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Assessing quality of life dimensions of residents living near industrial zones – A case from Yen Binh industrial zone in Thai Nguyen City, Vietnam

Nguyen Thi Thu Thuong *, Bui Nu Hoang Anh

Thai Nguyen University of Economics and Business Administration, Vietnam

Abstract

Research on quality of life (QOL) is increasingly drawing the attention of planners because of its necessary in evaluating and overseeing public policies. Therefore, an effort has been made in this study to assess the QOL of people staying near Yen Binh industrial zone in Thai Nguyen city, Vietnam using 44 subjective life indicators to measure the overall life satisfaction. The structural equation modelling (SEM) was conducted to determine relationship between variables in the model. The results of the study showed that based on standardized regression weight the land-dwellings and utility services dimension had highest contribution toward the prediction of quality of life satisfaction in compare with income-employment dimension and environmental dimension among the quality of life dimensions. It is hoped that the data gathered from this study can be used by planners in formulating and implementing future policies.

Keywords: CFA; EFA; Overall Life Satisfaction; Quality of Life; SEM

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* Corresponding author. *E-mail address:* thuongtula.tueba@gmail.com

1. Introduction

Research on quality of life (QOL) is critical because politicians and economists have learned the best way to improve the quality of life in rural areas in a developing society like Vietnam. QOL is a subjective concept because it is a multidimensional measure, including economic, political, environmental, social and personal aspects. Although there is still no consistent way to quantify the QOL, objective or subjective indicators are often used by researchers to measure it. While objective indicators are often developed at cities and countries, subjective indicators are more used at the individual level and measure the level of individual satisfaction with life as they experience (Muhammad and Sim, 2003).

In 2011, Vietnam approved the new Socio-Economic Development Strategy (SEDS) for 2011-2020, which foresees Vietnam becoming industrialized by 2020. The SEDS affirms the change in the growth model and the restructuring of the economy, with increased productivity, environmental sustainability, social equity and macroeconomic stability. The recent efforts by the Government to restructure the economy towards industrialization may have caused environmental problems, especially near the mountainous region, where the bulk of industrial developments are located.

The policymakers accentuated the importance of measuring QOL to understand people's overall satisfaction with their existence. Assessment of QOL provides researchers with data regarding the factors that affect the social, environmental and economic categories of a community. There are a variety of dimensions that can be used to measure QOL, therefore it is not easy to choose the exact dimensions for measuring QOL. In fact, In Vietnam there have been many studies on measuring QOL quality at the national and urban levels. Although these studies have successfully measured the QOL of residents living near industrial zones of Vietnam, few studies were done with regard to the assessment of QOL using structural equation modelling (SEM).

This research aims to study and measure the satisfaction with the QOL of people living in Dong Tien, Hong Tien and Bai Bong communes, near Yen Binh industrial zone. We hope that through this research we will have a penetrating insight into the QOL of people living near industrial zones in Vietnam. In addition to considering the physical aspects of the QOL, its social and environmental aspects have also been considered. This study also aims to examine the issues to which corrective actions can be proposed. Showing satisfaction level of community with different aspects of QOL can assist policy makers and other stakeholders in developing best strategies for improving residents' QOL.

2. Literature review

Recently, research on the QOL of people living near industrial zones has received extensive attention. Relevant literatures expose that the concept of QOL has been investigated from various fields of geography, sociology, environment and economy, implying its multidimensional nature. (Eby et al., 2012; Li and Weng, 2007; Marans, 2003; Mercier et al., 1998; Mulvey, 2002; Tu¨rksever and Atalik, 2001; Tuan, 2000; Wish, 1986). Although it has been studied by geographers and others for decades, there is still no single, strict, universally accepted definition or insight about QOL (Samaneh and Esfandiar, 2015, Apparicio et al., 2008; Das, 2008; McCrea et al.,

2011; Royuela et al., 2009; U''lengin et al., 2001). Therefore, it can be seen that the concept of viability and quality of the place is sometimes used to determine QOL (Li and Weng 2007).

Seed and Lloyd (1997) define the QOL as the needs and hopes of individuals and groups. It is also about the personal environment and general environment, including social, economic and environmental aspects. This indicates that QOL research is often personal and based on individual perceptions of their surroundings and life. Although QOL may be difficult to identify and evaluate, scientists, governments, and communities often find that pursuing QOL research is worthwhile doing (Ibrahim and Chung, 2003).

To develop urban planning and management strategies, the QOL research is very useful providing necessary tools for policymakers to evaluate the effectiveness of policy and prioritize issues that the community confronts (Samaneh and Esfandiar, 2015). QOL related findings may help to identify issues, causes of dissatisfaction, human's priorities in life, monitor and evaluate the effectiveness of relevant policies and strategies, and design future planning policies (Lee, 2008, Tesfazghi et al., 2010). Participation of residents in the QOL researches and information on the level of satisfaction with different areas of life they provide can be served as a useful tool in identifying and establishing policies in the long run (Santos and Martins, 2007)

Subjective measures about residents' perceptions, assessments and satisfaction with life or objective indicators of urban and rural environments are usually used to measure the QOL (McCrea et al., 2006). Despite tangible condition of environment is usually favored by objective approach, personal assessment of objective conditions of life is preferred by subjective approach (Das, 2008; Royuela et al., 2009; Malkina-Pykh and Pykh, 2008; Shin et al., 2003)

While the subjective approach measures the level of citizen's satisfaction or dissatisfaction with various aspects of life (Royuela et al., 2009), tangible and measurable environmental conditions are usually considered in objective approach (Royuela et al., 2009 Das, 2008). There are different criticisms of these methods in the QOL researches. According to Lee (2008), QOL studies need to be evaluated in a subjective approach and ask people directly about their living conditions. Nooraie and Tabibian (2012), Eby et al. (2012), Zebardast (2009), Lee (2008), McCrea et al. (2006), Ibrahim and Chung (2003) adopted a subjective approach to measuring QOL as they believe that objective QOL may not accurately reflect people's awareness, while subjective indicators disclose more valuable information about people's awareness (McCrea et al., 2006, Ibrahim and Chung, 2003).

Consequently, overall life satisfaction in different contexts is considered in the various components of life, which must be recognized in order to improve the quality of life for citizens. Therefore, the method used here is a subjective measure of quality of life.

The fact is that Vietnam experiences rapid changes in both economic growth and social areas. Although the economic development and prosperity of Vietnamese people have increased, one cannot be sure that the QOL in the country has improved because of the subjective indicators. Therefore, it is necessary to continuously study the QOL in order to satisfy the material and spiritual needs of Vietnamese.

As mentioned above, QOL is a complex concept that has been studied from different perspectives (Nooraie and Tabibian, 2012, Eby et al., 2012, Li and Weng, 2007, Marans 2003, Mulvey, 2002, Turksever and Atalik, 2001). Various studies have, therefore, used different indicators to evaluate QOL and it is difficult to employ the standard method for selecting measures (Diener, 1995).

Based on literature review and local conditions, 44 indicators from different dimensions of life that best describe the QOL of residents living near Yen Binh industrial zone are used. These indicators are shown in Table 1 below.

Table 1. Indicators to measure QOL of residents after establishing Yen Binh industrial zone

Items	Description	Study
Income and employment		
INC_EMP1	Health and safety at work	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP2	Employment opportunities	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP3	Differing employment policies	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP4	Women's employment	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP5	Local employment	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP6	Training job opportunities	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
INC_EMP7	State of income	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
Infrastructure and public utilities services		
INF_PUS1	Electricity system	U¨lengin et al. (2001), Foo (2000), Santos and Martins (2007), Lee (2008)
INF_PUS2	Telephone system	U¨lengin et al. (2001), Foo (2000), Santos and Martins (2007), Lee (2008)
INF_PUS3	Access to transportation facilities (mobility condition, public transportation expense, pedestrian mobility, easiness in access to transport facilities)	U¨lengin et al. (2001), Foo (2000), Das (2008), Lee (2008
INF_PUS4	Water system	U¨lengin et al. (2001), Foo (2000), Santos and Martins (2007), Lee (2008)
INF_PUS5	Sewage disposal system	Santos and Martins (2007), Lee (2008), Foo (2000), Das (2008), U ¨ lengin et al. (2001
INF_PUS6	Access to recreational facilities (park, recreational center, zoo, sports center, cultural centers, clubs…)	U¨lengin et al. (2001), Foo (2000), Lee (2008), Santos and Martins (2007), McCrea et al. (2006)
INF_PUS7	Access to daily services (official centers, shopping centers, market, bank…)	McCrea et al. (2006), Santos and Martins (2007), Das (2008), Lee (2008)
INF_PUS8	Access to educational services (kindergarten, primary school, elementary, high school)	Lee (2008), Foo (2000), Santos and Martins (2007)
INF_PUS9	Access to health care services (clinics, hospital)	U¨lengin et al. (2001), Foo (2000), Santos and Martins (2007), McCrea et al. (2006), Das (2008), Marans (2003)
Environment		
ENV1	Waste disposal system	Santos and Martins (2007), Lee (2008), Foo (2000), Das (2008), U¨lengin et al. (2001)
ENV2	Effect of noise	Das (2008), McCrea et al. (2006), Marans (2003)
ENV3	Effect of industrial solid waste	Robert Nurick và Victoria Jonhson, 1998
ENV4	Green open spaces (trees on streets) Cleanliness (no dust, no mosquitoes, …)	U¨lengin et al. (2001), Santos and Martins (2007), Foo (2000)

ENV5	Effect of air quality (air pollution and funny smells, odor at the settlement area…)	Das (2008)
Health impacts		
HEA1	Possibility of suffering from asthma due to environmental pollution	Lee and Guest (1983)
HEA2	Possibility of suffering from sore throat due to environmental pollution	Robert and Victoria, 1998
HEA3	Possibility of suffering from headaches due to environmental pollution	Robert and Victoria, 1998
HEA4	No skin and other ailments associated with toxic waste	Robert and Victoria, 1998
HEA5	No occupational fatigue and stress	Robert and Victoria, 1998
Housing, living conditions and land		
HOUS1	Planning and establishment of industrial zone	Ladewig and McCann, 1980
HOUS2	Land-use planning in residential area	Ladewig, H., và McCann, G. C., 1980
HOUS3	Suitability of new location (resettlement area)	U¨lengin et al. (2001), Foo (2000), Das (2008)
HOUS4	Housing spaces, number of rooms	U¨lengin et al. (2001), Foo (2000), Das (2008), Zebardast (2009)
HOUS5	Amount of compensation from the government for land acquisition	Ladewig, H., và McCann, G. C., 1980
HOUS6	Life expenses (rental, consumer goods)	U¨lengin et al. (2001), Becker (2007), Tesfazghi et al. (2010), Das (2008)
HOUS7	The quality of domestic water	U¨lengin et al. (2001), Foo (2000), Das (2008)
HOUS8	Garbage collection system	U¨lengin et al. (2001), Foo (2000), Das (2008)
Social environment		
SOL1	Sense of personal security (safety on the streets, presence of police or security officers)	Santos and Martins (2007), Foo (2000), U¨lengin et al. (2001), Rahman et al. (2005)
SOL2	Community and properties safety	Santos and Martins (2007), Foo (2000), U¨lengin et al. (2001), Rahman et al. (2005)
SOL3	Friendly neighbor relationship (Sense of belonging to the community)	Eby et al. (2012)
SOL4	Calmness (no drug supplying and abuse, stealing, gambling, prostitution, …)	Filkins and Corders, 1999; Smith, 2008
SOL5	Reliability of inhabitants and having supportive friends	Das (2008), McCrea et al. (2006)
SOL6	Local cultural and spiritual life	Wilkinson, 1991; Brown, 1993; Filkins and Corder, 1999
SOL7	Recreational activities, physical training and sports	Filkins and Corders, 1999; Smith, 2008
Local government		
GOV1	Community engagement (Council's engagement in decision making on key local issues)	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV2	Council's interaction and responsiveness in dealing with the public	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV3	Performance in environmental management, including waste management	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV4	Informing community performance	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV5	Effectiveness in planning and socio-economic development	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV6	Effectiveness of local authorities in solving problems of social evils and security	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV7	Council's taking into account the basic needs of the community	Ladewig and McCann, 1980; Mollie and Stinner, 1992

GOV8	Support services (support for training job, access to loan services, …)	Ladewig and McCann, 1980; Mollie and Stinner, 1992
GOV9	Decisions made in the interest of the community	Ladewig and McCann, 1980; Mollie and Stinner, 1992

3. Methodology

This empirical study is mainly based on primary data. A household survey was carried out to collect primary data from the Pho Yen district. The statistical population included all the households inhabiting Dong Tien, Hong Tien and Bai Bong communities of Pho Yen district, and based on the population of the district, 200 households were included in the sample. The number of samples was determined using the Slovin formula, with due regard for time and financial limitations of the project. In order to collect the data, Pho Yen was divided into 3 areas, nearing the Yen Binh industrial zone. The sample size taken was 26 smallholder farmers randomly selected from 1175 households in Bai Bong commune. One hundred and six households were also randomly selected from 4718 households in Dong Tien commune. Sixty eight households were also randomly selected from 3005 households in Hong Tien commune, and the total number of households under study reached a total of 200.

The questions used to capture subjective QOL are 44 close ended questions on an 5- point Likert scale from totally disagree = 1 to totally agree = 5. Qualitative scales include general questions about the QOL, questions about the residents' level of satisfaction with different areas of life, and questions on general satisfaction with the QOL.

Structural equation modeling (SEM) is considered as one of the effective statistical methods used to test the hypotheses about causal relationships between observed and unobserved variables (Reisinger and Turner, 1999). SEM includes multiple regression, path analysis and factor analysis which allow it to be better than other techniques. Because of the interaction effects among predicted and predictor variables other statistics techniques could not consider them. As a result, this method can help to deal with complex managerial and behavioral problems. SEM is a method used to represent, estimate and test a theoretical network of linear relationships between variables (Rigdon, 1998).

In order to explore factors influenced significantly overall life satisfaction and define the influenced level of these factors, sets of hypotheses were developed:

H1: There is a positive impact of income and employment on overall quality of life satisfaction.

H2: There is a positive impact of infrastructure and public utilities services on overall quality of life satisfaction.

H3: There is a positive impact of environment on overall quality of life satisfaction.

H4: There is a positive impact of health on overall quality of life satisfaction.

H5: There is a positive impact of housing, living conditions and land on overall quality of life satisfaction.

H6: There is a positive impact of social environment on overall quality of life satisfaction.

H7: There is a positive impact of local government on overall quality of life satisfaction.

4. Findings

4.1. Measure reliability and validity

Exploratory factor analysis (EFA) provides an effective way to evaluate construct measures. Firstly, item-total correlations and Cronbach's alpha were applied to evaluate reliability, then, Principal Axis Factoring analysis along with Promax with Kaiser Normalizati rotation was used to explore dimensionality for each scale. In this process, the items that did not satisfy the evaluating criteria were removed. Criteria of refinement of item included factor loading > 0.50, item-total correlation >0.3, Cronbach alpha > 0.60, % of variance > 50% (Hair et al., 1998). In this study, we used SPSS 20 software to evaluate and filter measurement scale.

Following the procedure and criteria described above, first, pretest was applied to enhance reliability and validity. When the corrected item total correlation was <0.3, and if deleting the item would increase Cronbach's α, the item was deleted. The Cronbach Alpha results show that 12 variables, including INF_PUS2, INF_PUS4, ENV1, ENV5, HEA1, HEA5, HOU6, HOU7, HOU8, GOV7, GOV8, GOV9 should be deleted due to the item-total correlation under the cut-off value (0.3). The result of Cronbach Alpha is showed in the Table 2.

Table 2. Cronbach Alpha Reliability Test Results

Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cronbach's Alpha =0.898		
INC_EMP1	0.611	0.894
INC_EMP2	0.679	0.886
INC_EMP3	0.741	0.879
INC_EMP4	0.713	0.882
INC_EMP5	0.765	0.876
INC_EMP6	0.699	0.884
INC_EMP7	0.710	0.882
Cronbach's Alpha =0.826		
INF_PUS1	0.354	0.833
INF_PUS3	0.387	0.835
INF_PUS5	0.620	0.795
INF_PUS6	0.531	0.810
INF_PUS7	0.714	0.778
INF_PUS8	0.724	0.779
INF_PUS9	0.698	0.782
Cronbach's Alpha =0.762		
ENV2	0.623	0.646
ENV3	0.589	0.701
ENV4	0.589	0.694
Cronbach's Alpha =0.840		
HEA2	0.731	0.751
HEA3	0.768	0.713
HEA4	0.618	0.857
Cronbach's Alpha =0.920		
HOU1	0.819	0.897
HOU2	0.818	0.897

HOU3	0.808	0.901
HOU4	0.788	0.903
HOU5	0.752	0.912
Cronbach's Alpha =0.754		
SOL1	0.580	0.699
SOL2	0.593	0.695
SOL3	0.445	0.730
SOL4	0.582	0.699
SOL5	0.410	0.737
SOL6	0.334	0.753
SOL7	0.352	0.748
Cronbach's Alpha =0.940		
GOV1	0.785	0.933
GOV2	0.833	0.927
GOV3	0.867	0.922
GOV4	0.847	0.925
GOV5	0.804	0.930
GOV6	0.784	0.933
Cronbach's Alpha =0.940		
OS1	0.647	0.794
OS2	0.687	0.745
OS3	0.716	0.730

EFA for all Scale of Factor Together, then, was conducted. The final result of EFA test for construct measurement scales was presented in Table 3 and Table 4. The result of Bartlett's Test of Sphericity and KMO measure showed that the EFA procedure can be applied (KMO=0.858 > 0.5, Sig = .000).

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.858
Bartlett's Test of Sphericity	Approx. Chi-Square	4764.134
	df	528
	Sig.	.000

When multidimensional scale and reliability of each scale were conducted, all 38 items were used for a common factor analysis. The result of this procedure shows that 6 factors consist 33 items together explained 64.270% of the total variance. In this testing, rotation method: Promax with Principal Axis Factoring analysis was applied providing better reliability.

Table 4. EFA results

N#	ITEMS		FACTOR					
	CODE	Description	1	2	3	4	5	6
1	HOU2	Land-use planning in residential area	0,898					
2	HOU3	Suitability of new location	0,891					
3	HOU4	Housing spaces, number of rooms	0,852					

4	HOU1	Planning and establishment of industrial zone	0,825				
5	INF_PUS9	Access to health care services	0,820				
6	INF_PUS7	Access to daily services	0,758				
7	HOU5	Amount of compensation from the government for land acquisition	0,755				
8	INF_PUS8	Access to educational services	0,728				
9	INF_PUS5	Sewage disposal system	0,633				
10	GOV3	Performance in environmental management, including waste management		0,893			
11	GOV4	Informing community performance		0,882			
12	GOV5	Effectiveness in planning and socio-economic development		0,848			
13	GOV6	Effectiveness of local authorities in solving problems of social evils and security		0,829			
14	GOV2	Council's interaction and responsiveness in dealing with the public		0,826			
15	GOV1	Community engagement (Council's engagement in decision making on key local issues)		0,800			
16	SOL7	Recreational activities, physical training and sports		0,769			
17	SOL6	Local cultural and spiritual life		0,551			
18	INC_EMP6	Training job opportunities			0,866		
19	INC_EMP5	Local employment			0,862		
20	INC_EMP3	Differing employment policies			0,740		
21	INC_EMP4	Women's employment			0,730		
22	INC_EMP7	State of income			0,633		
23	INC_EMP2	Employment opportunities			0,610		
24	SOL2	Community and properties safety				0,893	
25	SOL1	Sense of personal security				0,778	
26	SOL4	Calmness (no drug supplying and abuse, stealing, gambling, prostitution, …)				0,746	
27	SOL3	Friendly neighbor relationship (Sense of belonging to the community)				0,730	
28	HEA3	Possibility of suffering from headaches due to environmental pollution					0,885
29	HEA2	Possibility of suffering from sore throat due to environmental pollution					0,838
30	HEA4	No occupational fatigue and stress					0,696
31	ENV2	Effect of noise					0,757
32	ENV4	Green open spaces (trees on streets)					0,748
33	ENV3	Effect of industrial solid waste					0,657

The first factor includes 9 observable variables: HOU1, HOU2, HOU3, HOU4, HOU5, INF_PUS5, INF_PUS7, INF_PUS8, INF_PUS9.They are named as "Land-dwellings and utility services" (HOU_PUS).

The second factor consists of 8 observation variables: GOV1, GOV2, GOV3, GOV4, GOV5, GOV6, SOL6, SOL7. They are named as "Local government and socio-cultural environment" (GOV_SOL).

The third factor includes 6 observable variables: INC_EMP2, INC_EMP3, INC_EMP4, INC_EMP5, INC_EMP6, INC_EMP7. They are named as "Income-employment" (INC_EMP)

The fourth element consists of 4 observable variables: SOL1, SOL2, SOL3, SOL4. They are named as "Social security and order" (SOL).

The fifth factor includes 3 observable variables: HEA2, HEA3, and HEA4. They are named as "Health" (HEA).

The sixth element consists of three observation variables: ENV2, ENV3, ENV4, which are named as "Environment" (ENV)

The result of EFA for variable "Satisfaction with quality of life (OS)" was showed in the Table 5. The total variance explaining ratios of these factors are 74.412%, KMO=0.715 > 0.5, Sig = .000, therefore the items were suitable for EFA.

Table 5. Result of EFA for variable "Satisfaction from quality of life

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.715
Bartlett's Test of Sphericity	Approx. Chi-Square	223.009
	df	3
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.232	74.412	74.412	2.232	74.412	74.412
2	.436	14.547	88.959			
3	.331	11.041	100.000			
Extraction Method: Principal Component Analysis.						

Component Matrix	
OS3	.881
OS2	.868
OS1	.839

Consistent with the two-step approach advocated by Anderson and Gerbing (1988), this study estimated a measurement model through confirmatory factor analysis (CFA) before using SEM. This measurement model was estimated using the maximum likelihood method, and this model showed a good fit to the data. λ^2 with p-value = 0.000, Chi-square/df = 1,665<2 (Carmines & Mclver, 1981), Goodness of Fit Index (GFI) = 0.802 >0.8 (sometimes acceptable), Comparative Fit Index (CFI) = 0.924 >0.9 (Bentler & Bonett, 1980), Tuecker & Lewis(TLI) = 0.916>0.9, and Root Mean Square Error of Approximation (RMSEA) = 0.058 <0.05 (Steiger, 1990) (see Figure 1).

To evaluate the reliability and validity of the measurement model, a number of tests were conducted. The composite reliability for each construct was showed in Table 6. Compare with coefficient alpha composite reliability is a measure of internal consistency (Fornell & Larcker, 1981). The results of composite reliability and coefficient alpha showed that the measures were internally consistent.

When there is a statistic significance between path coefficients from latent constructs and their corresponding manifest indicators, convergent validity is confirmed. Table 6 indicated that all indicators loaded strongly and significantly on their respective factors with standardized loadings being from 0.516 to 0.908, supporting the convergent validity of the item variables (Anderson & Gerbing, 1988). Furthermore, the average variance extracted (AVE) was satisfactory (Table 6). The result showed that the all AVEs were close and more than recommended value 0.5 ranged between 0.526 to 0.650.

Chi-square difference tests between a model where factor correlation parameter was fixed at 1.0 and the original CFA model were done in order to analyze the discriminant validity between the constructs. The discriminant validity was seen as every restricted model had a significantly poorer fit than the unrestricted model. In addition, correlations among the variables examined in the present study were lower than 1 (see Figure 1), thus the scale achieved discriminant validity. Taken together, these findings support the reliability and validity of the constructs and their items.

Table 6. Result of CFA

Variables	**Standardized factor loadings**	**Average Variance Extracted**	**Construct Reliability**
Structural variable			
Land-dwellings and utility services" (HOU_PUS)		0,941	0,643
HOU2	0.875		
HOU3	0.829		
HOU4	0.798		
HOU1	0.885		
INF_PUS9	0.838		
INF_PUS7	0.76		
HOU5	0.788		
INF_PUS8	0.789		
INF_PUS5	0.626		
Local government and socio-cultural environment" (GOV_SOL)		0,932	0,637
GOV3	0.897		
GOV4	0.895		
GOV5	0.85		
GOV6	0.83		
GOV2	0.817		

GOV1	0.773		
SOL7	0.741		
SOL6	0.516		
"Income-employment" (INC_EMP)		0,895	0,587
INC_EMP6	0.765		
INC_EMP5	0.853		
INC_EMP3	0.763		
INC_EMP4	0.783		
INC_EMP7	0.728		
INC_EMP2	0.694		
"Social security and order" (SOL)		0,867	0,621
SOL2	0.903		
SOL1	0.782		
SOL4	0.753		
SOL3	0.701		
"Health" (HEA)		0,846	0,650
HEA3	0.908		
HEA2	0.828		
HEA4	0.663		
"Environment" (ENV)		0,769	0,526
ENV2	0.742		
ENV4	0.695		
ENV3	0.738		
Overall satisfaction from quality of life (OS)		0,826	0,614
OS3	0.854		
OS2	0.752		
OS1	0.739		

4.2. Structural equation model results

To examine the structural relationship between variables the path analyses process were used after validating the single CFA models. The structural model assessed the relationship between six independent/exogenous latent variables with overall quality of life satisfaction dependent variable.

The structural model tested in the present study is presented in Figure2. The chi-square value for the structural model was statistically significant (chi-square= 569, p = 0.000). The model chi-square statistic was employed as a goodness of fit index, with the chi-square value/*df* ratio lower than the rule of thumb of 2.00 (1.661 in this study). The values of GFI, CFI and Non-normed Index (NNFI) were 0.803, 0.917 and 0.925, respectively. The Root Mean Square Error of Approximation (RMSEA) and Root Mean Square Residual (RMR) were 0.0058. As a result, these indices suggest a good and acceptable model fit, even though the GFI index was sometimes acceptable.

The result of the structural model, according to Figure 2 and Table 7, indicated that there is positive significant relationship between Land-dwellings and utility services dimension latent construct including items representative of nine dimensions (including Land-use planning in residential area, Suitability of new location, Housing spaces, number of rooms, Planning and establishment of industrial zone, Access to health care services, Access to daily services, Amount of compensation from the government for land acquisition, Access to educational services, Sewage disposal system) and quality of life satisfaction (β = .661, C.R. = 8.054, p = .000). Considerable that for any one unit standardized deviation increase in Land-dwellings and utility services variable, quality of life satisfaction increase by .661. Overall, the second and fifth hypotheses of study are supported.

As depicted in Figure 2 and Table 7, there is positive significant relationship between Income-employment dimension latent construct including items representative of six dimensions (including Training job opportunities, Local employment, Differing employment policies, Women's employment, State of income and Employment opportunities) and overall satisfaction of quality of life (β = .255, C.R. = 3.248, p = .001). It means by any one unit standardized deviation increase in Income-employment, quality of life satisfaction increase by .255. Thus, first hypothesis of study is supported.

The Figure 2 and Table 7 further shows that, there is a positive significant relationship between environmental dimension latent construct including items representative of three dimensions (including Effect of noise, Green open spaces, Effect of industrial solid waste) and quality of life satisfaction (β = .157, C.R. = 2.451, p = .014). Therefore, third hypothesis of study is supported. Considerable that for any one unit standardized deviation increase in environment, satisfaction of quality of life increase by .157.

According to the standardized regression weights the Land-dwellings and utility services dimension (β =.661) had highest contribution toward the prediction of quality of life satisfaction in compare with Income-employment dimension (β = .255) and environmental dimension (β =.157) (Table 15).

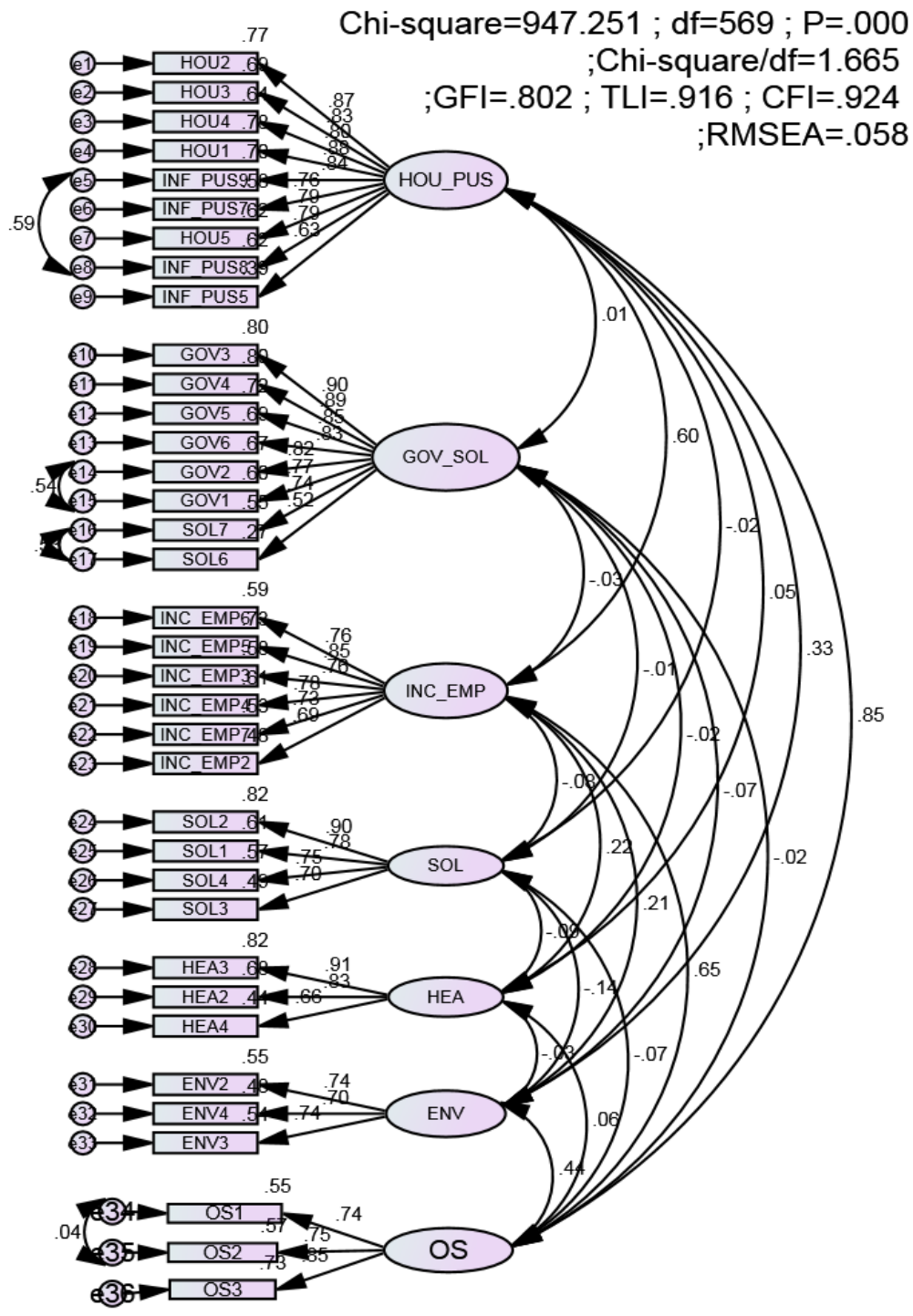

Figure 1. The result of CFA

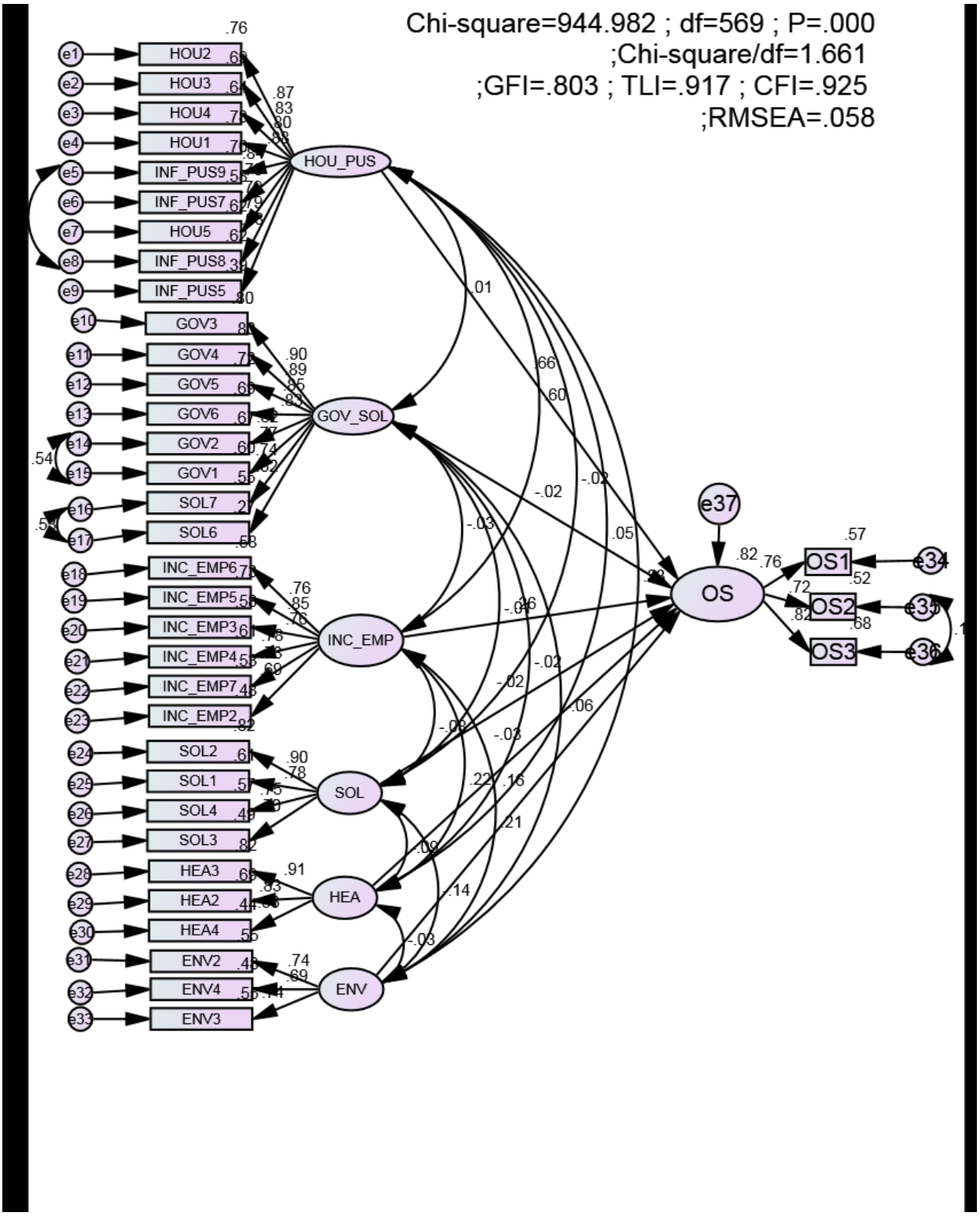

Figure 2. The result of SEM

Table 7. SEM Regression Weights

Relationship			Estimate	S.E.	C.R.	Standardized regression weights	P
OS	<---	HOU_PUS	.605	.075	8.054	.661	***
OS	<---	INC_EMP	.266	.082	3.248	.255	.001
OS	<---	ENV	.180	.074	2.451	.157	.014
OS	<---	GOV_SOL	-.014	.042	-.334	-.017	.738
OS	<---	SOL	-.016	.042	-.391	-.021	.696
OS	<---	HEA	-.023	.044	-.528	-.030	.598

As mentioned earlier structural equation modelling (SEM) performed to determine the strong relationship of different dimensions with quality of life satisfaction. The result showed that based on standardized regression weight the Land-dwellings and utility services dimension had highest contribution toward the prediction of quality of life satisfaction in compare with Income-employment dimension and environmental dimension among the quality of life dimensions. It means if management purpose was to improve quality of life satisfaction should focuses on Land-dwellings and utility services dimension that include sub dimensions is explained earlier.

5. Discussion and recommendation

The relation of different dimensions of quality of life (Land-dwellings and utility services, Local government and socio-cultural environment, Income-employment, Social security and order, Health and Environmental dimensions) was tested on quality of life satisfaction. The relationship between six dimensions of quality of life and life satisfaction was investigated using structural equation model. Structural equation model (SEM) revealed that there was a significant and positive relationship between Land-dwellings and utility services dimension with overall satisfaction of quality of life. The second investigation concerned the relationship between Income-employment dimension and overall satisfaction of quality of life. The findings show that there was a positive significant relationship between Income-employment dimension and quality of life satisfaction. In assessing the influence between Environmental dimensions on quality of life satisfaction, the (SEM) also performed to investigate the relationship these variables, finding confirmed that there is a positive significant relationship between Environmental dimension and quality of life satisfaction.

According to the results of the present research, there is a significant relationship between Land-dwellings and utility services, Income-employment, Environmental dimensions and job satisfaction; therefore, applying the result of this research could improve and increase quality of life satisfaction. Since this research shows there is a significant relationship between the Land-dwellings and utility services dimension and quality of life satisfaction, it could increase quality of life satisfaction by improving this dimension and its sub dimensions.

Similarly research supports the significant relationship between the Income-employment dimension and overall satisfaction of quality of life; it is possible to improve quality of life satisfaction by improving the mentioned sub dimensions of this variable. Due to the significant relationship between the environmental

dimension and quality of life satisfaction shown by this research, improvement of the mentioned dimension will result in improvement of the quality of life satisfaction.

6. Limitation

Firstly, the hypotheses of dependent variables were constructed in isolation from the impacts of other factors, like social-demographic characteristics of the respondents including age, ethnicity, marital status, gender, and education level. Regardless of these social-demographic characteristics may result in the biased interpretation of relationships between dependent and independent variables.

Secondly, the concept of community satisfaction is by itself a subjective concept with a broad research scope. In practice there are a variety of dimensions that can be used to measure the QOL, and therefore, it is not easy to formulate a standard scale. However, by constructing the dimensions based on previous studies we hope that the satisfaction level of people living near industrial zones with the QOL was assessed accurately.

Thirdly, although findings of this research disclose useful information on the satisfaction with QOL of residents staying near industrial zones in terms of economic, social, health, local authority, public utility services and environmental aspects, it limited in geographical areas of the Thai Nguyen city. Therefore, expanding this study to other cities of Vietnam to judge the findings before applying them at the national level is necessary. Another limitation of this study is the lack of time-series data. Additionally, the sample size was not enormous because of time and funds.

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