Seniors Use of Medical Electric Scooters with the Intention Satisfaction Study in Taiwan

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Abstract

This study aims to explore the properties of the senior citizens in Taiwan's living and their needs of going out. Through using the software "SPSS12.0" to build the model of this research to do confirmatory factor analysis, path analysis and satisfaction analysis, we can understand the influence caused by several dimensions on people's intention to go out by medical electric scooters. It can also be used in the research of evaluating the elder's needs, necessity and satisfaction of going out by land. The results can be served as the reference for future development and implement of traffic management strategy and the design of quality assessment as well. Nowadays, medical electric scooters belong to medical assistive devices. However, there aren't any relative laws of the right of way and the complete constructions of barrier-free space. The government should attach more importance to this problem and strike a balance between the elder's needs for using medical electric scooters and the road traffic safety.

According to the overall analysis, the conclusions are as following: by the collection of relevant documents and the direct distribution of questionnaire survey, we find that there are five dimensions of the factors that will significantly influence the elder and the disabled's willingness to go out by medical electric scooters. In the future, the government should give priority to the minority groups when legislating and create a safer environment for them.

Keywords: seniors, medical electric scooter, factor analysis, path analysis

1. Preface

1.1Background and motivation

As Taiwan turns to be aging population society, the government puts more emphasis on senior's daily life same as America, Europe and other modern countries. After retirement, senior people still have many decades to live. If they don't develop their new interpersonal relationship, search for new society resources and enrich entity and necessity of life, it's easy to cause unhappy, not-adapt problems due to health decay and children's leave. With the urgency of senior's care problem, each government brings up with policy from different aspects such as economics, society and politics. They bring up solutions based on each problem from aging population to expect that senior get more understanding of themselves, develop their whole potential and raise their society value and life quality.

Taiwan is one of the most aging population country in the world, just minor than Japan in Asia region. Furthermore, these senior people from baby boom are not like the past of them who have little interest in social connect. They own fortune and quite large purchasing power. They are more active in social activities and business activities which create more commercial potential. Each enterprise brings up suitable merchandise and route to satisfy the requirement of aging people.

Medical electrical scooters solve the out-going problem and substantially increase mobility and feasibility of seniors. Electrical scooters indeed are quite popular among seniors. The amount of electric scooters raises up gradually because they are easy to operate and their smaller speed than other transportation's speed. Senior people don't have enough ability to response of chaos traffic which is obviously lower than general drivers. Furthermore, medical electric scooters belong to medical assistive devices nowadays. However, there aren't any relative laws of the right of way and the complete constructions of barrier-free space. . The government should give priority to the minority groups when legislating and create a safer environment for them.

1.2 Research intention

(1) This research explores elders in Taiwan area and their everyday transport needs.
(2) An electric powered scooter satisfactory survey is used as the reference for the electric scooters quality requirement.
(3) Provided Ministry of transportation and communications with elder's view towards traffic laws so that safety measures and precautions can be planned.

1.3 Methodology

(1) Establish research topic (2) Establish the research motivation and intention (3) Research and collect documents (4) Design and revise questionnaires (5) Execute questionnaires (6) Collect and process questionnaire data (7) Analyze and review the data (8) Conclude and make suggestions

2. Reference review

2.1 The definition of the elderly

At Taiwan's current rate of aging, it takes 22 years to increase the senior (over 65) population by 10% to 20%. Other countries like Sweden, America, Denmark, England and Japan have rates of about 85, 70, 61, 50, 24 years respectively. Taiwan has the highest rate of aging among other countries. There will be 29.8% of people above 65 years old in 2051 (Executive Yuan for Economic Planning and Development, 2008). The existing welfare laws set up "people above 70 years old are the main body to enjoy welfare of old people's welfare." Official insurance laws prescribe that 65 is the right age to force them to retire. The labor insurance laws order that people up to 55 years old can apply for the elderly pension. And in general, indexes are used to measure the degree of population aging in demography such as the elderly population index, the aging index, Dependent population index which all use the age of 65 as the calculating standard.

Due to different grow-up background, culture background, living environment, personal character and interaction with family, emotion condition of elders would be obviously different. However, while people mentally and physically decay, people tend to have same mode as followings:

(1) opposite response
(2) feelings of empty and loneliness
(3) response to emotion gets lower obviously
(4)lack of thinking
(5)easy to be affected by environment or others

Elders face the change of living type, such as retirement which would make entire life filled with problems such as aging decay, birth, death, loss of couple, smaller living circle.

Elders have large heterogeneity in the aspect of physiology, cognition and social relation. Development in each age has its own property. Therefore, it's necessary to

put more emphasis on heterogeneity. Realize elder's requirement of degree and type and evaluate in particular.

3. Architecture and Methods of Study

3.1 Architecture of Study

Learn the factors for affecting seniors' intention of going out from questionnaire. The direction of this study is to know the current physical and mental status, the potential awareness and attitudes. Get know how to affect intention of going out and affect the actual outside behavior.

3.2 Research model and hypothesis

To analyze the reason for the electric powered scooters user's intention of going out, the whole research hypothesis is as following,

H1: The motivation of going out for using or purchasing the electric powered scooter has significant positive influence on the user's intention of going out.

H2: The current physical and mental condition of the user has a significant positive influence on the user's intention of going out.

H3: The interaction and support from family has significant positive influence on the user's intention of going out.

H4: The view of the external traffic environment has significant negative impact on the user's intention of going out.

H5: The satisfaction degree of using the electric powered scooter has significant positive influence on the user's intention of going out.

H6: The physical and mental conditions have a significant positive influence on the motivation of purchasing electric powered scooters.

H7: The physical and mental conditions have significant influence on the user's family interaction and support for going out.

H8: The external traffic environment has significant negative impact on family's support for him going out.

H9: The current situation of interaction with his family has significant positive influence on motivation of purchasing an electric powered scooter.

3.3 Research instrument

(1)A questionnaire survey

Conducting a questionnaire survey is determining the purpose of the study. An object of the study is defined as the electric powered scooters users who are over 65 years old in 13 townships of Taiwan. The questionnaire survey is designed to be 39 questions and 120 people are tested by pretest sample. The number of testers is

determined by that of questions (about 3 to 5 times). If the formal questionnaire survey sample is a regional study, it's more proper to keep the average number of samples at 500 to 1000 people. Limited by time, manpower, the cost and the large divergence of study object, I adopt the "Simple random sampling" method.

(2) The design of questionnaire

At the questionnaire design, Davis (1985) brought up the "Technology Acceptance Model (TAM)" in 1989. The main purposes of this model are explaining and predicting users' acceptances of information systems. TAM theoretical model develops two important beliefs of measuring the acceptance of technology which are "Perceived Usefulness (PU)" and "Perceives Ease of Use (PEOU)".A scholar Alpaugh considered that people who are over 65 years old must re-evaluate and concern more about personal health leisure, searching the meaning of life. Wilde (1982) raised "Risk Homeostasis Theory (RHT)". It supposes whether risk and risk-taking tendency balance can be the basis for making the own decision of taking adventure.

"Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST)" is published in 1996 in Quebec by scholars Demers, Weiss-Lambroum and Ska. The foundation of theory integrates "Scherer's Matching Person and Technology Model, MPT (1989)" and Weiss-Lambrou's "Tridimensionalparadigm (1993)". From those document, this study sorts in five dimensions as followings: The motive of using or purchasing electric powered scooters, current physical and mental conditions, current interaction with families, viewpoints toward the traffic environment and the satisfaction of using electric powered scooters.

3.4 Scale questionnaire, Pretest and Analysis

The questionnaire included 5 factor dimensions and 39 questions at the first design. Furthermore, we use Likert's five-point to score, item analysis, validity analysis(construct validity), reliability analysis . In the terms of item analysis, the pretest scale adopts CR to test and deletes the questions with low α value to proceed item analysis. In terms of construct validity, the factor analysis proceeds namely after item analysis_deletion some questions of the pretest scale analysis,. Subsequently, using principle component analysis and taking orthogonal axes to capture the factors when eigenvalues >1. At the basic assumptions test area, the value of KMO is 0.919, greater than 0.5 which shows that many common elements exist among variables. Therefore, it's suitable for using factor analysis. In Bartlett's spherical test, the value of $\chi 2$ is 15400.528（$p< 0.01$）which achieves significant and indicates that there is a remarkable identical element between the study objects relevance matrix. Therefore, it

is suitable for using factor analysis, too. The reliability adopts the internal consistency corfficient,that is, calculating the total scale and the subscale by Cronbach α coefficient. And its various sub-scales' Cronbach α values range from 0.442~0.903, while the Cronbach α value of the total scale is 0.943.

3.4 The object of study

This study selects elders who are above 65 years old and using medical electric scooters as objects. Overall, there are 65 questionnaires. Except for 6 questionnaires which aren't qualified, there are 120 qualified questionnaires. The second edition questionnaires are 630 in total. After deleting improper questionnaires, there still remain 600 effective questionnaires.

4. Statistics and analysis of Survey results

4.1 Satisfaction and ANOVA analysis

Most of the respondents average value 4.72~4.77 are satisfied with the electric powered scooters they use now. By the Pearson correlation coefficient, we can get know of the motivation of using electric powered scooters, the current physical or mental condition, the current interaction with family, the viewpoints of the traffic environment, the satisfaction of using electric powered scooters and which are all related to intention of going out. Except for the views to the traffic environment of seniors are negative relevant to other four dimensions, other four dimensions to each other are all positive relevant. To explore if there exists the specific relations between the intention using electric powered scooters and potential variables, the study adopts "Analysis of Variance (ANOVA)" this method to analyze and proceed statistics. First of all, in this regard of intention using electric powered scooters, the analysis result of ANOVA can be found 5 latent variables which have achieved statistic significance. It indicates that for senior citizens, the potential variables indeed exists significant difference in intention of going out. We can see data from table 1 to 4.

4.2 Multiple Regression and Structural Equation Models

Adopt Multiple Regression and Structural Equation Models to test the conceptual architecture and hypothesis. To observe individual variable, the senior citizens have the highest ability to explain the view of traffic environment while the second of interaction with their family. As a result, 5 dimensions for going out intention of using electric powered scooters all present significant relations. Therefore, in regard to the motivation of using electric powered scooters, it considers that physical and mental conditions have greater influence than interaction with their families.

Collect foregoing data of Multiple Regression(Figure1) and we get that Structural Equation Models as follows:

(1) In terms of this study's factor dimensions for explaining the intention of going out of using electric powered scooters, regression coefficient is 0.955.

(2) Through surveying the results, there is direct significant influence between the physical and mental conditions and viewpoints to traffic environment. The physical and mental conditions can explain coefficient of regression which is 0.759 for interaction with family is. The traffic environment explains that coefficient of regression which is 0.820 for interaction with family. According to foregoing information, it indicates that the more disordered traffic environment is, the lower support from family is.

(3)Through surveying the results, there is direct significant influence on the using electric scooters motivation to the physical and mental conditions and viewpoints to traffic environment. Physical and mental status of senior citizens explain coefficient of regression which is 0.749 for the motive of using electric scooters. After adjusting, the interaction with family explain coefficient of regression which is 0.684 for the motive of using those scooters. Although the external traffic environment for senior citizens is very dangerous, they still need to go out. Therefore, their requirement for scooters quality will be absolutely higher which has significant influence on going out intention. Kim (2004) also pointed out they may still have higher willing to use personal transportation under the physiological and psychological permission (Quan Lun,Xu,2001). Physical and mental conditions, interaction with family and using motivation of five dimensions have also have effect directly significantly.

5. Conclusion and make suggestions

5.1 Conclusions

(1)In this study, there are over 70% users living with their family who expect to use electric powered scooters to mitigate family's burdens. In independent-family circumstance, they can safely get around. Therefore, the motive of using or purchasing electric scooters is direct proportion to the going out intention. Shi An, Liang (2005) adopts David's (1989) "TAM" to research for the basis and discovers that personal view for electric scooters will be a positive effect of the using willing.

(2)In this survey, the physical and mental status of users has the significant influence on intention of going out which is conformed to hypothesis "The behavior for physical and mental status (mentioning at chap 3.2)".

(3)The survey of seniors in Nantou Country indicates that seniors living with their family account for 70.83%. Only on the circumstance of their good physical and mental condition can they get around alone with their family's support which is conformed to this hypothesis of study "(H3)The interaction and support from family has significant positive influence on the user's intention of going out."

(4)Homeostasis Theory (RHT) supposes whether risk and risk-taking tendency balance can be the basis for making the own decision of taking adventure. While senior citizens face the risky traffic environment, they intend to change their degree of attentiveness to environment. Through cautious behavior to reduce the risk, their intention of going out is negative relevant and significantly affected.

(5)Every average degree of question is above 3.5 in this study of "The satisfactory degree of using electric powered scooters". "Do you know the policy of government's pension for purchasing electric powered scooters?" got the highest points of satisfactory. "Prices of scooters are reasonable " are the most unsatisfied item. It indicates that seniors in Taiwan care much for the price of the electric powered scooter.

5.2 Suggestion

For most seniors, medical electric scooters are the most convenient transportation. However, under such traffic condition, there is no-barrier space and complete construction. The government should attach more importance to no-barrier space and road only-for-electric scooters.

The reason for the increase of electric scooters' requirement is a lot of time after elders retiring. According to this research, there are 60 percent people having middle-low income. We suggest government should modify the law of allowance to reduce the burden of minority groups.

Each driver should be familiar to traffic law and obey traffic sign. However, the data shows that there are approximately 57% people without any vehicle license. It indicates that elders might don't make sense of every traffic law and sign. We suggest that related transportation officials should strengthen the guidance on law and safety, encourage they to take license exams and hold vehicle course regularly to enhance effect and build the correct concept of traffic safety.

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8. Figures and Tables

Table 1 Valid analysis and reliability analysis

Scale	Cronbach's Alpha value	Subject to standardize project Cronbach's Alpha value	The number of items
The motive of using and purchasing electric powered scooters (MUPE)	0.442	0.515	7
The current physical and mental condition (CPMC)	0.451	0.496	7
The condition of interaction with families (CIF)	0.795	0.794	5
The views toward the traffic environment (VTE)	0.828	0.828	6
The satisfaction degree of using electric powered scooters (SDUE)	0.903	0.904	14
Total scale	0.943	0.946	39

Table 2 The Multiple regression test of the going out intention of using electric powered scooters

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Standardized Coefficients (Beta)	T	Significance
The motive of using and purchasing electric powered scooters (MUPE)	0.785	0.616	0.711	6.53508	0.785	30.969	0.000***
The current physical and mental condition (CPMC)	0.870	0.757	0.757	5.11729	0.870	43.177	0.000***
The condition of interaction with families (CIF)	0.906	0.822	0.821	4.383887	0.906	52.479	0.000***
The views toward the traffic environment (VTE)	0.940	0.883	0.88	3.54442	0.940	67.339	0.000***
The satisfaction degree of using electric powered scooters (SDUE)	0.955	0.911	0.911	3.08944	0.955	78.470	0.000***

Table 3 The multiple regression of senior citizens' interaction with families

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Standardized Coefficients (Beta)	t	Significance	VIF
The current physical and mental condition (CPMC)	0.759	0.576	0.575	1.12567	0.759	28.512	0.000***	1.000
The views toward the traffic environment (VTE)	0.824	0.680	0.679	0.97873	0.824	35.614	0.000***	1.000

Table 4 The multiple regression of the motive of using electric powered scooters

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Standardized Coefficients (Beta)	t	significance
The current physical and mental condition (CPMC)	0.749	0.561	0.561	1.01902	0.749	27.667	0.000***
The condition of interaction with families (CIF)	0.684	0.468	0.467	1.12192	0.684	22.953	0.000***

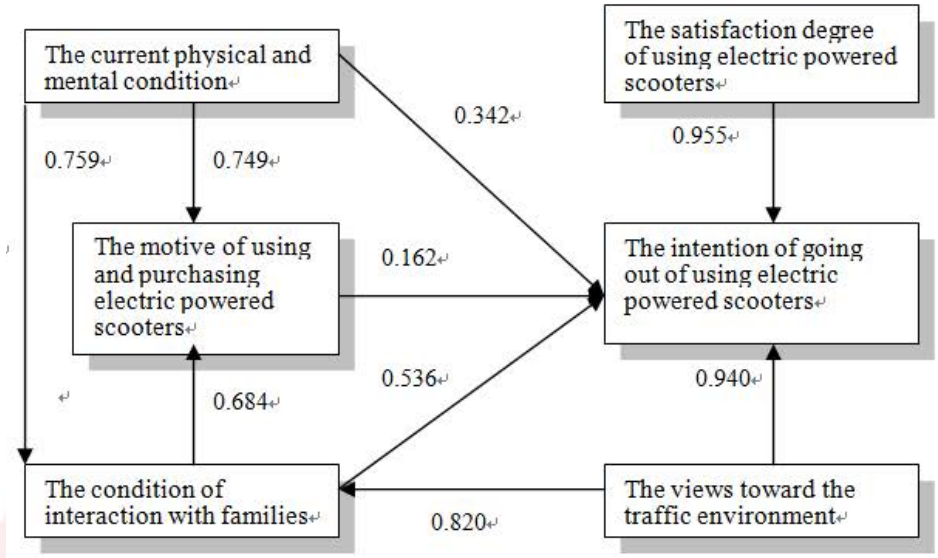

Figure1 Path analysis

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