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MEASURING HAPPINESS OF TAIWAN - APPLY THE INNOVATIVE TECHINQUE

Abstract:

To measure the state of happiness is never a simple task to accomplish, especially its unclear concepts which include subjective and objective indicators simultaneously. From now on, many happiness-relative indexes were generated to evaluate the citizens' well-being of the countries as a practical policy tool all over the world. In Taiwan, the Better Life Index (BLI) from the OECD is applied by the government to calculate citizens' state of well-being, to solve the issues that a huge structure may lead to, this research used DEMATEL-ANP (DANP) as the methodology to analyze the existing relations between the indicators and discover the crucial ones from the viewpoints of the experts. The result shows that personal earnings and education are two very important criteria to the state of happiness in Taiwan.

Keywords:

Happiness, Better Life Index (BLI), DEMATEL-ANP (DANP)

1. Introduction

In the last decade, many researchers made effort to explore the meaning of happiness[1-3]. Instead of that, for instance, governments such as Bhutan, England, France, China and Brazil, have put the happiness-related index into the structure of the measurement of the progress of the nation. Even the chairman of the Fed in the United States and the U.S. Census Bureau discuss about the value and defects of those indexes. Apparently, the issue of how to evaluate happiness appropriately starts to draw governments' and the publics' attention globally and is going to cause profound influence on the policy of each nation in the future.

Thinking about measuring the state of happiness, it's definitely a difficult topic for economists since the components of the structure, very often, not objective but subjective[4], and this fact may explain why lots of the related researches are came from psychologists in the past. Building a fair and comprehensive measuring structure is still unsolved and an essential task to be accomplished. Then, to measure happiness precisely is never a simple task, since it involves both tangible and intangible items, moreover, the concept of the happiness is unclear, that is, can be interpreted in various ways from various aspects or research fields[5]. There has been lots of dialectic from economists includes the relationships between happiness and income, or the possibilities of substitutes happiness index for utility[6,7]. It also can be seen that economists have tried to consider happiness as a new component of the measurement of economic growth, those researchers make efforts to let happiness-related indexes and GDP measurement complement and supplement each other, and aim to develop the index that can be compared transnationally and traced in the long term[8,9].

When it comes to happiness, vocabularies such as well-being, subjective well-being or life satisfaction are applied by economists refer to the similar idea, even if happiness has drawn most attention from the public, it's definitely the least clear vocabulary with the highest degree of openness[7]. Generally, related survey aims to evaluate the degree of happiness toward their lives of the citizens, and the basic structures may involve peoples' income, education, housing, jobs, health, and environment etc., those aspects of peoples' lives applied by the researches can be traced from the measurement of the sustainable development[10] , which includes not only environment maintenance but issues about moral, ethics, and happiness. In 2016, the United Nations has established sustainable development goals (SDGs) with 17 items which covers wild ranges and aspects, and aim to build a better world by fulfilling those scheduled targets [11]. Those goals, include no poverty, zero hunger, good health and well-being and decent work and economic growth, are highly-related to the degree of peoples' happiness. From OECD, to measure people's views of well-being, the UN has invited people to vote for 6 issues from a list of 17 in connection of the SGDs, to ensure that the measurement effort in this field reflects what people themselves feel is most important for a good life [12]. While the SDG process is a policy-driven exercise, it will have major implications for the statistical agenda on "measuring performance beyond GDP", as many of the goals, targets and indicators featured in the SDGs bear some relation to the wellbeing outcomes described in this report [12]. Obviously, the concepts of happiness and sustainable development are inseparable [13], then, it can be seen that many happiness-related indexes are established from the components came from the structure of the sustainable development, or just drawn a part from it.

Presently, many happiness-related indexes has been developed and applied by the governments of the world, for example, gross national happiness (GNH) and human development index (HDI), or other remarkable discussions between the academic, those exploration has always triggered one similar but basic question, if

those happiness-related researches have truly helped to measure the state of human welfare and well-being more precisely, moreover, included the presence and the future [7]. After all, the results of those research explorations construct the measuring structures, which provides more generalized components of the indexes, that is, instead of income and can be applied as the tools to examine the overall effects of various situation, or assign them with different weights, ranges from environmental degradation, crime and unemployment rate, life expectancy and satisfaction are all be included, can be considered an effective policy tools used by scholars and policy makers.

If we carefully examined those happiness-related indexes that developed by governments or related institutions, to provide comprehensive view which usually brings out the huge system under the generalize frame, it means there are many components under the overall structure, the big system can result in difficulties to measure practically, those kind of happiness-related survey usually take long time and need lots of manpower and resources. Therefore, this also decreases the feasibility of assigning the weights since there are too many criteria in detail, or if it's still meaningful to do this. Studies had pointed out the chosen weighs of most countries are insensitive during the pairwise comparisons of the Better Life Index (BLI) [14]. It may provide the reason why in the real world governments or institutions usually calculate those indexes without assigning weights. However, one index can be considered comprehensively refers to it can be adapted to various situation, since citizens from countries hold unequal values from different cultures, this simple fact point out weights assignment let those indexes present the real state of happiness more faithfully and precisely. Even more, to cover all aspects of the concept of happiness, those indexes tent to include similar criteria to avoid omissions, considering criteria with high correlation in one structure may create repeated calculation, or cause the similar effect of weights assignment unintentionally, apparently, theoretical ideal may contribute to the gap of the reality, overcome these problems seen to be necessary in the next research stage.

In this research, we chose one famous happiness-related index, Better Life Index (BLI) proposed by the Organization for Economic Co-operation and Development (OECD) in 2011, aims at offering an alternative to the gross domestic product (GDP) to compare countries, taking into account not only the global amount of their wealth, but also well-being indicators [14].This index have gained recognition and application all over the world, includes material living conditions and quality of life, totally 11 topics followed by 24 indicators to evaluate and compare well-being across countries. In Taiwan, it is applied by the government to evaluate citizens' state of well-being but without using weights. We examine the index by experts' viewpoints and analyze which indicators and criteria of the index should be considered important for Taiwan to inform the policy makers. Through DEMATEL and ANP, the appropriate method, we can first analyze the causal relationship between the criteria, assign weighs and second, identify the key criteria of the indexes, which can help to extract the essential ones and simplify the whole structure, provides the suggestions and conclusions to the point.

2. Evaluation Model based on DEMATEL-ANP

In this research, the BLI of the OECD are applied as guidelines, we used expert questionnaires with decision-making trial and evaluation laboratory (DEMATEL) and DEMATEL based analytical network process (DANP) to analyze the detailed relations between indicators. In the past, Delphi method should be applied before DANP, but since the contents of the BLI are fully reference to the OECD, the Delphi method is not necessary anymore.

According to the official web site of the OECD, we will integrate the guidelines and analysis with DEMATEL and survey through the expert questionnaire to obtain the relationship between impact indicators.

3. Empirical analysis-results from DANP

This research applied the detail contents of the BLI to form the questionnaires of DANP, then distributed to the chosen experts from the academic and the research institution from October to December in 2016, 5 complete questionnaires were collected and been put into the analyzing process, the initial analysis are presented as follows.

After establishing the direct impact matrix and normalized relationship matrix, we can obtain the total impact matrix. By calculating d+r and d-r, the results from DEMATEL are shown in Table 1.

Table 1. Prominence and relation of each criterion

	Criteria	d	r	d+r	Ranking	d-r
A1	Housing expenditure	2.0278	2.0659	4.0936	10	-0.0381
A2	Dwelling with basic facilities	1.9309	2.0102	3.9411	14	-0.0793
A3	Rooms per person	2.1667	1.827	3.9937	12	0.3396
B1	Household financial wealth	2.6225	2.1678	4.7902	3	0.4547
B2	Household net adjusted disposable income	2.6015	2.414	5.0156	2	0.1875
C1	Job security	2.372	2.1088	4.4808	7	0.2632
C2	Personal earnings	2.8788	2.6728	5.5516	1	0.2059
C3	Long-term unemployment rate	2.5111	2.0531	4.5641	6	0.458
C4	Employment rate	2.1656	2.159	4.3245	9	0.0066
D1	Quality of support network	1.6425	2.0034	3.6459	16	-0.3609
E1	Years in education	2.2849	1.7247	4.0097	11	0.5602
E2	Students skills	2.2366	1.7319	3.9686	13	0.5047
E3	Educational attainment	2.8494	1.9008	4.7502	4	0.9485
F1	Water quality	1.3724	1.3552	2.7276	19	0.0172
F2	Air pollution	1.287	1.2134	2.5004	21	0.0736
G1	Stakeholder engagement for developing regulations	1.3165	1.2981	2.6147	20	0.0184
G2	Voter turnout	0.8896	1.5015	2.3911	22	-0.6119
H1	Self-reported health	1.934	2.528	4.462	8	-0.594

	Criteria	d	r	d+r	Ranking	d-r
H2	Life expectancy	1.5985	2.0587	3.6573	15	-0.4602
I1	Life Satisfaction	1.6714	2.9028	4.5742	5	-1.2315
J1	Homicide rate	1.1212	1.1214	2.2426	23	-0.0002
J2	Feeling safe walking alone at night	0.9475	1.2621	2.2096	24	-0.3146
K1	Time devoted to leisure and personal care	1.1816	1.7534	2.935	18	-0.5718
K2	Employees working very long hours	1.6831	1.4589	3.1419	17	0.2242

In Table 2, it displayed Rooms per person, Household financial wealth, Household net adjusted disposable income, Job security, Personal earnings, Long-term unemployment rate, Employment rate, Years in education, Students skills, Educational attainment, Water quality, Air pollution, Stakeholder engagement for developing regulations are important factors affecting the national well-being in Taiwan. As for, Housing expenditure, Dwelling with basic facilities, Quality of support network, Voter turnout, Self-reported health, Life expectancy, Life Satisfaction, Homicide rate, Feeling safe walking alone at night, Time devoted to leisure and personal care are regarded as less important criteria. Criteria in the sorting on the "cause" or "effect" of the classification, usually a row of positive and negative value of the difference between the judges, the results are summarized in the Table 2.

Table 2. Cause/effect properties of criteria

Cause/Effect	Criteria
Cause	Rooms per person, Household financial wealth, Household net adjusted disposable income, Job security, Personal earnings, Long-term unemployment rate, Employment rate, Years in education, Students skills, Educational attainment, Water quality, Air pollution, Stakeholder engagement for developing regulations
Effect	Housing expenditure, Dwelling with basic facilities, Quality of support network, Voter turnout, Self-reported health, Life expectancy, Life Satisfaction, Homicide rate, Feeling safe walking alone at night, Time devoted to leisure and personal care

After a total influence matrix (T) is generated, ANP is applied to construct a weighted sumpermatrix. In this process, we used the software DECISION SUPER to calculate the data. Applying with Markov chain mode and multiply the unweighted matrix by three times to converge to the limit supermatrix (W *), we can obtained the relative weight of each criterion as shown in Table 3.

Table 3. Relative weight of each criterion

Ranking	Criteria	Weights
11	Housing expenditure(A1)	0.045068665
12	Dwelling with basic facilities(A2)	0.043130497
8	Rooms per person(A3)	0.048483683
2	Household financial wealth(B1)	0.05828142
3	Household net adjusted disposable income(B2)	0.057837109
5	Job security(C1)	0.052521802

Ranking	Criteria	Weights
1	Personal earnings(C2)	0.063902275
4	Long-term unemployment rate(C3)	0.055136224
9	Employment rate(C4)	0.048064374
12	Quality of support network(D1)	0.035882869
6	Years in education(E1)	0.050795248
7	Students skills(E2)	0.050037366
2	Educational attainment(E3)	0.063130400
18	Water quality(F1)	0.029975019
20	Air pollution(F2)	0.027895977
19	Stakeholder engagement for developing regulations(G1)	0.028938349
24	Voter turnout(G2)	0.019830344
13	Self-reported health(H1)	0.042468542
17	Life expectancy (H2)	0.035259795
14	Life Satisfaction(I1)	0.036845704
22	Homicide rate(J1)	0.024123559
23	Feeling safe walking alone at night(J2)	0.020471658
21	Time devoted to leisure and personal care(K1)	0.025617610
15	Employees working very long hours(K2)	0.036301510

To determine key factors, the initial results of the above process can be sorted into the final rankings. Importance of each criterion will be determined according to the principle that the smaller the Borda score, the more important the criterion. The overall rankings are shown in Table 4.

Table 4. The overall ranking for criteria

Rankings				Criteria	Weights
DEMATEL	ANP	Sum	Overall		
10	11	21	12	Housing expenditure(A1)	0.0400
14	12	26	14	Dwelling with basic facilities(A2)	0.0467
12	8	20	10	Rooms per person(A3)	0.0333
3	2	5	3	Household financial wealth(B1)	0.0100
2	3	5	2	Household net adjusted disposable income(B2)	0.0067
7	5	12	6	Job security(C1)	0.0200
1	1	2	1	Personal earnings(C2)	0.0033
6	4	10	5	Long-term unemployment rate(C3)	0.0167
9	9	18	8	Employment rate(C4)	0.0267
16	12	28	15	Quality of support network(D1)	0.0500
11	6	17	7	Years in education(E1)	0.0233
13	7	20	11	Students skills(E2)	0.0367
4	2	6	4	Educational attainment(E3)	0.0133
19	18	37	18	Water quality(F1)	0.0600
21	20	41	21	Air pollution(F2)	0.0700
20	19	39	19	Stakeholder engagement for developing regulations(G1)	0.0633
22	24	46	23	Voter turnout(G2)	0.0767
8	13	21	13	Self-reported health(H1)	0.0433
15	17	32	16	Life expectancy (H2)	0.0533
5	14	19	9	Life Satisfaction(I1)	0.0300
23	22	45	22	Homicide rate(J1)	0.0733

Rankings				Criteria	Weights
DEMATEL	ANP	Sum	Overall		
24	23	47	24	Feeling safe walking alone at night(J2)	0.0800
18	21	39	20	Time devoted to leisure and personal care(K1)	0.0667
17	15	32	17	Employees working very long hours(K2)	0.0567

Table 4 shows the Personal earnings (0.0033), Household net adjusted disposable income (0.0067), Household financial wealth (0.0100), Educational attainment (0.0133), Long-term unemployment rate (0.0167) and Job security (0.0200) those 6 criteria have the largest impacts on the national well-being. Therefore, through the viewpoints of the experts, those criteria can be regarded as the key factors when evaluate the state of happiness in Taiwan. After that, the causal diagram for the key criteria can be depicted as follows.

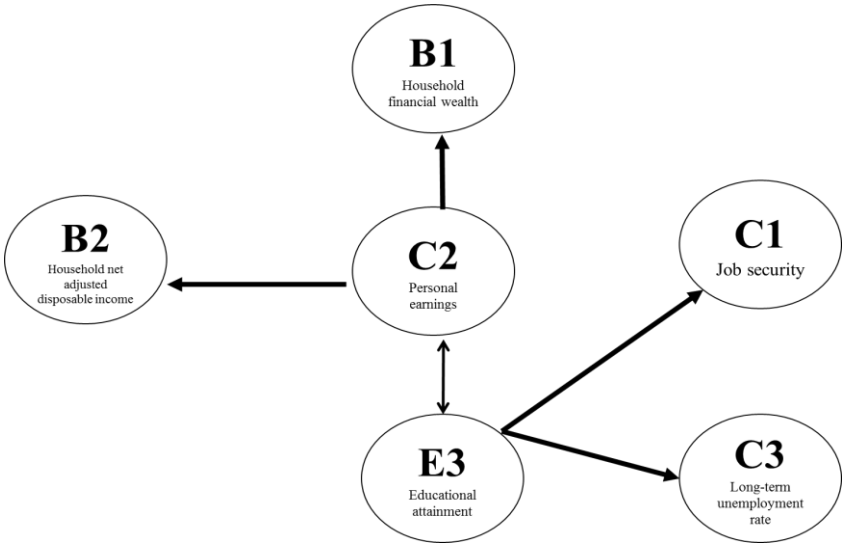

Figure 1. The causal diagram for evaluation criteria

From Figure 1, we discover there are three main relationships between these 6 key criteria. First, Personal earnings (C2) Educational attainment (E3) are mutually influential. Second, Personal earnings (C2) is a direct impact Household financial wealth (B1) and Household net adjusted disposable income(B2), educational attainment (E3). And third, Educational attainment (E3) is a direct impact Long-term unemployment rate (C3) and Job security (C1). The result shows that, to improve the state of well-being in Taiwan, we should start with Personal income and Educational level since these 2 indicators are regarded as the cause factors.

4. Conclusion

Through the formal structure of the OECD Better Life Index, the research applied DEMATEL and DANP to explore each criteria from experts and have the conclusion that, from the outcome of DANP, we extracted the most important six criteria which are Personal earnings, Household financial wealth, Educational attainment, Household net adjusted disposable income, Long-term unemployment rate, Job security, this result is very similar to the outcome of DEMATEL, which points out the

most important six criteria are Personal earnings, Household net adjusted disposable income, Household financial wealth, Educational attainment, Life Satisfaction, Long-term unemployment rate. Compare these two orders generated by two different methodologies, it's very obvious that from the experts' point of view, mostly agree with the economic-related criteria such as Personal earnings, Household financial wealth and Household net adjusted disposable income are the most crucial criteria, means that economic issue may strongly influence peoples' happiness, if the government wants to enhance the degree of peoples' happiness, they definitely are the criteria should be satisfied in the first place, if we also take other chosen criteria into account, for example, Long-term Unemployment rate, it's also belong to the economic-related criteria, since jobs can bring in Personal earnings and provide the source of money to the household as well, means the economic state of a country can have a great impact on the happiness. We can also notice that DMATEL choose Life Satisfaction, the subjective criteria as the fifth important criteria while DANP put it into the eleventh, therefore after calculating Bbrda score, this criterion is excluded as the key criteria of the OECD better life index.

After the combination of the outcomes from DEMATEL and DANP, Personal earnings, Household financial wealth, Household net adjusted disposable income, Educational attainment, Long-term unemployment rate, Job security are recognized as the six key criteria of the OECD better life index. Details are very similar to the analysis above, from the influential network-relationship, we also have several findings. First, Personal earnings and Education attainment influence each other. Second, Personal earnings have the direct influence on Household financial wealth and Household net adjusted disposable income. Third, Educational attainment have the direct influence on Long-term unemployment rate and Job security. The last, Household financial wealth have the direct influence on Job security. These findings points out Personal earnings can influence Household financial wealth and Household net adjusted disposable income and Educational attainment directly and influence Job security through Household financial wealth and Job security, Long-term unemployment rate through Educational attainment indirectly, is regarded as the most important criterion of the OECD better life index. Furthermore, Educational attainment have the direct influence on Long-term unemployment rate, Job security and Personal earnings, and also have the indirect influence on Household financial wealth and Household net adjusted disposable income through Personal earnings. Since Educational attainment and Personal earnings can influence each other, we can conclude that education can also have a great impact on other five criteria, considering that education is the basis of earnings, because without good education, people are hardly find themselves good jobs and earn less, it's the infrastructure that a society or a government need to make lots of effort to maintain and improve to secure peoples' happiness. Therefore, to improve happiness, the first thing we should pay attention is education, it's the fundamental of other five key criteria, improve both the quantity and quality of education can enhance happiness comprehensively in the long run.

In this research, we explore the importance and relationship between the criteria of the OECD better life index through experts' viewpoints, finding that the economic and educational-related criteria are most crucial of the OECD better life index, means these two objective criteria are regarded as the main issue of peoples' happiness instead of other subjective ones, for example, Self-reported health, Quality of support network or Feeling safe walking alone at night, which are not considered as very essential when it comes to happiness. This conclusion may force us to face the reality of life, or result from the changing economic environment nowadays that gives people the feelings of uncertainty, make this kind of practical criteria the most emphasized.

To meet the real OECD better life index, which is provided by the formal organization and has been discussed systematically by experts, thus we did not change any criteria through the research. However, we find that there are several criteria that is highly related to each other, from the analysis of DEMATEL, we understand causal relationships may exist between the criteria, or we don't even need methodology to interpret this fact, for example, Educational attainment and Years in education, Employment rate and Long-term unemployment rate, Household net adjusted disposable income and Household financial wealth, considering put similar criteria in one evaluation structure could result in repetitive calculating or potentially put more emphasis on one specific phenomenon that may cause unbalance, moreover, increase the complexity of the research and the burden of questionnaire distribution. In this research, we apply DANP, one methodology that is thought appropriate to handle the circumstances here, and it does help us to simplified the measurement system and depict the relationships between criteria clearly. Therefore, we suggest filtering the criteria in the future research, not only to prevent the problem we mention above but improve the structure to evaluate happiness more comprehensively.

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