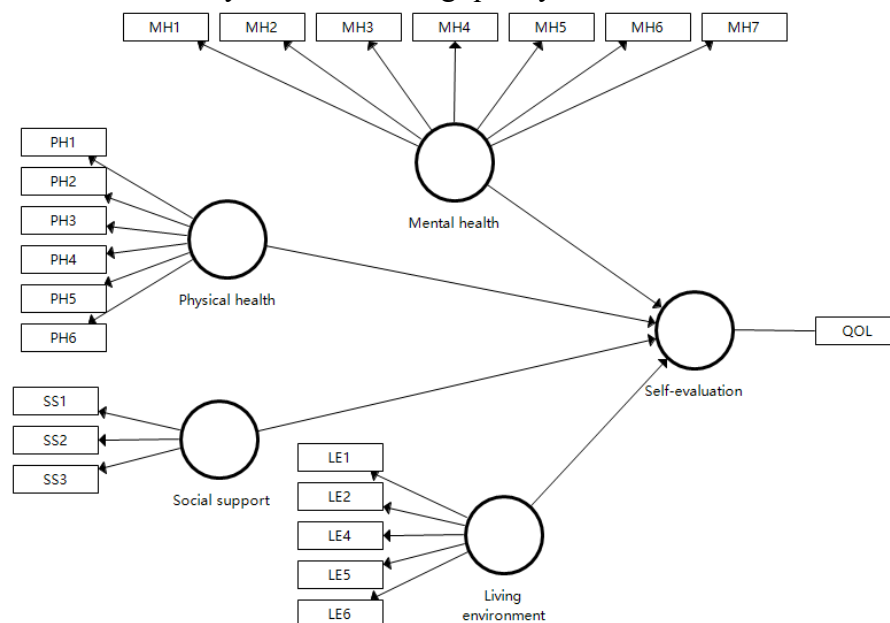


Fig 1: The key factors affecting quality of life

III. METHODS

The "6 + 1" elderly people in relevant cooperative community elderly care service centers in various cities of China were randomly selected for the survey. The government provided basic care services such as life care, medical care, household services, emergency relief and spiritual consolation for these elderly people. 324 valid samples were collected from the elderly in the relevant cooperative community elderly care service centers in various cities of China. TABLE I shows that, among these samples, 53.7% were males; 61.4% were the elderly over 80 years old, 22.2% were 70–80 years old people and 16.4% were 60–70 years old people. The main educational background was junior high school and lower, accounting for 76.5% of those sampled.

TABLE I. Demographic characteristics of respondents

Basic information	Grouping	N	Constituent ratio (%)
Sex	Males	174	53.7
	Females	150	46.3
Age	60–70	53	16.4
	70–80	72	22.2
	Over 80	199	61.4
Education Background	Junior high school and below	248	76.5
	Senior high school or technical secondary school	49	15.1
	Junior college or above	27	8.4
Marital status	Non-marriage	127	39.2
	Married or cohabitating	197	60.8
Employment status	Government	14	4.3
	Public institutions	38	11.7
	State-owned enterprises	46	14.2
	Private enterprises	44	13.6
	Farming	63	19.4
	No permanent job	49	15.1
	Others	70	21.6

3.1 Measurement Items

Based on the main items of World Health Organization Quality of Life Questionnaire (WHO QOL-BREF), the survey was fine-tuned to describe the four dimensions of QOL according to the actual situation and cultural background of the elderly population in China: physical health, mental health, living environment and social support. Finally, one item was surveyed on their overall evaluation of life satisfaction. In this survey, a unified training plan and survey guidebook were developed, requiring each investigator to guide the respondents to fill out the questionnaire according to the requirements and the survey guidebook without any guidance or suggestion. The investigator will answer the questionnaire on the spot.

3.2 Data Analysis

SPSS 22.0 software was used to process the questionnaire data, and the partial least squares (PLS) approach was used to analyze the data comprehensively. According to the two-stage analytical procedures recommended by Andersen and Garbing^[5], the reliability and validity of the structural model were analyzed firstly, and then the hypothesis relationship of the model was tested. To validate the effectiveness of the path coefficients and the loadings, we used a bootstrapping composed of 5,000 resamples to determine significance levels for the path coefficients, the loadings, and their weights.

IV. RESULTS

4.1 Measurement Model

4.1.1 Convergent Validity

TABLE II. Results of the measurement model

Construct	Item	Loadings	CR	AVE
Physical health	PH1	0.797	0.899	0.599
	PH2	0.650		
	PH3	0.772		
	PH4	0.741		
	PH5	0.818		
	PH6	0.85		
Living environment	LE1	0.791	0.866	0.565
	LE2	0.821		
	LE4	0.639		
	LE5	0.740		
	LE6	0.754		
Mental health	MH1	0.695	0.897	0.556
	MH2	0.753		
	MH3	0.703		
	MH4	0.627		
	MH5	0.813		
	MH6	0.807		
	MH7	0.803		
Self-evaluation	QOL	1.000	NA	NA
Social support	SS1	0.837	0.809	0.588
	SS2	0.811		
	SS3	0.638		

Note: LE3 is deleted due to low loadings

Convergent validity represents the consistency of a concept with multiple projects. Followed by the literature^[6], observation factor loadings, average variance extraction (AVE), and combined reliability (CR) values are needed to measure convergence validity. All items' loading exceeds the threshold 0.6. CR depicts the indicating capability of construct indicators on the latent, and their values range between 0.809 and 0.899, exceeding the threshold 0.7. The values of AVE range between 0.556 and 0.599, exceeding the threshold 0.5. It can be seen from

TABLE II that all the values are above the recommended threshold. Therefore, the scale has convergent validity.

4.1.2 Discriminant Validity

The discriminative validity can be evaluated by heterotrait-monotrait ratio of correlations (HTMT)^[7]. If the HTMT value exceeds 0.85, the scale has discriminative validity. TABLE III shows that all the values are lower than the threshold level, indicating discriminant validity.

TABLE III. Heterotrait-Monotrait (HTMT)

	1	2	3	4
1. Physical health				
2. Self-evaluation	0.691			
3. Living environment	0.831	0.778		
4. Mental health	0.842	0.595	0.690	
5. Social support	0.660	0.562	0.786	0.784

4.1.3 Reliability Analysis

The reliability of questionnaires is measured by Cronbach's coefficient (Cronbach's α). Sekaran believes that Cronbach's α coefficients are above 0.6, in general empirical research, which are highly credible^[8]. The Cronbach's α of each latent variable in TABLE IV are greater than 0.8, except for the social support structure value is slightly lower than 0.639. The above shows that the internal reliability of the questionnaire is good.

TABLE IV. Result of reliability

Constructs	Measurement items	Cronbach's α	Loading range	Number of items ^a
Physical health	BH1, BH2, BH3, BH4, BH5, BH6,	0.864	0.650–0.850	6(6)
Self-evaluation	QOL	1.000	1.000	1(1)
Living environment	LE1, LE2, LE4, LE5, LE6	0.805	0.639–0.821	5(6)
Mental health	MH1, MH2, MH3, MH4, MH5, MH6, MH7	0.868	0.695–0.813	7(7)
Social support	SS1, SS2, SS3	0.639	0.638–0.837	3(3)

^a Final items numbers (initial numbers)

4.2 Structural Model

Sang et al. [9] proposed to use a structural model with path coefficient and R^2 value to describe the causal relationship between the constructs in a hypothetical model. The specific response data of R^2 and path coefficient β and significance value in structural model support the hypothetical model.

In order to evaluate the structural model (TABLE V, Figure 2), according to the method proposed by Hair et al. [10], through repeated sampling 5000 times through the bootstrap bootstrapping procedure, the standardized coefficient (Std. Beta) and t-values are obtained.

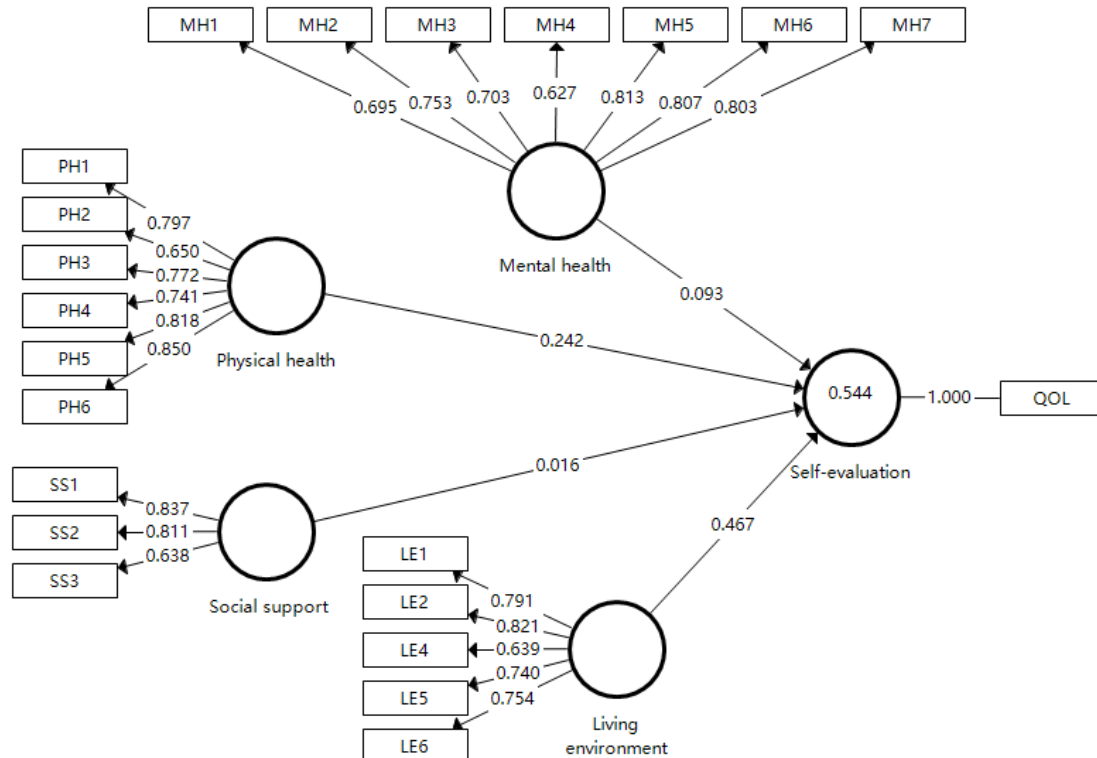


Fig 2: The structural model

TABLE V. Structural model

Hypothesis	Path	Std. Beta	Std Error	t-values	P-values	Decision	VIF
H1	PH→QOL	0.242	0.069	3.525	0.000	Supported	3.429
H2	MH→QOL	0.093	0.068	1.359	0.087	Not Supported	3.173
H3	SS→QOL	0.016	0.042	0.378	0.353	Not Supported	1.727
H4	LE→QOL	0.467	0.050	9.419	0.000	Supported	2.198

The results showed that physical health ($\beta = 0.242$, $P < 0.01$) and living environment ($\beta = 0.467$, $P < 0.01$) were the significant influencing factors of QOL. Therefore, we support the hypothesis H1 and H4. The results do not support H2, because it is impossible to prove whether the impact of mental health on QOL is significant ($\beta = 0.093$, $P > 0.05$). Similarly, there was no significant relationship between social support and quality of life ($\beta = 0.016$, $P > 0.05$). Therefore, H3 is not supported.

We use the criteria of variance inflation factor (VIF) to evaluate the multicollinearity between the variables in the model. TABLE V shows that the values are all lower than the threshold 5.00 ^[21].

V. DISCUSSION

How do social support, economic factors, physical condition, age, marital status, community care, education level, and living conditions affect the QOL of the elderly? What are the mechanisms of influence and mediation or regulation of these variables? Previous studies have discussed one or more of these factors ^[11]. However, what are the features of the QOL of the elderly at home in urban community under the socialized professional pension service? How can the QOL of "6 + 1" disadvantaged elderly groups be improved? In this study, from the point of view of the QOL of the elderly, the current situation is discussed, focusing on the analysis of the impact of social demographic factors, physical health, environmental impact and social relations thereon, so as to evaluate the QOL of the elderly to a certain extent. The results show that physical health and living environment are the most important and significant QOL factors affecting the disadvantaged elderly groups. Through analysis, it can screen out the controllable factors affecting the QOL of the elderly, and provide the basis for the next step of intervention, thereby making elderly people properly cared of and useful, providing them with proper medical care, education, and entertainment.

The study found that physical health is an important factor affecting the QOL of the elderly ^[4]. Most elderly people receiving professional pension services suffer from deterioration of their physiological functions, decline in disease resistance, poor health, and lower their tolerance and adaptability to the outside world. Especially hypertension, coronary heart disease, and diabetes affect self-care ability, self-evaluation, and life satisfaction of the elderly. Families, hospitals, and professional service centers for the aged should coordinate and focus on providing healthcare to the elderly. They should provide the elderly continuous, dynamic, and comprehensive services such as prevention, rehabilitation, and health education to improve their QOL.

In addition, we confirm the importance of the impact of social environment on QOL. Social and environmental security needs, for the elderly, are also low-level needs, including personal safety, life stability and freedom from pain, threat, or disease. Although the government has provided professional pension services to the "6 + 1" elderly group, for the disabled, intellectually disabled, and independent elderly groups, stronger medical insurance, social

insurance and retirement benefits should be offered so as to make them feel safer and to improve their QOL.

However, the impact of mental health on QOL is not significant, which is discordant to our prediction, which can be attributed to the fact that compared with physical health and living environment, "6 + 1" elderly people do not pay much attention to psychological state. Based on Maslow's hierarchy of needs, only when the basic physical health and living environment safety needs are satisfied to the level necessary for survival can other needs become new incentives, and at this time, these relatively satisfied needs will no longer become incentives. Most of the "6 + 1" elderly are disabled, demented, and venerable age, whose physical health is poor and with no regard for their psychological status.

Finally, we found that the social support has a limited impact on the QOL of "6 + 1" elderly. As the majority of the "6 + 1" group is over 80 years old (61.4%), and some of them are disabled and mentally retarded elderly who make low use of social support, and the main people they associate with are spouses, children and neighbors. Due to the limited activity ability, there are fewer opportunities to visit relatives and friends, which weakens the influence of various social relations on the disabled elderly. The resources that society can provide for the "6 + 1" elderly are also very limited, such as transportation conditions, medical security, health resources, pension institutions, social welfare and so on, which all affect the QOL of the "6 + 1" elderly. Therefore, the care of the "6 + 1" elderly should not be confined to a single-family model, and the "6 + 1" elderly should be helped to communicate with the outside world as much as possible, make effective use of social resources, and obtain support from various aspects. It cannot be limited to the care of daily life, but also provide support and services to their spiritual life, and more psychological care be given to improve their overall health.

VI. IMPLICATIONS

Based on investigation and research, by referring to the experience gained in some areas in China and other countries, the following points are important aspects for us to actively respond to the aging of the population and improve their QOL.

(I) A sound medical and endowment security system should be established to alleviate the medical and economic burden of the elderly, so that the elderly can be looked after properly and provided with proper medical care. A social atmosphere that respects the elderly should be created to provide them more care and support. The advantages of the community in improving the QOL of the elderly should be given play to.

(II) The government and society should actively develop and provide comprehensive community-based services. The government and society have various resources and their support can guarantee the development of community pension services. Currently, the demand of senior services is mainly for material life and medical health. In addition to the development of residential pension institutions, various types of daycare centers, nurseries, and other specialized social pension institutions should also be established for the disabled and semi-disabled elderly to meet the needs of the elderly at different levels.

(III) Family-centered positioning of the role and function of social care services

The family carries the most basic and effective pension resources. In the process of developing socialized aged care services, attention must be paid to avoiding the practice of separating social pension from family pension and self-support. Social endowment service should be a supportive service for the families of the elderly, not just for the elderly individually. Only in this way can all aspects of endowment resources be effectively integrated to improve the efficiency of social endowment services and meet the needs of the elderly at home.

VII. CONCLUSION

Physical health and the safety of the living environment are the primary concerns for the elderly. As described in past studies and verified in this study, if basic living conditions are not met, then higher levels of demand, such as psychological comfort, neighborhood relationships, leisure, and entertainment, are not motivating. Therefore, it is very important to guarantee the basic living conditions of the elderly population, which requires the joint efforts of the government, the community, the organization, and the individual to effectively improve the QOL of the disadvantaged elderly.

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ABBREVIATIONS

HTMT: heterotrait-monotrait; PLS: partial least squares; QOL: quality of life; VIF: variance inflation factor.

REFERENCES

- [1] Bukenya JO, Gebremedhin TG, Schaeffer PV (2010) Analysis of quality of life and rural development: evidence from west virginia data. *Growth Change* 34, 202-18
- [2] Andrews FM, Abbey A, Halman LJ (1991) Stress from infertility, marriage factors, and subjective well-being of wives and husbands. *J Health Soc Behav* 32, 238-53
- [3] Fu SYK, Anderson D, Courtney M, Mcavan B (2006) The relationship between country of residence, gender and the quality of life in Australian and Taiwanese midlife residents. *Soc Indic Res* 79, 25-49
- [4] Adam S, Feller A, Rohrmann S, Arndt V (2018) Health-related quality of life among long-term (≥ 5 years) prostate cancer survivors by primary intervention: a systematic review. *Health Quality Life Outcomes* 16, 22
- [5] Andersen JC, Gerbing DW (1988) Structural equation modeling in practice: A review and recommended two-step approach. *Psychol Bull* 103, 411-23

- [6] Hair JF, Sarstedt M, Pieper TM, Ringle CM (2012) The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long Range Plann* 45, 320-40
- [7] Henseler J, Ringle CM, Sarstedt M (2015) A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J Acad Mark Sci* 43, 115-35
- [8] Sekaran U, Bougie R (2010) *Research methods for business: A skill building approach*. London: Wiley
- [9] Sang S, Lee JD, Lee J (2010) E-government adoption in Cambodia: A partial least squares approach. *Transform Gov* 4, 138-57
- [10] Hair JF, Ringle CM, Sarstedt M (2013) The use of partial least squares (PLS) to address marketing management topics: from the special issue guest editors. *J Mark Theory Pract* 19, 135-8
- [11] Moyle W, Venturto L, Griffiths S, Grimbeek P, Mcallister M, Oxlade D, et al. (2011) Factors influencing quality of life for people with dementia: a qualitative perspective. *Aging Mental Health* 15, 970-7