

Modeling quality of life of Ho Chi Minh City dwellers

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ABSTRACT

Quality of life (QoL) has received more and more attention from scholars and researchers from various fields such as healthcare, philosophy, psychology, sociology, and especially economics after many decades of focusing on income. However, researchers have faced many challenges to gain the proper measurement of QoL due to the contextually based concept. This study employs the primary data conducted in Ho Chi Minh City including 500 observations in 2022, with the application of partial least squares structural equation modeling (PLS-SEM) to construct a hierarchical model to measure the QoL of the dwellers in Ho Chi Minh City. The empirical model supports the multi-level hierarchical structure of the QoL. The statistically significant contribution of economic, social, and environmental dimensions in the integrated index has been confirmed. The environmental component shares the highest weight, followed by the economic factor. The social aspect contributes the least share in the quality-of-life index. Further analysis of the sub-criteria in each dimension has been made. The findings implicitly suggest the policy concentration on sustainable factors enhancement to raise the QoL. It was a milestone for policy makers to switch the focus from material to non-material factors in the life quality model in Vietnam.

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1. INTRODUCTION

Quality of life (QoL) becomes the great interest of economists after many decades of focusing on income as the ultimate goal of life, given its role in promoting strategies of inclusive and sustainable economic, cultural and social development [1]–[2]. In fact, developing countries have emphasized on economic growth in an insatiable way to meet human needs, leading to severe harms to other aspects of people's lives such as the environment. Specifically, natural disasters occur continuously due to unsustainable development. The consequence is environmental pollution and resource depletion [3], [4]. Vietnam is among the developing countries with similar experiences. Ho Chi Minh City is a major hub for the economy, culture, and society in Vietnam. Despite occupying only, a small portion of the country's land area (0.63%), it

contributes more than 20% of the country's gross domestic product (GDP). With a population of 9.1 million people, it is the most populous city in Vietnam and makes up 9.35% of the country's population. In the Southeast region, it comprises 50.44% of the population [5]. The municipal authority now targets the livable city. High QoL is considered a superior incentive for attracting human capital, the key policies for cities to reach the economic development hub, and public visibility [6]. QoL is considered an interdisciplinary concept, integrated into diversified fields, such as healthcare, sociology, economics, environmental science, psychology, and demographics [7]–[9]. This leads to various stakeholders' perspectives and inconsistencies in its definition and measurement [10], [11]. Cities seek innovative and cost-effective methods to enhance the QoL and Ho Chi Minh City is not an exception. Therefore, the measurement model of Ho Chi Minh City dwellers QoL is useful for diagnosing prior policy initiatives, identifying root causes of problems, and conducting future policy strategies. Unlike most previous studies, the measurement of QoL was only unidimensionally considered. For instance, research by Vo *et al.* [12] only relied on the World Health Organization QoL (WHOQOL) index when studying the QoL for the elderly. This study approaches a multi-faceted overview of the city dwellers' life quality. This benefits the policymakers and practitioners in identifying areas where interventions are most needed, evaluate the effectiveness of existing performance, and monitor progress toward development goals. In addition, the QoL measurement model can help identify and address disparities in access to essential services and opportunities, as well as identify factors hindering economic growth and social development [13]. Given the foregoing, this study employs a subjective way of evaluating the QoL to analyze how internal and external influences concurrently impact it.

The study contributes to the literature in several ways. Firstly, the theoretical concept of QoL has been operationalized at the hierarchical structure to allow the focus attention to detailed components of QoL. Secondly, the weights of each component are measured for priority policies under the resources constraint. Thirdly, the results indicate a significant turning point in the policy direction towards prioritizing non-material aspects for improving the QoL of urban residents in Ho Chi Minh City. Finally, this paper highlights the importance of measuring the QoL in a metropolis in developing countries to understand better the challenges facing these countries and identify effective policies that can improve the lives of people in these countries. The organization of the study is as follows: section 1 introduces the research problem, and section 2 provides a review of the relevant literature on the hierarchical model and measurement criteria of QoL. Section 3 describes the method with data collection strategy and data analysis technique. Section 4 presents and discusses the study findings before the conclusion in section 5.

2. LITERATURE REVIEW

The definition of QoL is not unequivocal with a multidimensional approach, covering many aspects from physical and mental health to socioeconomic characteristics of a subject [14]. QoL was introduced around the end of World War II, and the notion has evolved with growing urbanization and globalization [15]. It is gaining importance in promoting the growth of the local economy because greater QoL encourages foreign investments and skilled labor. But it wasn't until the 1960s, the term "QoL" first appeared in medical research, and the main origin of this word came from the WHO definition [16], [17]. The concept of QoL refers to how human needs align with their perceived fulfillment [18], [19]. According to Epley and Menon [20] QoL has become a viable form of advertising for livable cities all over the world. QoL theory is derived from Maslow's human developmental perspective. QoL refers to meeting human needs using resources, facilities, and opportunities supplied by the environment, and on the other hand, it refers to an individual's perspective, appraisal, and satisfaction with meeting their requirements. The hierarchy of needs includes physiological necessities such as food and clothing, safety needs like job security, the desire for love and belongingness through friendships, the pursuit of esteem, and ultimately self-actualization, in ascending order. Maslow [21] believed that the truly happy person would have these eight needs fulfilled.

The consideration of QoL used to be limited as policymakers were often biased toward economic factors [22]. Economic development sometimes goes against aspects of QoL such as environment and health. According to Felce and Perry [23] built a model of QoL consisting of three components: i) life conditions with objective factors related to an individual's situation; ii) subjective happiness implying the individual's satisfaction with living conditions and lifestyles; and iii) personal values, an important part in connecting the first two major factors. Furthermore, Mitchell and Kemp [24] viewed QoL in terms of its constituent elements, which include health, personal growth, the physical environment, natural resources, and security. Research by Shafer *et al.* [25] considered QoL from an ecological perspective by building a conceptual model that combines economy, environment, and community. The definition of QoL is still very controversial [26]. Economists often equate the QoL with happiness, well-being and measure it in both objective and subjective ways [27]–[30]. How well each person perceives their life is a measure of its subjective quality. Each person assesses uniquely their thoughts, feelings, and perceptions of the world.

Whether an individual is content with life and happiness reflects the subjective QoL. Subjective measurement is based on primary data acquired via sample surveys and interviews, in which people's feeling about QoL domains are quantified by scaled attributes associated with those QoL categories. The subjective QoL refers to how one feels about his or her own life. The culture in which individuals live has an impact on their point of view. We learn little about a person's existence from the objective quality of their life, which emerges in their capacity to adopt the cultural norms. This aspect is based on secondary data gathered from large statistics collections such as censuses.

The growing interest in the economic literature on the analysis of individual happiness is directly related to QoL based on utility theory. The standard economic theory employs an "objectivist" perspective of individual satisfaction that is based on observable decisions. The research on the economics of happiness, for instance, Clark *et al.* [31] examines the relationship between reported individual happiness and characteristics such as income, unemployment, and consumption levels. In this research approach, QoL is defined as the good feeling that each individual feels and self-assesses from the diverse perspectives in her or his life, which can be categorized into: i) economic; ii) social; and iii) environmental dimensions [32].

Although there is no standard measure of QoL across countries, efforts are being made by government agencies to use QoL research to guide policy to enhance overall social welfare. The human development index (HDI) of the United Nations Development Program (UNDP) is perhaps the most popular and commonly utilized composite index [33]. For instance, the research of Beslerová and Dzuričková [34] stemmed from the fact that developed countries are making efforts to monitor people's happiness and general QoL in addition to macroeconomic indicators. The researcher claimed that a variety of measurements and methodologies on this topic leads to different results. Despite the differences among the articles, what they all have in common is that they use several key factors such as economy, health, education, and population longevity to shape the QoL. Two well-known indexes, HDI and legatum prosperity index, have been compared to show the main components and measure their differences with the data of European countries from 2010-2013. The causes of disparities have been found and further research gap has been uncovered. HDI comprises three major QoL aspects, objectively measured [35].

The WHO also created a set of broad assessment instruments known as the WHOQOL index. Based on the WHOQOL-OLD module (a tool launched by the WHO), Vo *et al.* [12] measured the QoL of the elderly group in Ho Chi Minh City based on 442 observations. The study took data in 2015 and found the QoL of the elderly in Ho Chi Minh City was relatively high, with a total score (ratio from 0 to 100). of 76.62 ± 10.16 . Age, education, and difficulty with daily living activities all hurt the older people QoL, whereas perceived income sufficiency has a positive effect. The authors also show that the QoL of the group of participants will be improved when there are policies related to the development of functional health and living standards. WHOQOL's comprehensive coverage of QOL assures conceptual consistency that is lacking in many other measures of health status. However, WHOQOL is more inclined to use the subjective perception of individuals to measure QOL with much priority to health problems.

The QoL of Vietnamese people had been explored by Huong *et al.* [36]. In-depth interviews with experts on the QoL of the elderly, as well as the focus group discussion method with respondents in three communes in Hai Duong Province, Vietnam have been employed. The study identified six major dimensions of QoL including physical health, social relations, financial and economic, socio-physical environment, psychological health, and participation in religious activities. The results showed that for the elderly in both urban and rural areas participating in the study, all six aspects above are assessed as important for QoL. In terms of relationships, the elderly in urban areas prioritized their children, while their rural counterparts focus on community relations and economic conditions. The study also presented difficulties in separating individual factors when analyzing QoL because these factors have overlapping and interwoven relationships. Besides, like other studies on the topic of QoL in Vietnam, the research results are limited to the views of a specific group of elderly people living in rural areas and/or urban areas in Hai Duong Province, Vietnam.

Tran *et al.* [37] combined data from the 2011 Vietnam national age survey and the 2011 rural, agricultural and fishery census, which measures happiness or life satisfaction through an indicator by asking a choice question about the respondents' subjective satisfaction "overall, how satisfied are you with your current life?" with five response levels from 1 (very dissatisfied) to 5 (very satisfied). Since the concept of QoL is complex and multidimensional, a more multifaceted measurement model is required. Furthermore, research data was only collected from elderly people (50 years old and older) in rural areas, so findings are limited to the elderly in rural areas, while different target groups will have different characteristics and views on QoL. Therefore, the policy implications cannot be generalized to the entire population in Vietnam, especially those who live in the city. Other indicators used throughout the development and refinement of QoL research include the comprehensive QoL scale [8], the value-based index of national QoL [38], the index of social progress [39], the physical QoL index [40], the QoL index [41]. Recent research on QoL has focused on two basic methods of measurement. One method relies on quantifiable economic or social indicators to reflect how well people's needs are being met. The other considers happiness, pleasure,

satisfaction, and the like, and so-called “subjective well-being” (SWB) [22]. QoL is usually measured by either subjective indicators using surveys of human appraisals and satisfaction with life or by objective factors of the living environment using secondary data with relative weights [42]. However, due to the fact that it is difficult to incorporate both subjective and objective factors into QoL measurement because of the complexity of data collection (each direction will require a different data type: primary or secondary).

Moreover, combining two types of data during a study is impossible. Therefore, the QoL with subjective and objective domains should be analyzed separately. But there are bound to be inconsistent and confusing results. In particular, the study of Ardestani *et al.* [32] aimed to investigate the QoL of 61,402 rural households in Tehran Province, Iran in 2019-2020. The authors evaluated the subjective and objective QoL of rural residents by developing a set of survey questions based on document analysis. The first part of the survey contained 56 items, measured on a 5-point Likert scale (ranging from 1=very low to 5=very high), to assess the subjective dimension of QoL. The second part contained 51 questions to measure objective QoL and the third part included general questions. The study found that, objectively, the standard of living of villagers in Tehran Province was relatively moderate to high. However, about 20% of the villagers had a poor subjective QoL. Given the empirical evidence with a negative bias towards subjective criteria, subjective measurement of QoL at the second level is approached in this research (Figure 1).

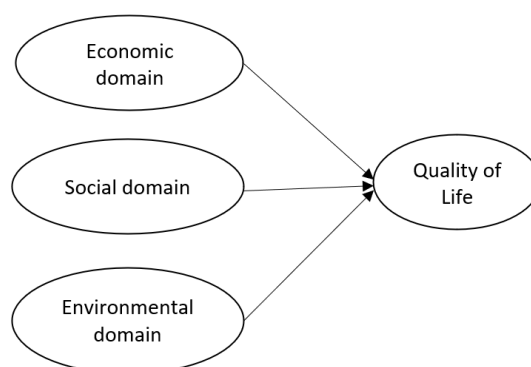


Figure 1. Hierarchical measure model of QoL

3. RESEARCH METHOD

In this study, cross-sectional data obtained from a survey of 500 residents in Ho Chi Minh City are applied. The city of Ho Chi Minh is situated in the Southeast region of Vietnam. It is bordered by Binh Duong and Dong Nai Provinces to the Northeast, Ba Ria-Vung Tau Provinces to the Southeast, and Long An and Tien Giang Provinces to the West and Southwest, respectively, and the Northwest borders with Tay Ninh; to the South by the East Sea. The natural area of Ho Chi Minh City is 2,095.01 km², including 494.01 km² in the inner city and 1,601 km² in the suburbs, population as of April 1, 2019 (the census is taken every 10 years) is about 9 million people. Administratively, Ho Chi Minh City is divided into 22 districts and cities, with 01 city, 16 urban districts and 05 rural districts (Ho Chi Minh City statistics office, 2021). The simple random sampling method applied in this study steps:

- Step 1: randomly select 2 wards from the list of 312 wards in 22 districts, cities and towns. A total of 44 wards were selected.
- Step 2: randomly select 2 residential groups from the list. A total of 88 residential groups were selected.
- Step 3: at each residential group, 2 roads are selected by random drawing from the list of numbered roads. A total of 176 roads were randomly selected.
- Step 4: at each road, 3 households are randomly selected. A total of 528 households were randomly selected.
- Step 5: in each household, 01 representative who is willing to join the survey is interviewed.

After screening the data with the exclusion of missing data, 500 observations were satisfactory for the next steps of quantitative analysis. A hierarchical model with three main domains at the 2nd order construct was structured in Table 1. Domains are treated as unobserved or latent constructs. Three domains consist of 11 indicators to measure the perceived satisfaction of the city residents across diversified dimensions and aspects of life, using a scoring scheme with a minimum core of 1 and a maximum score of 10 [43].

When estimating higher-order constructs in partial least squares structural equation modeling (PLS-SEM), algorithm settings of reflective and formative measurement models should be addressed [44]. A broad range of indicators is included in the QoL measurement model. These, however, are only weakly connected and are therefore handled separately. As a result, conventional index development techniques like factor analysis and reflective measurement model are inapplicable. In order to avoid this, formative modeling is employed, in which the indicators are defined as causes rather than as effects. In the study, indicator weights are computed by regression of each construct on its associate indicators. Two criteria are evaluated including: i) collinearity among indicators and ii) significance and relevance of outer weights [45]. The indicator weights are examined separately. Bootstrapping, a resampling with replacement is an appropriate strategy in PLS-SEM to validate a model. Samples chosen using the bootstrapping process have the same number of observations as the initial sample.

Table 1. Indicators in the QoL model

No.	Code	Description
1	ECON	Economic dimension
1.1	ECON1	Rate employment quality satisfaction
1.2	ECON2	Rate income quality satisfaction
1.3	ECON3	Rate residence quality satisfaction
2	SOC	Social dimension
2.1	SOC1	Rate education access satisfaction
2.2	SOC2	Rate the social support satisfaction
2.3	SOC3	Rate the health care satisfaction
2.4	SOC4	Rate leisure facilities' satisfaction
3	ENV	Environmental dimension
3.1	ENV1	Rate the green landscape satisfaction
3.2	ENV2	Rate the waste treatment satisfaction
3.3	ENV3	Rate the sewage system satisfaction
3.4	ENV4	Rate the traffic satisfaction

4. RESULTS AND DISCUSSION

Information obtained from 500 observations shows that the proportion of males and females in the survey sample does not have a large difference. The majority of samples are concentrated in urban districts, accounting for 55%. Thu Duc district shares 10% of the sample. This reflects the population distribution in Ho Chi Minh City with the urban and Thu Duc of 64% and 14% respectively. The population is relatively young, under the age of 30 (51%), single (52%), with a degree in education (50%) and income in the range of over 5 million Vietnamese Dong (VND) to 10 million VND (40%), matching the average income of the city dwellers of 8.8 million VND in 2021. Table 2 presents the QoL indicators description covering 3 domains: economic, social, and environmental aspects with the mean value from 8.244 to 9.444, reflecting the high evaluation of QoL made by the city residents. This also reflects the better performance of personal well being in Ho Chi Minh City compared to other provinces and cities in Vietnam [46].

Table 2. Indicators description

No.	Indicators	Mean	Min.	Max.	Standard deviation
1	ENV1	9.444	4	10	1.001
2	ENV2	9.033	4	10	1.386
3	ENV3	8.244	4	10	1.551
4	ENV4	8.844	5	10	1.349
5	SOC1	8.456	4	10	1.550
6	SOC2	8.267	2	10	1.497
7	SOC3	9.044	4	10	1.182
8	SOC4	8.371	5	10	1.003
9	ECON1	8.456	5	10	1.203
10	ECON2	8.522	6	10	1.157
11	ECON3	8.533	5	10	1.267

Table 3 presents the result of the QoL measurement model of the Ho Chi Minh City residents. The authors apply a formative measurement approach to reduce the duplication between complementary indicators since missing an indicator implies omitting a portion of the construct [47]. First, evaluating any formative measurement model starts with checking whether there is multicollinearity between the components. In general, the variance inflation factor (VIF) of any indicator should be less than 5 [48], and if that threshold is required more strictly, it is less than 3 [49]. This empirical model has met the criteria when

the VIF values of the indicators range between 1.379 and 1.942. Next, we proceed to look at the outer weights and their significance. Employing bootstrapping with 5,000 samples, the relevance of outer weights was examined [50]. Good [51] supposed that the bootstrap method is a statistical strategy for creating several tiny data samples with replacement from a significant data sample on the presumption that data would resemble the actual population data if you resample numerous times. Since the outer weight values are standardized, they may be compared with one another. Overall, the bootstrap shows that the original weights are within the 95% confidence intervals, confirming the robustness of the weights. The effects of the dimensions on the index are also significant. Figure 1 visually illustrates the importance of three dimensions, including economic, social, and environmental domains in the integrated index of QoL.

Moreover, Table 3 and Figure 2 visually illustrates the importance of three dimensions, including economic, social, and environmental domains in the integrated index of QoL. The environmental aspect (0.497) is the priority, followed by economic (0.354) and social dimensions (0.340). These findings confirm the favor of the first two dimensions in the big city, as reported by Goerlich and Reig [6]. With geo-economic advantages, Ho Chi Minh City always pioneers in national economic growth, contributing 15.4% of 2021's GDP. Specifically, the environment has been greatly emphasized in the livable city besides economic and social aspects due to current environmental problems such as hot weather with high UV index, alarming air quality, and climate change. Further investigation of the indicators in each component indicates the order of improving each sub-component. In economic terms, employment (0.424) is ranked as the top concern of the city dwellers, then income (0.423) and residence (0.384). Given the role of the national economic center, Ho Chi Minh City has attracted migrants for employment opportunities. It has encountered the net emigration rate in the recent 10 years. It is not debatable that migrants contribute to the city's growth but also cause a burden on its infrastructure and social issues.

Residence in Ho Chi Minh City become expensive. Moreover, traffic is a nightmare for city dwellers. Therefore, for environmental indicators, several interventions with priority order are indicated, including traffic (0.511), sewage treatment (0.403), waste (0.159), and green landscape (0.1). The social domain reaches the most minor importance in the integrated index. Social support (0.527) is highly demanded, followed by education access (0.446), facilities (0.313), and health care (0.236). The primary purpose of this study was a meticulous construction and validation of city dwellers' QoL in Ho Chi Minh City, Vietnam. This article applies PLS-SEM to build a hierarchical model to measure the QoL using 500 observations from primary data collected in 2022. Economic, social, and environmental factors' statistically significant contributions to the integrated index have been validated. The environmental element is given more weight than the economic factor. The QoL index's social component makes up a minor portion. Then we further examine the sub-criteria for each dimension. The results imply that policy should focus on developing sustainable fields to improve QoL. It marked a turning point in the Vietnamese life quality model's shift from material to immaterial standards.

Building a multidimensional QoL index inherited from Ardestani *et al.* [32] has helped us conceptualize the city dwellers' QoL as a third-order formative construct. It is a fascinating and original investigation because it acknowledges the distinctiveness of each QoL construct dimension, which captures various aspects of this concept and further elucidates the construct [52]. It also embraces the possibility that any items could be left out and cause a change in the nature of the construct. Furthermore, since these variables represent several components of the QoL construct and are conceptually unique, they are neither highly correlated nor covariate with one another. This also has similarities with the organization for economic cooperation and development (OECD) better life index recorded in the study of Durand [53], Koronakos *et al.* [54] for recognizing and building a scale of QoL in many aspects. As mentioned, the authors have bridged the gap from previous studies that only measured QoL uni-dimensionally, for instance, in favor of health. Typically Arian *et al.* [55], Lins and Carvalho [56] referred to a widespread global measure of health-related QoL based on the 36-item short form health survey questionnaire.

Alternatively, Lins-Kusterer *et al.* [57] considered the QoL among Brazilian individuals living with HIV. This measurement is limited because the authors introduce the concept of QoL concerning the impact of health on individuals' self-perception of health, taking into account gender, lifestyle, physical, social, and spiritual. Nevertheless, the QoL must be understood in a broader sense, ensuring the presence of economic, social, and environmental factors. Therefore, this empirical study enriches the QoL literature by proposing a hierarchical measurement model of the city dwellers' QoL. However, it must also be acknowledged that the generalizability of the results is limited as our sample size was small compared to the population with the inclusion of only 500 observations in Ho Chi Minh City. This will probably be a good development direction when future studies consider expanding research in other research contexts outside big cities or measuring the QoL for individual groups such as the elderly or workers. This measurement will help the government perceive the level of QoL in each region and identify the strengths and weaknesses in economic, social, and environmental aspects to make timely policies to transform and improve people's QoL.

Table 3. The QoL model results

No.	Code	VIF	Weight	Confidence interval (95%)			
1	ECON->QoL	1.379	0.497	0.442	0.562		
	ECON1->ECON		0.424	-0.115	0.849		
	ECON1->QoL		0.150	-0.041	0.306		
	ECON2->ECON		0.423	-0.035	0.853		
	ECON2->QoL		0.150	-0.012	0.303		
	ECON3->ECON		0.384	-0.241	0.806		
	ECON3->QoL		0.136	-0.084	0.284		
	2		SOC->QoL	1.942	0.340	0.250	0.399
			SOC1->SOC		0.446	0.202	0.693
SOC1->QoL		0.152	0.072		0.236		
SOC2->SOC		0.527	0.230		0.729		
SOC2->QoL		0.179	0.082		0.249		
SOC3->SOC		0.236	-0.055		0.506		
SOC3->QoL		0.080	-0.018		0.178		
SOC4->SOC		0.313	-0.039		0.524		
SOC4->QoL		0.106	-0.012		0.191		
3	ENV	1.940	0.354	0.289	0.042		
	ENV1->ENV		0.100	-0.240	0.400		
	ENV1->QoL		0.050	-0.122	0.190		
	ENV2->ENV		0.159	-0.290	0.571		
	ENV2->QoL		0.079	-0.160	0.277		
	ENV3->ENV		0.403	0.034	0.690		
	ENV3->QoL		0.200	0.018	0.365		
	ENV4->ENV		0.511	0.111	0.949		
	ENV4->QoL		0.254	0.054	0.498		

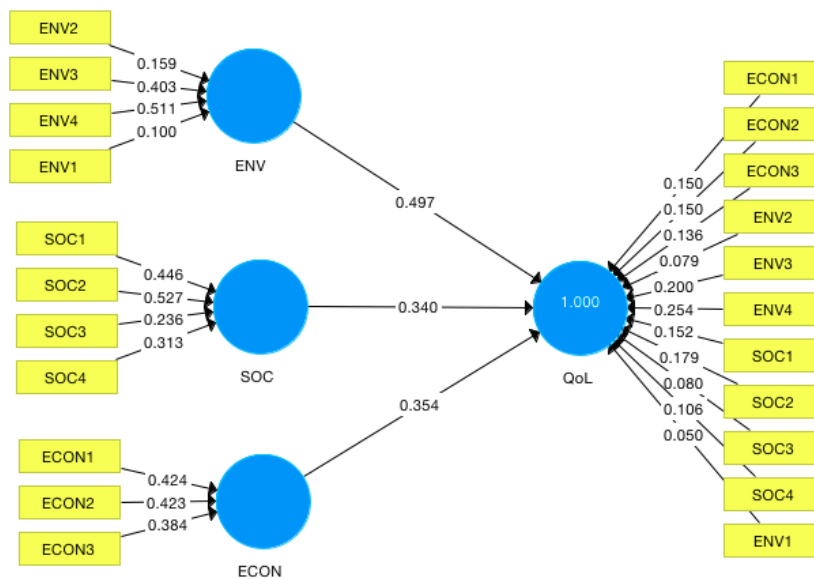


Figure 2. Hierarchical measurement model of QoL of the Ho Chi Minh City residents

5. CONCLUSION

The study has explored the measurement model of QoL of the Ho Chi Minh City residents by employing PLS-SEM. The hierarchical model with three levels has been developed to reflect the integrated index of QoL. The second level, with compositions of economic, social, and environmental domains, has fully captured QoL theoretically and practically. The priority of the environmental domain over economic and social aspects in the model has emphasized the milestone in switching the focus on sustainable factors in the life quality model in Vietnam. Further deployment of 11 indicators at level 3 of the hierarchical model implicitly reveals the requested interventions at proper priority towards non-material criteria to boost the QoL.

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