

Multidimensional Poverty Indicators in light of ASEAN Integration

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Abstract

This study aimed to explore poverty among ASEAN member nations by introducing a multidimensional poverty index that can be used to determine the relative success of a country in deterring several deprivations that are identified and measured. It utilized multiple factors that can be useful for policy and investment decisions and are intended to complement analyses using financial poverty indicators. Using exploratory data analysis, several indicators were selected to represent the different dimensions of poverty. Said indicators were then subjected to factor analysis which yielded four multidimensional indices namely: General Welfare Index, Governance and Emotional Landscape Index, and Social Climate Index. Singapore, Brunei, and Malaysia ranked 1st, 2nd, and 3rd in all three indices, respectively. In addition, multivariate cluster analysis was also performed. It revealed that Singapore exhibited exceptional performance in all indices, thereby earning it a cluster all to its own. Similarities were observed between Brunei and Malaysia while Thailand, Vietnam, Philippines, and Indonesia were clustered together. Cambodia, Lao PDR, and Myanmar belonged to another cluster, indicating similarities among them. The study concluded that a wide gap exists among ASEAN countries in terms of the various deprivations measured. It also identified several problem areas and strengths of the ASEAN member states. This information can be helpful in making sound judgments especially in the delicate circumstances that surround economic integration.

Keywords: Poverty, ASEAN, ASEAN Integration

1.0 Introduction

Every country aspires for progress, and each citizen seeks for advancement. The vision of making the country evolve towards its better version has been an unending quest for every nation. The attainment of this goal affects both the state leaders and their constituents. It is undeniable, however, that some nations are not strong enough to achieve their goal for betterment. Thus, they form alliances with other nations to strengthen themselves. One of these alliances is the Association of South East Asian Nations (ASEAN). It is composed of ten

countries from Southeast Asia as its members, namely: Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

The ASEAN Integration has been organized for the benefit of each member state where every member shall support each other. But being a dream as it is, only few countries can realize the status that is being considered as progressive from the perspective of most individuals. Some do good, yet not enough to reach the excellence they aim. On the other hand, there are also some countries

that are not doing well and are then labelled as poor. For obvious reasons, no country would want to be looked down by other nations and maintain the status of "being poor". The word poverty then enters the door of discussion. Typically, poverty is associated with the lack of or the insufficiency of the basic needs such as food, water, and shelter. In the financial sense, when we say poor, most persons would think of having little or no money at all. Poverty is a word that is ordinarily used and sounds so comprehensible, but no consensus has been reached on the definition and measurement of poverty. Being a topic that affects everyone in every corner of the earth, poverty has been the subject of different studies conducted by different countries. It has been a challenge on how to exactly define poverty and how to measure it with accuracy.

In the Statement of Commitment for Action to Eradicate Poverty adopted by the United Nations Administrative Committee on Coordination (1998), poverty is described as fundamentally being a violation of human rights. In the same statement, the committee recognizes that poverty is a problem that is not described by a single factor, but one that is characterized by multiple dimensions. According to the committee, poverty is not only characterized by an inability to support and provide for one's personal needs. Conversely, it also entails being exposed to environments that are not conducive to health and well-being, and being powerless to participate effectively in society.

Poverty, being multidimensional in nature, has become not only a difficult and pressing problem to eradicate, but also a very elusive condition to measure. Its measurement has seen interesting twists and turns, mainly owing to the pivotal critique of Sen (1976) on the problems of poverty

measurement. By developing an axiomatic approach to poverty measurement, he posited that the financial measures of poverty appeared to be very crude thereby failing to capture the real picture of poverty. His two step measure of poverty (i.e. identification of the poor and aggregation of data to come up with an overall index) opened a lot of discussion and spurred a number of scholarly works on the phenomenon of poverty. For example, Foster, Greer, and Thorbecke (1984) subsequently introduced several improvements to the financial poverty measures, which satisfied Sen's axioms of poverty measurement. In addition, Weikard (2004) noted that most poverty measures ignored the effect of income risk on an individual's poverty risk and found that these measures understated poverty measurements when income risk was factored in.

Despite the poverty measurement advancements mentioned above, the method used remains to be a predominantly financial measure. For example, the Foster, et al. (1984) class of measures is widely used. It is being regularly reported by the World Bank, various UN agencies, and individual countries (Foster, et al, 2010). However, because of the multidimensional nature of poverty, using purely financial methods of poverty measurement presents drawbacks both to authorities and researchers in acquiring a larger and more informative picture of poverty. The images of poverty seen through uni-dimensional lenses are skewed towards financial difficulties and miss out on other aspects of poverty such as malnutrition, susceptibility to violence, and emotional deprivation. Alkire and Foster (2011) also recognized shortcomings in composite measures of poverty. They found that even when multiple factors are used to measure poverty,

viewing them without consideration of the effects each component variable may have ignores the separate contributions of each factor to poverty experienced by an individual. Bourguignon and Chakravarty (2003) found that this method of aggregation only expanded the unidimensional definition of poverty, but it did not analyze poverty according to its different components.

A need for developing a multidimensional model for poverty thus arises. These multidimensional poverty measures are intended to complement financial poverty measures, not to replace them (Alkire and Foster, 2011). Several multidimensional models have already been developed. It includes the Multidimensional Poverty Index (MPI), a method developed by Alkire and Foster (2011) to measure poverty from a multidimensional perspective. The MPI measures poverty using three different dimensions: health, education, and living standards. This method is being used by the Oxford Poverty and Human Development Initiative (OPHI). Bourguignon and Chakravarty (2003) discussed one of the earliest multidimensional poverty measurement frameworks that used a unification approach for the determination of a person as poor. They considered poverty according to two dimensions: income and educational attainment. Callander, Schofield, and Shrestha (2012) also developed a multidimensional model for measuring poverty in Australia, considering the factors of health, education, and economic resources. Santos (2013) studied poverty in Bhutan using indicators such as consumption expenditure, health, education, access to electricity and safe water, and enough room per person in a dwelling. Shirvanian and Bakhshoodeh (2012) considered poverty in rural Iran according to five dimensions: housing, health,

nutrition, education, and income.

These studies (Alkire and Foster, 2011; Bourguignon and Chakravarty, 2003; Callander, Schofield, and Shrestha, 2012; Santos, 2013; Shirvanian and Bakhshoodeh, 2012) speak of poverty in different views. Some have touched more than one kind of poverty while others focus on only one face. Nevertheless, despite the numerous studies regarding poverty that have been published, none of these studies have considered looking at poverty based on other relevant social indicators such as security and gender inequality. Poverty has been predominantly determined by viewing the financial aspect, and most multidimensional poverty measures have been frequently determined through the aspects of health, education, and standard of living. There is a dearth of literature studying poverty in terms of social and political atmosphere, emotional and environmental factors.

The components mentioned above are all significant factors in determining a more comprehensive view of poverty. Poverty has been seen in different faces but has still not been viewed in the perspective of other national factors. Thus, all these components must be considered together to understand better the concept of poverty. This study aims to fill the gap that separates the different faces of poverty from each other and come up with a result that would reveal a more realistic perspective of poverty. It shall not only look at those factors that have been commonly studied. It will examine the other components of poverty that have not been considered in other studies. The study aims to improve existing poverty measures by introducing new vantage points of observation, from which we can improve our understanding of and response to poverty.

The study focused on the member states of the ASEAN since they are currently having a move towards integration and cooperation for the improvement of the status of its members. This research work could help the ASEAN assess the current condition of its members and to have a clearer view on the actions that need to be undertaken in response to the different situations of its member countries. By complementing financial poverty indicators, this study can serve as a guide not only for the ASEAN but also for other countries and individuals to more comprehensively assess and respond to the problem of poverty.

2.0 Design and Methods

The study principally utilized data mining or exploratory data analysis to gather and analyze data. The process involves acquiring data from reputable sources (e.g. the World Bank database, official websites of the ASEAN member nations, Transparency International, Happy Planet Index, World Health Organization) and analyzing the data with the help of statistical software. It aims to determine meaningful relationships and gain new insights from collectively analyzing the data that might not have been previously available.

As mentioned earlier, the study focused on the ASEAN member states, especially because of its move towards integration. Specifically, data concerning the following member states were obtained and analyzed: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

The latest available data about factors affecting poverty were gathered from reputable statistical sources (e.g. the World Bank database, official websites of the ASEAN member nations,

Transparency International, Happy Planet Index). Several of these data were aggregated into a single factor for use in the analysis. The study uses a three-step aggregation process, aggregating specific poverty indicators into common categories, and then analyzing the statistical relationships between the aggregated indicators to come up with indices to measure the poverty level of a country. These indices are then further analyzed for statistical relationships and aggregated into a single poverty index that measures how less certain deprivations are in a particular country.

The indicators used measure the percentage of the population that do not suffer certain deprivations in a particular country as compared to the others. In other words, it shows how much better a country compares to others by having less of its population suffering the identified deprivations. As such, some indicators that measure the prevalence of deprivations in the population have been normalized using the following formula:

$$J_n = 1 - J_u$$

Equation 1: Normalization formula

Where J_n is the normalized indicator, and J_u is the raw value for the indicator as obtained from the reputable statistical source. The formula translates the percentage of the population that is deprived into the percentage of the population that is not deprived in terms of that specific variable.

The following poverty factors and their respective components were determined and used in the analysis:

1. Education – these factors refer to the indicators pertaining to the educational advancement of a particular ASEAN economy. It is

defined as the average of the following indicators:

- a. Persistence to last grade of primary school – measures the percentage of students who enroll in the first grade of primary school and eventually reach the last grade of primary school.
 - b. Literacy rate of adults – measures the percentage of the population aged 15 and above that can read and write with understanding.
 - c. Literacy rate of youth – measures the percentage of the population aged below 15 that can read and write with understanding.
2. Health – these are factors related to the quality of health in a particular economy as measured by the average of the following indicators:
- a. Child mortality (normalized) – measures the percentage who die by the age of 5 per 1,000 live births. The normalized indicator measures the percentage of live births who survive to the age of 5.
 - b. Underweight (normalized) – measures the percentage of children aged 0 to 59 months who are below minus two standard deviations from the median growth-for-age of the World Health Organization (WHO) child growth standards.
 - c. Improved sanitation facilities – percentage of the population that have accessed to improved sanitation facilities. The improved sanitation facilities include flush/pour flush (to piped sewer system, septic tank, pit latrine), ventilated improved pit (VIP) latrine, pit latrine with slab, and composting toilet.
3. Utilities – this refers to factors relating to access to an adequate supply of necessary utilities. It is the average of the following indicators:

- a. Access to electricity – it is the percentage of the population with access to electricity.
 - b. Improved water source – this refers to the percentage of the population using an improved drinking water source. The improved drinking water source includes piped water on premises (piped household water connection located inside the user's dwelling, plot or yard), and other improved drinking water sources such as public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection.
 - c. Access to non-solid fuel – it measures the percentage of the population with access to non-solid fuel. Non-solid fuels include liquid fuels such as kerosene and other biofuels, and gaseous fuels such as liquefied petroleum gas (LPG) and natural gas. It also encompasses electricity as a fuel source.
4. Shelter and Security – these refer to factors concerning an individual's physical and social security and susceptibility to violence or danger. It is measured as the average of the following indicators:
- a. Unemployment (normalized) – it is the percentage of the labor force that is without work but is actively seeking and available for work. The normalized version measures the proportion of the population that do not experience unemployment.
 - b. Homeless (normalized) – it is the percent of the population who lack a shelter for living quarters as a result of natural disasters, those who carry their few possessions with them, and those who sleep in the streets, in doorways or on piers, or in any other space on a more or less random basis. The normalized indicator measures the percent of the population who

do not lack shelter.

c. Homicide (normalized) – the number of unlawful deaths purposefully inflicted on a person by another person. The normalized indicator measures the portion of the population that is not subject nor threatened by homicide.

5. Corruption Perception Index – this index assigns a rating from 0 to 100 measuring the perceived corruption of a country, with 0 being regarded as highly corrupt and 100 being the least corrupt. The study factors corruption into the analysis because corruption has a notable effect on inequality. Jong-sung and Khagram (2005) found a significant correlation between inequality and corruption.

6. Happy Planet Index – this index measures the well-being of the country in terms of life expectancy and experienced well-being per unit of environment input (ecological footprint). The index is derived as the quotient of the product of Life Expectancy and Experienced Well-being, and Ecological Footprint. The higher the index, the greater the well-being of a country per unit of its ecological footprint. The components of this index are particularly relevant to multidimensional poverty.

7. Environmental Performance Index – it is an index that aggregates over twenty different indicators related to environmental health and ecological vitality including indicators related to agriculture, air quality, pollution, agriculture, fisheries, and health impacts. It measures the success of an economy or government in preserving a safe and healthy environment for its citizens.

8. Gender Gap Index – the index benchmarks national gender gaps on various social and

economic aspects and allows for comparison between nations on the basis of gender difference. The greater the index, the more accomplished is the country in terms of closing the gender gap. Since the study also considers emotional deprivation, an analysis of gender gap dynamics is also incorporated into the analysis.

9. Human Development Index – it is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. A greater human development index represents increased government emphasis on matters other than economic progress.

The study used factor analysis to determine the factors that exhibited high correlation. These factors were grouped into a single index. Using principal components analysis, the appropriate weights each factor contributed to the index. The principal components analysis was also used to determine the overall poverty index. A cluster analysis was then made to determine the countries that exhibited high similarity between the different indices.

Limitations of the Study

The study incorporated indicators that did not contain data for several countries. If the usual computation of the raw score were utilized in the analysis, results would have been understated for the countries with missing data values. In order to overcome this resulting understatement from considering the unavailable data as zero values, the study does not incorporate the indicator with missing data in the calculations. As a result, the raw scores and indices might not be entirely comparable among countries. However, the

researchers believe that the results are sufficient and reasonable enough to support the conclusions reached.

3.0 Results and Discussion

As discussed earlier, the factors determined should be analyzed and aggregated to determine the poverty index of a country. The following tables show the first-stage aggregation of the specific indicators mentioned above.

Table 1: Education Indicators

Country	PERSISTPRIM	LITAD	LITYOU	EDUC
Brunei Darussalam	96.36919	95.39485	99.78067	97.18157
Cambodia	64.22960	73.90002	87.13246	75.08736
Indonesia	88.97507	92.81190	98.77800	93.52166
Lao PDR	73.33742	72.70226	83.93106	76.65691
Malaysia	99.11965	93.11788	98.41872	96.88542
Myanmar	74.79233	92.62518	96.02813	87.81521
Philippines	75.77984	95.42010	97.75080	89.65025
Singapore	98.67684	96.36598	99.84586	98.29623
Thailand	93.63924	96.43091	96.59757	95.55591
Vietnam	94.49783	93.52045	97.09167	95.03665

In Table 1, PERSISTPRIM refers to the persistence to the last grade of primary school, LITAD refers to the literacy rate for adults, and LITYOU refers to the literacy rate of youth. It can be observed that Malaysia has the highest persistence to the last grade of primary school. In terms of literacy rates, Thailand has the highest literacy

rate for adults while Singapore has the highest literacy rate for youth. Taking the arithmetic mean (simple average) of the three variables results in the education indicator, denoted by the symbol EDUC. Considering all three factors, Singapore has the highest EDUC indicator.

Table 2: Health Indicators

Countries	CHMORT _n	UNDWGT _n	SNTN	HEALTH
Brunei Darussalam	99.01	*	*	99.01
Cambodia	96.21	71.00	68.00	78.40
Indonesia	97.07	80.10	78.66	85.28
Lao PDR	92.86	73.50	76.99	81.12
Malaysia	99.15	87.10	93.98	93.41
Myanmar	94.95	77.40	83.25	85.20
Philippines	97.01	80.10	83.80	86.97
Singapore	99.72	96.70	98.81	98.41
Thailand	98.69	90.80	94.30	94.60
Vietnam	97.62	88.00	86.87	90.83

CHMORT_n refers to the normalized under-5 child mortality rate. UNDWGT_n refers to the normalized percent of the population with underweight children. SNTN refers to the access to improved sanitation facilities. The arithmetic mean of the three results is the health indicator. Notice that there is a lack of data pertaining to childhood underweight rates and access to improved

sanitation for Brunei Darussalam. The average for Brunei thus only incorporates the child mortality rates. Singapore has the highest normalized child mortality rate, underweight rate, and percent of people with access to improved sanitation. However, Brunei has the highest HEALTH value because of the lack of data mentioned above and its above-average normalized child mortality rate.

Table 3: Utility Indicators

Country	ELECTR	WATER	FUEL	UTILIT
Brunei Darussalam	72.5988	*	95.0000	83.7994
Cambodia	31.1000	71.3000	10.6138	37.6713
Indonesia	94.1500	84.9000	45.2992	74.7831
Lao PDR	66.0000	71.5000	5.0000	47.5000
Malaysia	99.3000	99.6000	95.0000	97.9667
Myanmar	48.8000	85.7000	8.2985	47.5995
Philippines	83.3000	91.8000	50.4516	75.1839
Singapore	72.5988	100.0000	95.0000	89.1996
Thailand	99.7000	95.8000	73.8684	89.7895
Vietnam	96.0000	95.0000	43.7808	78.2603

Table 3 shows the different indicators for access to utility, denoted by the symbol UTILIT. It is derived as the arithmetic mean of the percentages of the population with access to electricity (ELECTR), water (WATER), and non-solid fuel (FUEL). Thailand has the highest rate of people with access to electricity. Singapore has the highest rate of

people with access to improved sources of water. Brunei, Malaysia, and Singapore have the highest rate of people with access to non-solid fuel. In terms of UTILIT, Malaysia has the highest value in terms of providing access to utilities. There is no data regarding access to improved access to water for Brunei.

Table 4: Shelter and Security Indicators

Country	UNEMPL _n	HOMLS _n	HOMCD _n	SHLTSEC
Brunei Darussalam	98.3000	99.9980	*	99.1490
Cambodia	92.9000	97.7750	*	95.3375
Indonesia	93.8000	99.2260	99.3946	97.4735
Lao PDR	98.6000	80.3000	95.3670	91.4223
Malaysia	97.0000	99.7350	*	98.3675
Myanmar	*	99.7070	89.8413	94.7742
Philippines	92.7000	96.7150	94.6054	94.6735
Singapore	96.9000	99.9980	99.6916	98.8632
Thailand	99.4000	99.5730	95.2430	98.0720
Vietnam	98.2000	97.9690	98.4340	98.2010

Table 4 shows shelter and security indicators for the ASEAN nations. UNEMPLn refers to the normalized unemployment rate. HOMLSn refers to the normalized percentage of homeless persons. HOMCDn refers to the normalized homicide rate. Thailand has the highest normalized unemployment rate. Singapore and Brunei have the highest normalized homeless rate, and

Singapore has the highest normalized homicide rate. There was no data regarding unemployment rates for Myanmar and homicide rates for Brunei, Cambodia, and Malaysia. Brunei has the highest SHLTSEC value.

A summary of the other indicators along with the aggregated indicators derived above is shown in Table 5.

Table 5: Poverty Indicators

Countries	EDUC	HEALTH	UTILIT	SHLTSEC	CORRU	HPI	ENVIR	GNDRINQL	HDI
Brunei Darussalam	97.18	99.01	83.80	99.15	60.00	41.16	66.49	67.19	85.182
Cambodia	75.09	68.00	37.67	95.34	21.00	24.07	35.44	65.20	58.401
Indonesia	93.52	78.66	74.78	97.47	34.00	42.16	44.36	67.25	68.426
Lao PDR	76.66	76.99	47.50	91.42	25.00	34.42	40.37	70.44	56.942
Malaysia	96.89	93.98	97.97	98.37	52.00	25.89	59.31	65.20	77.291
Myanmar	87.82	83.25	47.60	94.77	21.00	27.36	27.44	43.02	52.353
Philippines	89.65	83.80	75.18	94.67	38.00	37.45	44.02	78.14	65.953
Singapore	98.30	98.81	89.20	98.86	84.00	25.22	81.78	70.46	90.131
Thailand	95.56	94.30	89.79	98.07	38.00	38.43	52.83	70.27	72.193
Viet Nam	95.04	86.87	78.26	98.20	31.00	45.97	38.17	69.15	63.802

The CORRU value refers to the Corruption Perceptions Index. HPI refers to the Happy Planet Index. GNDRINQL refers to the Gender Gap Index, and HDI refers to the Human Development Index. The ENVIR indicator shown above relates to the environmental performance of a country in preserving its environmental resources. It also takes into account the level of pollution (particularly air pollution) that a country's citizens are exposed to, and the health effects of these exposures.

The higher the value of these indices, the better off an economy is in terms of the measured phenomenon. For example, the higher the corruption perceptions index is, the better is the perception of corruption in a country, that is, the less corrupt is the state perceived by its inhabitants.

The second stage of the aggregation is to utilize a factor analysis to determine the statistical relationships of the indicators with each other after gathering all of the above factors. Table 6 shows the results of the factor analysis.

Table 6: Unrotated Factor Loadings and Communalities

Variable	Factor1	Factor2	Factor3	Communality
EDUC	0.8900	-0.1530	-0.3910	0.9680
HEALTH	0.9090	0.0700	-0.2040	0.8730
UTILIT	0.9230	-0.2030	-0.0890	0.9010
SHLTSEC	0.8370	-0.0400	-0.3360	0.8150
CORRU	0.9100	0.2910	0.2170	0.9610
HPI	0.1430	-0.9410	-0.1620	0.9330
ENVIR	0.9070	0.2480	0.3030	0.9770
GNDRINQL	0.3630	-0.5170	0.7570	0.9720
HDI	0.9600	0.1300	0.1800	0.9710
Variance	5.8950	1.3879	1.0858	8.3687
% var	0.6550	0.1540	0.1210	0.9300

The nine factors determined above can now be grouped using factor analysis into three factors because of their correlations with each other. These correlations are shown by the high communality values of the different variables with each other. Furthermore, using the three factors depicted above, 93% of the variability in the multiple variables can be explained.

A country can be considered as poor when its overall environment does not allow for its citizens' satisfaction and happiness. Accordingly, the first index, called the General Welfare index, is composed of the factors of education, health, utility, shelter and security, corruption, environment and human development. These factors refer to the general climate of a country in terms of providing adequate resources and satisfying deprivations.

The citizen's perception of the government of a country also affects their perceived poverty and deprivation. Citizens that perceive the government as corrupt and perceive broad economic gaps between the rich and the poor tend to intensify their perception of themselves as impoverished.

A country may also be considered as poor when

it cannot sustain the long-term happiness of its citizens. This emotional quicksand tends to perpetuate low labor force morale, and can spiral into financial and economic poverty. Factor 2, called the Governance and Emotional Landscape index, incorporates the indicators linked to corruption, happiness, environment and human development to capture this aspect of poverty.

A country can also be considered as poor when it is unable to maintain a social environment that is conducive to the personal growth and advancement of its citizens. This is aggravated by the existence of barriers to equal opportunity and institutionalized disadvantages to people of different gender preferences. Factor 3, called the Social Climate index, captures this aspect of poverty. It considers the factors of happiness, environment, and gender inequality.

In summary, the factors shown in Table 7 and their respective indicators have been identified to determine the poverty level of a country.

Table 7: Poverty Factors and Indicators

Factors	Indicators
General Welfare	Education (EDUC), Health (HEALTH), Utility (UTILIT), Shelter and Security (SHLTSEC), Corruption (CORRU), Environment (ENVIR), and Human Development (HDI).
Governance and Emotional Landscape	Corruption (CORRU), Happiness (HPI), Environment (ENVIR), Human Development (HDI).
Social Climate	Corruption (CORRU), Environment (ENVIR), Gender Inequality (GNDRINQL), Human Development (HDI).

The study utilized the principal components analysis after determining the various factors and their indicators to determine the factor weights to be used in the determination of the various indices. The following is the results of the principal components analysis for the General Welfare Index.

Eigenvalue	1219.1	157.6	24	11	7.4	0.9	0.6
Proportion	0.858	0.111	0.017	0.008	0.005	0.001	0
Cumulative	0.858	0.969	0.986	0.994	0.999	1	1

Variable	PC1	PC2
EDUC	0.203	-0.29
HEALTH	0.263	-0.135
UTILIT	0.532	-0.711
SHLTSEC	0.055	-0.050
CORRU	0.540	0.468
ENVIR	0.442	0.385
HDI	0.342	0.153

From these data, we can compute the GWI using the following formula:

$$\text{GWI Raw Score} = \frac{.203 \text{ EDUC} + .263 \text{ HEALTH} + .532 \text{ UTILIT} + .055 \text{ SHLTSEC} + .540 \text{ CORRU} + .442 \text{ ENVIR} + .342 \text{ HDI}}{2.377}$$

Equation 2: GWI Raw Score

$$\text{GWI} = \frac{\text{GWI Raw Score}}{\text{Maximum GWI Raw Score}}$$

Equation 3: General Welfare Index (GWI)

Based on the equations above, the *General Welfare Index* of the ASEAN member nations is shown in the table on the below:

Table 8: General Welfare Index among ASEAN countries

Country	EDUC	HEALTH	UTILIT	SHELTSEC	CORRU	ENVIR	HDI	GW	GW I	RANK
Brunei	97.182	99.010	83.799	99.149	60.000	66.490	85.182	78.554	0.884	2
Cambodia	75.087	68.003	37.671	95.338	21.000	35.440	58.401	44.337	0.499	10
Indonesia	93.522	78.657	74.783	97.474	34.000	44.360	68.426	61.500	0.692	6
Lao PDR	76.657	76.987	47.500	91.422	25.000	40.370	56.942	49.190	0.554	8
Malaysia	96.885	93.983	97.967	98.368	52.000	59.310	77.291	76.837	0.865	3
Myanmar	87.815	83.250	47.600	94.774	21.000	27.440	52.353	46.963	0.529	9
Philippines	89.650	83.803	75.184	94.673	38.000	44.020	65.953	62.254	0.701	5
Singapore	98.296	98.807	89.200	98.863	84.000	81.780	90.131	88.836	1.000	1
Thailand	95.556	94.297	89.789	98.072	38.000	52.830	72.193	69.803	0.786	4
Viet Nam	95.037	86.873	78.260	98.201	31.000	38.170	63.802	60.836	0.685	7

Singapore ranked first in terms of General Welfare Index among ASEAN countries while Cambodia got the lowest spot. This result can be attributed to the fact that Singapore ranked first in six among the seven variables under GWI (Education, Health, Shelter and Security, Corruption, Environment and HDI). On the other hand, Cambodia ranked the least in two variables (Education and Utility) and consistently belonged in the bottom three in other variables except for the variable Shelter and Security where it ranked seventh.

The low indicator values pertaining to education, health, utilities and human development for Cambodia point towards problems regarding its provision of basic needs. This coincides with reports in the Demographics and Health Survey of

Cambodia (2005) which find that overall, twenty percent of its children under the age of five have diarrhea. According to the same report, this is in part due to lack of sanitary water sources. Notably, Cambodia also has low completion rates for primary school and low continuation rates towards secondary school. These represent problem areas that should be considered.

In determining the level of poverty among ASEAN nations, it is also imperative to measure the Governance and Emotional Landscape of each country. This factor is composed of Corruption, HPI, Environment, and HDI. The following equations are constructed based on the following data, taking into consideration the weight of its components, which are the results of the principal components analysis.

Eigenvalue	796.32	66.35	9.07	3.3
Proportion	0.91	0.076	0.01	0.004
Cumulative	0.91	0.986	0.996	1

Variable	PC1	PC2
CORRU	0.699	-0.081
HPI	-0.033	0.975
ENVIR	0.573	0.001
HDI	0.426	0.208

$$\text{GOVEL Raw Score} = \frac{.699 \text{ CORRU} - .033 \text{ HPI} + .573 \text{ ENVIR} + .426 \text{ HDI}}{1.665}$$

Equation 4: GOVEL Raw Score

$$\text{GOVEL} = \frac{\text{GOVEL Raw Score}}{\text{Maximum GOVEL Raw Score}}$$

Equation 5: Governance and Emotional Landscape (GOVEL)

Interestingly, the results suggest that the Happy Planet Index has a negative correlation with the other three variables. An interpretation of this result is that the other three factors are primarily based on prospective perceptions, whereas the HPI is based on actual and experienced factors of people. The very low negative coefficient for HPI suggests that the forward-looking perceptions, being inherently subjective, might be skewed towards more positive outlooks. These situations overstate or understate the index. However, the HPI measures experienced well-being, and it compensates and adjusts for these overstatements and understatements by anchoring the perceptions with realistic experiences.

Table 9 below shows the Governance and Emotional Landscape Index of the ASEAN nations which results from the computations done above.

Table 9: Governance and Emotional Landscape Index among ASEAN countries

Countries	CORRU	HPI	ENVIR	HDI	GOVEL	GOVELI	RANK
Brunei Darussalam	60.00	41.16	66.49	85.18	69.04994	0.803191	2
Cambodia	21.00	24.07	35.44	58.40	35.47792	0.41268	9
Indonesia	34.00	42.16	44.36	68.43	46.21163	0.537535	6
Lao PDR	25.00	34.42	40.37	56.94	38.27528	0.445219	8
Malaysia	52.00	25.89	59.31	77.29	61.50406	0.715417	3
Myanmar	21.00	27.36	27.44	52.35	31.11209	0.361897	10
Philippines	38.00	37.45	44.02	65.95	47.23462	0.549435	5
Singapore	84.00	25.22	81.78	90.13	85.96949	1.00000	1
Thailand	38.00	38.43	52.83	72.19	51.84357	0.603046	4
Viet Nam	31.00	45.97	38.17	63.80	41.56321	0.483465	7

Singapore ranked first in the Governance and Emotional Landscape Index while Myanmar ranked tenth. As we can observe, Myanmar consistently belonged to the bottom two spots in three among the four variables with HPI as the exception. On the other hand, Singapore ranked first in all variables except for HPI where it only got the ninth place. However, since HPI has a negative weight, having a lower HPI had yielded a higher GOVEL Raw Score for Singapore; hence, a higher index. This high index value resulted in Singapore to leading the group in terms of Governance and Emotional Landscape. These results are consistent with Singapore’s low

perceived corruption and high motivation of its employees to work. Also, Singapore has a high environmental performance index, which can also contribute to increased employee morale.

Aside from GWI and GOVELI, it is also vital to measure the *Social Climate* of each nation in measuring poverty. The variables Corruption, Environment, Gender Inequality and HDI composesthis factor. The weight of every component as determined by the Principal Component Analysis as well as the formula are shown below.

Eigenvalue	807.81	72.2	9.02	4.39
Proportion	0.904	0.081	0.01	0.005
Cumulative	0.904	0.985	0.995	1

Variable	PC1	PC2
CORRU	0.692	-0.212
ENVIR	0.569	0.021
GNDRINQL	0.129	0.977
HDI	0.424	0.02

$$\text{SCI Raw Score} = \frac{.692 \text{ CORRU} + .569 \text{ ENVIR} + .129 \text{ GNDRINQL} + .424 \text{ HDI}}{1.814}$$

Equation 6: SCI Raw Score

$$\text{SCI} = \frac{\text{SCI Raw Score}}{\text{Maximum SCI Raw Score}}$$

Equation 7: Social Climate Index (SCI)

Based on the computations, presented in Table 10 are the Social Climate Index of each ASEAN nation.

Table 10: Social Climate among ASEAN countries

Countries	CORRU	ENVIR	GNDRLNQL	HDI	SC	SCI	RANK
Brunei Darussalam	60.00	66.49	67.19	85.18	68.43308	0.81688	2
Cambodia	21.00	35.44	65.2	58.40	37.41476	0.446617	9
Indonesia	34.00	44.36	67.25	68.43	47.66078	0.568923	6
Lao PDR	25.00	40.37	70.44	56.94	40.51858	0.483667	8
Malaysia	52.00	59.31	65.2	77.29	61.14303	0.729859	3
Myanmar	21.00	27.44	43.02	52.35	31.91435	0.380959	10
Philippines	38.00	44.02	78.14	65.95	49.27647	0.588209	5
Singapore	84.00	81.78	70.46	90.13	83.77372	1.00000	1
Thailand	38.00	52.83	70.27	72.19	52.93867	0.631925	4
Viet Nam	31.00	38.17	69.15	63.80	43.62899	0.520796	7

Singapore headed the group in the Social Climate Index while Myanmar landed on the tenth place. Myanmar's low rating in Gender Inequality primarily caused its Social Climate index to nosedive. According to the World Bank, Myanmar currently faces challenges regarding gender inequality especially in terms of political representation, high maternal mortality rates, and unequal pay rates for men and women. The World Bank recognizes the fact that advances in closing gender gaps can contribute to increased labor

productivity and better satisfaction of its citizens, all of which also impact a country's financial poverty indicators.

Lastly, the researchers determined the Overall Poverty Index, denoted by symbol POVI, of a nation in terms of general welfare, social landscape, needs satisfaction, well-being, and health care and sanitation. The following is a summary of the indices and the results of the principal component analysis of the same factors.

Eigenvalue	0.10148	0.00175	0.00003
Proportion	0.98300	0.01700	0.00000
Cumulative	0.98300	1.00000	1.00000

Variable	PC1	PC2
GW	0.52700	-0.85000
GOV	0.61600	0.39500
SL	0.58500	0.34900

The following equations can then be developed from the analysis:

The following equations can then be developed from the analysis:

$$\text{POVI Raw Score} = \frac{.527 \text{ GW} + .616 \text{ GOV} + .585 \text{ SL}}{1.728}$$

Equation 8: POVI Raw Scores

$$\text{POVI} = \frac{\text{POVI Raw Score}}{\text{Maximum POVI Raw Score}}$$

Equation 9: Poverty Index

The results of the poverty index using the equations developed above are shown in the following table.

Table 11: Poverty Index among ASEAN nations

Countries	GWI	GOVELI	SCI	NONPOV	POVI	RANK
Brunei Darussalam	0.884258	0.803191	0.816880	0.832549	0.832549	2
Cambodia	0.499093	0.412680	0.446617	0.450523	0.450523	9
Indonesia	0.692289	0.537535	0.568923	0.595357	0.595357	6
Lao People's Democratic Republic	0.553717	0.445219	0.483667	0.491325	0.491325	8
Malaysia	0.864933	0.715417	0.729859	0.765905	0.765905	3
Myanmar	0.528642	0.361897	0.380959	0.419204	0.419204	10
Philippines	0.700770	0.549435	0.588209	0.608715	0.608715	5
Singapore	1.000000	1.000000	1.000000	1.000000	1.000000	1
Thailand	0.785745	0.603046	0.631925	0.668542	0.668542	4
Viet Nam	0.684811	0.483465	0.520796	0.557509	0.557509	7

The indices presented in Table 11 are aggregated using the results of the principal components analysis to yield the Poverty Index among the ASEAN countries. The table ranks the countries from 1 to 10, where 1 represents the most successful country in terms of the identified indicators down to 10 which represents the poorest country in terms of the defined indicators. Unsurprisingly, Singapore ranked first among the

ten ASEAN member countries. Singapore is famous for its growing industry and, according to <http://www.bbc.com/news/world-asia-15961759>, is usually regarded as one of Asia's economic tigers. Cambodia got the lowest rank among the ASEAN countries. For better comprehension, the summary of the rankings of the ASEAN member countries in different indices as well as the overall ranking denoted as POVI is presented below.

Table 12: Summary of Rankings

Countries	GWI	SLI	SCI	POVI
Brunei Darussalam	2	2	2	2
Cambodia	10	9	9	9
Indonesia	6	6	6	6
Lao People's Democratic Republic	8	8	8	8
Malaysia	3	3	3	3
Myanmar	9	10	10	10
Philippines	5	5	5	5
Singapore	1	1	1	1
Thailand	4	4	4	4
Viet Nam	7	7	7	7

Singapore dominated in all three indices. It is unsurprising, therefore, that Singapore got the highest overall rank among all ASEAN countries. Singapore boasts of low deprivation levels in terms of its ability to provide for basic needs, governance, and social climate. Singapore is known as a tiger economy in Southeast Asia, with a highly industrialized economy and good key financial indicators.

On the other hand, it is worth noting that Brunei, who ranked second in the overall ranking, is also second in rank in all three indices. Brunei is a smaller country that is less famous than some of the other ASEAN member countries, but its immense wealth is something that the world is yet to discover. Aside from its unexploited natural resources, the country also possesses high oil and gas reserves which according to <http://thecommonwealth.org/our-member-countries/brunei-darussalam>, contributes to about 68% of its GDP in 2011 and plays a significant part in exports. In addition, it was estimated that proven reserves of oil in January 2013 totaled 1.1 billion barrels and gas reserves was 300 billion cubic meters. Having these significant resources and a small population, based on the same source, Brunei has been regarded as one of the richer countries in the world. It is also remarkable that according

to <http://www.bbc.com/news/world-asia-pacific-12990058>, people in Brunei enjoy high subsidies from the government while paying no taxes.

As we can observe, the bottom three countries (Myanmar, Lao People's Democratic Republic, and Cambodia) were consistent with their rankings, having the same rank relatively for the three indices. This result indicates a red flag that government leaders must look into when planning for improvements.

Table 11 and 12 is a helpful tool for each country leader to look at the poverty level of its country from different perspectives. Each leader would be able to know in which areas his country is underperforming and excelling. With this awareness, the leaders would have a guide in its policy-making and the allocation of its budget to various activities. Leaders will be able to distinguish in which particular indices a particular country needs improvement and to focus their projects on enriching these aspects. In other words, the country's well-being can be looked into with a broader scope. Considering poverty more holistically is vital for the total development of each country.

On another note, Table 13 below shows the top three countries in terms of GWI, GOVELI, and SCI.

Table 13: Top Three Countries in terms of a specific index

Rank	GWI	GOVELI	SCI
1	Singapore	Singapore	Singapore
2	Brunei	Brunei	Brunei
3	Malaysia	Malaysia	Malaysia

Singapore, Brunei, and Malaysia consistently rank first in all of the three indices. However, looking at the values for the indices in Table 11,

there exists a wide gap even between the top three nations. The cluster analysis in the following discussion highlights this wide gap.

The researchers also identified the bottom three countries in terms of the indices provided as seen in the table below.

Table 14: Lowest Three Countries in terms of a specific index

Rank	GOVI	GOVELI	SCI
10	Cambodia	Myanmar	Myanmar
9	Myanmar	Cambodia	Cambodia
8	Lao PDR	Lao PDR	Lao PDR

Myanmar, Lao PDR, and Cambodia are consistently in the bottom three in the different indices. However, it is interesting to note that Cambodia and Myanmar switch places in the bottom two positions only for the General Welfare index. This result is primarily attributable to Cambodia's below-average ratings in Education, Health, and Utilities. It is revealed from analyzing the utility indicator that Cambodia has very low

ratings in terms of access to electricity and access to improved water sources.

Furthermore, a cluster analysis was performed to determine the grouping of countries according to some similar characteristics. These characteristics are being identified and quantified by the statistical distance from a centroid. Table 18 shows the results of the cluster analysis.

Table 15: Cluster Analysis of Observations

Variable	Cluster1	Cluster2	Cluster3	Cluster4	Grand centroid
GOVI	0.8682570	0.5077790	0.7076670	1.0000000	0.709052
GOVELI	0.7593040	0.4065990	0.5433700	1.0000000	0.591189
SCI	0.7733700	0.4370810	0.5774630	1.0000000	0.616783
NONPOVI	0.7972940	0.4477760	0.6050190	1.0000000	0.635799

Cluster analysis attempts to segregate the countries on the basis of similar characteristics. In this case, the variables on which the segregation is based are the indices derived earlier. The countries are divided into four clusters with observations of one, two, three and four respectively.

Cluster 4 is comprised of Singapore. Cluster 4 leads the group in all the four indices as shown in Table 15. This result is not entirely surprising since Singapore's index values are far and above the other nine countries. This is further supported by the many accomplishments and awards Singapore

has secured for itself. The Global Competitiveness Report (2011, 2012) has awarded Singapore as Asia's best country to live in, while Mercer's Quality of Living Worldwide City Rankings of 2014 found the country to have the best quality of life in Asia. In addition, Singapore is the World's Easiest Place to Do Business (Doing Business Report 2014, World Bank) and the 3rd in the world for foreign trade investment (Globalisation Index, 2012). It is the 2nd most competitive city in the world (Global Competitiveness Report 2011-2012, World Bank) and is the least corrupt country in Asia

(2013 Corruption Perception Index, Transparency International). In the area of education, Singapore is 2nd in the Quality of Educational System (Global Competitiveness Report 2011 and 2012, World Economic Forum), with the National University of Singapore ranked 28th globally (QS.com World University Rankings, 2011). The country has also been reported to be 2nd for Infant Mortality and 9th for Life Expectancy at Birth by the World Health Statistics (2010). It is, thus, evident that Singapore has been able to successfully manage the factors which significantly reflect the indices explored in this paper, leading it to belong to a cluster all to its own.

Cluster 1 comprises Brunei Darussalam and Malaysia. The members of Cluster 1 do not obtain the highest rankings in the indices, but consistently display above average ratings. Observe the relatively large gap between Cluster 1 index values and Cluster 2 index values. This large gap in index values suggests that, even though these countries display above average performance, their performance has not reached the quality of that of Singapore. It is also to be noted that Brunei and Malaysia has consistently ranked 2nd and 3rd, respectively, in terms of the indices on general welfare index, governance and emotional landscape, and social climate index. For instance, Brunei Darussalam has a high result for Governance and Emotional Landscape. Known mainly for its oil and gas reserves as export products, this can be seen as an opportunity to develop its unexploited natural resources to market itself and attract tourists and investors. It can also invest in research and development to utilize its rich environmental resources. Brunei also has a high HPI, which suggests the happy attitude of its people. Additionally, it is quite interesting to note

that, among the ASEAN member nations, Brunei and Malaysia, respectively, rank the 2nd and 3rd in terms of the education variables as well as in the Environmental Performance Index. Transparency International (2014) scored Brunei and Malaysia at 60 and 52, respectively, on the Corruption Perception Index (CPI), making them the 2nd and 3rd least corrupt countries among the ASEAN member nations. It must be noted, though, that the scores given to Brunei and Malaysia, albeit making them 2nd and 3rd in CPI, is relatively far from Singapore's score of 84. This same observation also holds true for the Human Development Index, where Brunei scored 85 and Malaysia scored 77, making them 2nd and 3rd to Singapore which scored 90.

Cluster 3 is composed of Thailand, Vietnam, Philippines and Indonesia. These are countries that perform on average compared to the rest ASEAN member states. According to the Human Development Report of the United Nations Development Programme in 2014, Thailand, Indonesia, Philippines, and Vietnam were ranked as the 4th to 7th, respectively, in terms of Human Development Index among the ASEAN member nations. Transparency International (2014) has scored the Philippines and Thailand 38 in the CPI, putting them in tie as the 4th least corrupt countries among the ASEAN member nations, followed by Indonesia and Vietnam. The education indicators also placed these four countries within the 4th to 6th ranks. Considering that these countries appear to be performing on the average, high potential for growth and improvement can be observed. More specifically, these countries already have high ratings for providing general welfare to its citizens. However, these countries have low scores in terms of governance and social climate, and these are areas on which they should devote resources and

attention to remedy.

On the other hand, Cluster 2 is comprised of Cambodia, Lao PDR, and Myanmar. As shown in Table 14, these three countries belong to the bottom 3 in all indices. These three countries ranked 10th, 9th, and 8th, respectively in terms of the education variables, similarly reflecting the countries' performance in terms of persistence to primary education. The same ranking is also observed for access to electricity, water, and fuel. Among the ASEAN member nations, they also fall in the bottom three of the Corruption Perception Index, indicating that they are the 8th, 9th, and 10th least corrupt among the 10 ASEAN member nations. They represent the countries that need to exert more effort in improving their status. The results of the cluster analysis show a value that is significantly lower than the other three groups. Thus, these countries appear to be poorer than those countries in the other clusters. This result highlights issues that require increased effort from the government and the people to develop their countries and improve in the different aspects as represented by the various indices in the Poverty Index.

ASEAN is composed of ten countries namely, Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The goal of integration is for the member nations to work hand in hand for the betterment of all members. It is worth noting, however, that like any other alliances and organizations, ASEAN is facing the challenge of variability and differences among its individual member countries. The fact that some of the ASEAN member countries are performing better than the others cannot be disregarded. It is, therefore, imperative for every member nation

to look into its status before looking at the bigger picture of the advancement of all ASEAN members. Improving its performance would make an ASEAN member a helpful and healthy companion rather than a burdensome associate to its other members.

The overall ranking in the Poverty Index shows a wide gap between Singapore who ranked first and Myanmar who ranked tenth. Singapore got 100% while Cambodia got 41%. The variations among the ASEAN countries are further reflected in the cluster analysis where Singapore was alone in cluster 4 while the bottom three countries were in Cluster 2. The results revealed a wide gap among the ten member states in terms of the multidimensional poverty index put forward in this paper. The seemingly exceptional performance of Singapore makes it similar to an outlier when compared with the other nine member nations. On the other hand, the glaring discrepancy among the member states, particularly those in the bottom three, has made the inequality among the integrating nations evident thus raising the question of whether the integration can provide a solution to the said disparity.

3.0 Conclusions

The study sought to develop a perspective on poverty aside from its usual financial aspect. The financial aspect of a country merely represents how well a country utilizes its resources through economic activities. However, because fluctuations occur in the market, the financial standing of each country may vary from time to time. Also, since the financial resources of a country are a result of the utilization of a country's resources, it can be said that a country may be rich in tangible and intangible resources. These resources have yet to be utilized, and some of these resources cannot

be measured financially. It is then a wholesome approach to consider poverty beyond the purview of finance. More importantly, this paper endeavored to examine this multidimensionality of poverty in the context of the ASEAN integration. With the view of looking into the inequalities amongst the ten member states, the researchers generated and utilized a multidimensional poverty index with the aim of understanding its similarities and differences.

This study identified three factors that can be utilized in determining a country's ability to minimize the deprivations that characterize poverty. These factors included General Welfare, Governance and Emotional Landscape, and Social Climate. These factors are composed of different variables that enable us to view poverty through different lenses instead of focusing only on its financial aspect. The factors described above are helpful for a country to determine problem areas where it should exert more effort to improve, and strengths that serve as its assets and, therefore, should be developed. It is noteworthy to recall that, in the generation of the final poverty index as posited by the researchers, the three factors mentioned share a relatively equal weight in the determination of a country's poverty management. It is thus imperative that should a country wish to better alleviate poverty, it must focus on all aspects of its citizens' wellbeing.

The cluster analysis performed revealed some very interesting insights. It has become apparent that, among the ten member nations wishing to integrate, inequality is undeniably manifested. While this is expected, considering that each member nation brings to the table its own share of strengths and weaknesses, it is worth noting that such a wide gap may prove to be detrimental to

the concept of integration. Although integration symbolizes unity among ASEAN countries, it is undeniable that a spirit of competition would still exist. Comparisons would still be made, and no country would want a dwindling public perception as it could directly impact its economy. A glaring inequality would pull investors towards countries which are considered as rich and would thus hesitate to do business in countries perceived as poor. With the plan of operating under an integrated economic community, capital would be saturated in the top performing countries as stakeholders try to minimize the risks associated with the uncertainty of a newly integrated economy. The conspicuous inequality as highlighted by the exceptional performance of one country and the seemingly dismal performance of some others makes it easy to put the spotlight on the "rich" countries. With this, these top performing countries would progress even further while those in the bottom would remain stagnant or worse if they do not take action. The gap would become even wider. Most undesirably, this would result in a situation where the weaker nations would highly lean and depend on those on top. This dependence may lead to complicated conflicts that might result in the stagnation of the entire ASEAN economy. A country should thus leverage on its relative position to ensure not only its growth, but also that of the entire ASEAN region. While integration respects diversity, it is imperative to comprehend that pooling together countries with vast inequalities and wide disproportions may bring more harm than good. After all, it has been said that the whole is only as good as its parts.

Poverty then is not only limited to the sense of having low incomes, but also encompasses a much wider view. Poverty can be attributed not only to

the low income, insufficient natural resources, and low economic activity but also by the attitude of its government and its people. It is not enough that the country appears rich and the government leaders are satisfied. The progress should also trickle down to the ordinary citizens. It is significant to see poverty in a complete picture. Aside from the financial resources, it is important for a country to preserve and utilize its natural resources, maintain good governance, look after the happiness and well-being of its people. This is imperative in developing a country that is prosperous from the leaders to the ordinary citizens. Viewing poverty through these wider lenses promotes a more holistic and objective view especially in the light of ASEAN integration.

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