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SECURITY INDEX PERCEPTION STUDY: A REVIEW

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ABSTRACT:
Nowadays, the rate of criminal threats to countries across the world is increasing which inclusive of different internal and external threats such as extremists, foreigners, smugglers and cybercrime. Many countries took different initiatives to improve the security aspect for their people and countries. Yet, we are still lacking a specific security index that could be used as guidance in measuring the security, safety and national harmony of well-being. Thus, it is important to have a security index as one of the measurement mechanisms in any country. Hence, in this paper, we reviewed the existing security index perception comprehensively and proposed how the security index should be measured. We also presented a preliminary study for Malaysia in this paper. This paper could be used by other researchers with the same interest as guidance for future studies on the security index.

INTRODUCTION

Barry Buzan mentioned five factors that can affect the security of universal humanity, namely military, political, economic, social and environmental [1]. Thus, apart from these external threats, the peace and security of society is greatly influenced by the increase or decrease in crime rates in the country. In 2016, a new conceptual framework in defining peace has been developed by the Institute for Economics and Peace (IEP) to understand and to describe the factors that create a peaceful society [2]. The violence and crime that exist in and between nations have a significant impact on cultural, political and economic factors that further create unsafe and harmful to society. Among the

significant crimes in the world are divided into two main crimes, namely physical crime and cybercrime. The definition of physical crime consists of real cases such as murder, robbery and theft where it can sometimes still be seen and detected. While cybercrime is a form of criminal behavior that uses any type of electronic device through an internet service connection that allows criminal conduct is committed whether it involves an individual or a group of people. Cybercrime also able to transcend the boundaries from one country to another in a short period with no limitations [3].

There are a few different ways of measuring the security index according to different countries. For example, the Crime Harm Index (CHI) that has been proposed by [6] suggested the sentencing guidelines for the number of days in prison were based on convicted crimes. An extended study has been adopted by Cambridge to further evaluate the sentencing guidelines of crimes according to the independence of culpability and concept of harm. The amendments were proposed to identify the total number of days imprisonment based on the crime convicted [7]. Nowadays Cambridge CHI has successfully practiced in the UK, as well as other countries that have applied the Cambridge CHI in their syllabus.

This paper is organized as follows. Section II presents related works and Section III explains the proposed method for this study. While Section IV consists of the preliminary study findings we conclude and make a suggestion for future work in Section V.

PREVIOUS WORKS

As for Malaysia, according to Dr Huzir Mohamed, the crime index in Malaysia has shown a downtrend between 2009 and 2019. This is due to the government that has imposed the Security Offences (Special Measures) Act 2012 (Sosma) and Prevention of Crime Act (POCA) [4]. This shows that there was significantly important to implement acts and policies in order to reduce criminal cases, as well as an option to improve the security index. Yet, a lot of gaps still have to be filled in especially related to the non-indexed security index. There was a study on public perception of the level of national security which uses Security and Public Order Policy (SPOP) as the main component as a parameter. SPOP is a comprehensive policy designed to ensure the security and public order of the country are always maintained and to ensure the well-being of the people and the continuation of peace, prosperity, the sovereignty of Malaysia which is respected on the world stage. The policy will also make Malaysians united and able to defend national interests [5].

All of the threats related to physical crimes and cybercrimes, to some extent impact the people's condition and their perception of security. There are several international and local indices used to measure either the level of well-being, happiness or security. However, to this day, the index related to the security aspects of the people or the country is still lacking.

Another research on physical crime index done by [8] has conducted a cognitive behavioral therapy among criminal-engaged men to investigate the efficacy of the therapy in reducing crimes. Amazingly, the result of this study showed that crime and violence have significantly decreased for the first year of therapy implementation.

Also, a study by [9] has suggested that both securities measured and authoritative school discipline strategies have decreased the physical and verbal bullying in school. This shows that once both security measures and other related society/agencies bodies were joined together, may help to improve the security of the society.

Besides physical crimes, a study on cybercrimes also has been conducted. A security index for actuators has firstly introduced by [10] for measurement attacks. In order to ensure undetectability attacks, the number of measurements needs to be manipulated. Moreover, the introduction of this security index has helped in characterizing and localizing the vulnerable actuators in the network, as well as in the control system. This study was tried to track the actuators which later initiate a security budget to protect the control system [11]. This study also helps in reducing the misleading of network usage that has been abducted by the cyber adversary.

Cybercrime cases were found to increase to 283 out of 184 cases with a percentage increase of 53.8% compared to 2019 [12]. The Malaysian Communications and Multimedia Commission is among the authorities responsible for preventing the spread of fake news. The creation or dissemination of false news and content is an offense under Section 233 of the Communications and Multimedia Act (AKM) 1998 which provides for a maximum fine of RM50,000 or imprisonment for one year or both, if convicted [13].

All these showed that the security index has improved the well-being of people by constrained the crimes that occurred, regardless of cybercrimes or physical crimes. Thus, in this paper, as a preliminary study, we would like to highlight the security indices, as well as introduced a few policies as other countries did and implement it in Malaysia. We also retrieved all data and instruments based on SPOP and all list of respondents were retrieved from the Immigration Department.

METHODOLOGY
The following is the proposed method to build the security index. There will be two methods to be integrated which will be the quantitative method and qualitative method. All data and instruments will be based on SPOP and the proposed list of the respondents for the interview and questionnaire methods were retrieved from the Immigration Department. This study will involve 2 phases of analysis as follows.

Phase 1: Quantitative method

This phase consists of two types of analyses. The first analysis will be Content Analysis where several trusted news agencies such as AWANI and Bernama will be consulted to identify and shortlist security-related headlines. There are a few topics related to security in Malaysia that are associated with drugs, foreign worker problems, religion, cyber violence and cybercrime. Later, the comments for these headlines will be extracted for sentiment analysis.

The second analysis will be Sentiment Analysis. Sentiment analysis is used to understand and extract views in a text, to study and identify the views holders. Apart from that, formal texts such as news or letters from social media have attracted the researchers to study the views, attitudes and emotions through posts or comments on the post. This attraction was due to the general public around the world that chose social media as their preferred medium of communication to cast views or reactions on an entity such as products, issues, individuals and organizations.

Then, the views or sentiments in this method will be classified into three (3) categories of sentiment polarity namely positive, negative or neutral. Classification of polarity can be done through three methods, namely manually, based on dictionary or lexicon or machine learning [14]. Manual classification requires a large workforce to classify each text, while dictionary-based classification requires a complete dictionary or lexicon for automatic classification. Classification using machine learning is the most advanced and relevant solution if the amount of data involved is too high. This is because it uses computer intelligence to make classifications based on training data (supervised machine learning) or based on computer algorithm intelligence (non-supervised machine learning).

In this preliminary study, since the text data from social media to be extracted will be high, the method that will be used is guided with machine learning or supervised machine learning. Malay lexicon (MySentiDic) will be used with some other lexicon as in SMS and emoji as the basis for automatic classification. Comments or reactions to submissions by security-related news agencies that have been identified at this stage (content analysis) will be extracted for pre-processing before sentiment analysis is conducted. Three types of social media platforms owned by AWANI and Bernama such as Facebook, Twitter and YouTube will be used as the main data sources.

The pre-processing steps (include filtering, marking, word stop removal, document stamping, removal of blank space and conversion to lowercase) can be classified into 6 categories: a) screening/filtering - at this stage, the filter will be cleaned by removing ink, special words, emotional symbols, usernames and others; b)tokens - the tokens will be separated into several different tokens; c)removal of stop words - the same words that do not have analytical value will be removed from the suffix; d)documentation - this stage is used to remove words that have an adjective or that end in 'ing', 'es', 's' and others; e) empty space - each text has a lot of empty space that needs to be

cleared; f)conversion to lowercase - after removing all unnecessary terms in the text, the word will be converted to lowercase.

Phase 2: Qualitative method

This phase consists of three main activities including interview sessions, questionnaires and focus groups. The interviews and questionnaires will be conducted on elite/experts and the general public, while the focus group will be focused on experts and policymakers.

This study will use a semantic analysis involving quantitative and qualitative data analysis. In order to achieve the objectives of the study, quantitative analysis methods will be conducted on existing security indices to produce index-related parameters. Qualitative analysis involves data obtained from interviews, questionnaires and group discussions.

FINDINGS

In this section, we presented our preliminary study findings. The details as follows.

Semantic analysis

Semantic analysis is a process to ensure that a statement or declaration must be semantically correct, which is clear and consistent with the way the control structure and the type of data used. Some several ways and methods can be used such as the Focus Discussion Group (FDG) or the results of interviews on current news and issues in obtaining information related to the study. The semantic analysis aims to correlate with the findings of these measures.

The three qualitative data from these three methods will be transcribed first and the data encoding will be done based on the parameters identified in the first objective of the study. A few software will be used at this data analysis stage. Quantitative data analysis used in this study will be SPSS statistical software while qualitative data analysis will be NVivo or Atlas.ti application software.

To propose security resolutions, the findings from qualitative and quantitative analysis will be correlated with current news and security of related issues that were being actively discussed. Two types of methods will be used, namely content analysis and sentiment analysis. Security-related headlines will be identified for analysis.

The general parameter for the Malaysian security index is the control or eradication of threats to the pillars of peace and human security in Malaysia. Based on our analysis, we proposed the safety index to be calculated as follows.

New Formulation for Safety Index

The safety index will be calculated based on the observation score, S, of the overall respondents for all six components. An algorithm has been developed for computational purposes as follows:

$$S = \sum_{i}^{n} \propto x_i \qquad (1)$$

where x_i represents the question and $\propto$ represents the weight to x_i. This weight is derived from the correlation value between each question and the components of each index. The index calculation algorithm, I, continues by transforming the Z score into a raw score through the following formula:

$$x = \mu + Z\sigma \qquad (2)$$

where, μ represents the average value of the sample while σ represents the standard deviation value of the sample. This transformation aims to identify the actual raw score pair to the Z score used in PCA (for data normalization). Thus to calculate the index of security and public order, the following formula was used:

$$I = \frac{S}{N} \qquad (3)$$

where S represents the observation score and N represents the sample population.

New Formulation for zoning method based on the security index of a city.
By referring to MyCensus, the population of Malaysians currently is approximately 32.7 million. Geographically, Malaysia is divided into 5 zones namely North (Perlis, Kedah, Penang and Perak), Central (Selangor, Federal Territory of Kuala Lumpur and Putrajaya), South (Negeri Sembilan, Melaka and Johor), East Coast (Kelantan, Terengganu and Pahang) and SQL (Sarawak, Sabah and the Federal Territory of Labuan).

Based on the Krejcie & Morgan Sample Size Table, the sample size of the respondents with 99% Confidence Level for this study was 16557. The following formula used to calculate the sample size needed and the results represented a population.

$$n = \left(\frac{K \times S}{E}\right)^2 \qquad (4)$$

N = Sample size
K = Desired confidence level (90%, 95% or 99%)
S = Standard deviation of a sample
E = maximum error (accuracy)

The total size of 16560 samples was divided into 5 zones and then divided according to the number of states in Malaysia. The distribution of surveys will be covered in each zone and state includes the cities and villages. As well as areas with security cases such as crime and drugs. Cooperation from government and non-governmental organizations is needed to encourage respondents to fill out the survey forms.

Respondent Selection Process

Figure 1. The six core pillars of national security policy

There are several steps and ways of determining the respondents for a study. For this study, the selection of respondents will be based on GIS (Geographic Information System) analysis. GIS analysis produces a distribution map of suspects and a map of gray areas to facilitate the selection process of respondents [15].

SPOP
This study has adopted SPOP as the main component as a parameter to maintain the security and public order of the country. The SPOP was based on the six core pillars of national security policy as shown in Figure 1.

The respondent targets include the involvement of stakeholders from various government ministries and agencies as well as Non-Governmental Organizations (NGOs) through a series of engagements, interviews and focused group discussions. The involvement of respondents from GIS analysis and questionnaires, interviews and focused group discussions, will be approximately 40% of the public including village heads and 60% of the front liners, former prisoners and foreign workers, respectively [16]. Also, the involvement of respondents from the public will be based on age target which includes 20: 20: 20: 20 (age 60 and above: age 59-40: age 39-21: age 20-15) through questionnaires. Targeted approximately 1,000 for each state in Malaysia.

The Malaysian Well-Being Index (IKRM) also provides an overview of the well-being of the people using 14 components that include the economic well-being sub-composite and the social well-being sub-composite. IKRM consists of 14 components covering the subcomposite of economic and social well-being. Among the components are public safety, leisure, housing, work environment, income and distribution, Education, communication, transportation, family, environment, health, culture, governance and social participation.

In the formation of the index and the definition of national security, some various threats and challenges need to be taken into account so that the term covers the whole meaning. Based on Table 1, there are some challenges and problems related to domestic security.

Citizens are the most important asset for a country to ensure social, economic, and other survival. Therefore, the perception of the people should be taken into account by the authorities. The people's dissatisfaction can affect the peace and economy of the country in particular. According to the Berita Harian Online article, people feel safer and more secure when the crime index decreases by 53% between 2010 and 2017 [17]. The crime index has an impact on people's perceptions of their safety. The police play a very important role in ensuring the safety of the people in optimal conditions.

A study of the Malaysian Happiness Index in 2019 shows that the level of Happy Malaysia was at 80.4% [18]. The happiness index was closely related and serves as a tool for general measurement of the well-being of the population including the level of health and mental and physical well-being. Residents of Seremban, Negeri Sembilan, Historic Melaka and Kuala Terengganu, Terengganu can smile proudly when their city was recognized as among the 10 Happiest Cities 2019 in Malaysia in conjunction with World Happiness Day 2020 Celebration [18].

Looking at the existing studies, assessing the public's perception of the level of national security does not reflect the real perception of the people as a whole. This because the previous studies only adopted the thrusts in SPOP as the

backbone of their study and did not take into account other aspects that could potentially threaten the peace of the country.

Accordingly, this study will improve the previous index by including several other indices such as Urban Security Index, Global Peace Index Happiness Index, Global Health Index, People's Welfare Index, Corruption Perception Index and Shariah Index in producing a more comprehensive and holistic index that described in Table 2.

Table 1. The challenges and problems related to domestic security

Title	Point
[13]	• Discuss the importance of the defense industry to National Security • The need for a defense system in a state of readiness, professional and well-equipped defense assets as well as a good level of readiness will have a positive impact on Malaysia's security control
[14]	• Explain the priorities and challenges of Malaysia and Indonesia in improving the security level of the Straits of Melaka (SM) for the year 2016-2020. • This study has three objectives namely: first, to identify the types of threats that exist in BC, Second, to analyze the priorities and challenges of maritime cooperation between the Malaysian and Indonesian governments in the BC area, and third, to suggest the potential to create maritime cooperation new between Malaysia-Indonesia countries in BC
[15]	• Analyze the Malaysian framework based on its philosophy and challenges, through the emphasis on issues related to ethical, political, ecological and spiritual conflicts. The crisis needs to be addressed through the principles of metaphysical reality, which are found in the Divine Philosophy.
[16]	• The development of DAESH stands on an extreme ideology regarding the concept of monotheism and jihad where this extreme concept is contrary to the beliefs of Ahli Sunnah Waljamaah which is wasatiyyah. • In the Malaysian context, the continuity of the beliefs of Ahli Sunnah Waljamaah is important for the continuation of peace and harmony in a multi-racial and multi-religious society.
[17]	• Discuss the issue of media democratization as well as the problems and challenges that exist • Studies have found that media democratization presents new challenges in various forms such as terrorist problems, piracy, subversive ideologies and media ethics problems.
[18]	• This article analyzes the sources of Sabah security threats using Developing National Security Theory and Secularization Theory as the basis for discussion, this article explores and discusses how Sabah security management faces various dilemmas and is influenced by various political factors, inter-federal relations, and conflict of community loyalty to the state. • This article concludes that security issues have been secularized by the local community and political leaders in Sabah, but the threat was only secularized when secularization actors at the federal level were believed.
[19]	• Non-traditional threats such as sectarian strife and religious conflict also affect the core values of a country

Title	Point
	• This study aims to identify whether Shiite ideology can be a threat to national security even though its followers are not many. • Preliminary studies have found that the clash between Sunnis and Shiites failed to be managed from the beginning, it is feared that it could cause chaos among the unity of the Malaysian Muslim community and in turn lead to non-traditional threats to the country.
[20]	• Argued three non-traditional threats namely human trafficking, local colony formation, and illegal cross-border as the underlying impact of migration among the Rohingya ethnic group
[21]	• Analyze how the Lahad Datu incident had an impact on Malaysia's national security. • This study argues that the geostrategic and geophysical location of Sabah, the inadequacy of security personnel and also the threat from Jamalul Kiram III Sultan of Sulu of unrecognized Suluk descent, are among the factors of the Lahad Datu incident • Domestic issues such as immigrants, maritime threats and overlapping claims remain issues
[22]	• Security threats to a country can arise from various sources and dimensions; and this includes the phenomenon of socio-political and socio-economic instability of a country, especially neighboring countries. • Malaysia, as a country that is dynamically developing from an economic-political point of view and stable from an internal-economic point of view, cannot be complacent about the weak-state situation of neighboring countries that can be a thorn in the flesh for the security and integrity of the Malaysian nation.

Table 2. Index suggestions and parameters used to measure the index

Index	Definition	Parameter

Urban security index (*Indeks keselamatan Bandar*)	This index is produced by a business company sponsored by NEC Corporation. They classify each city according to several parameters on the side. Extensive studies and in-depth interview processes with experts in their respective fields have been conducted to obtain the results of the index [26].	Based on 4 main criteria namely:
		▪ digital security
		  • Privacy policy
		  • People's awareness of digital threats
		  • A dedicated cybersecurity team
		▪ Health safety
		  • Access to health care
		  • Environmental policy
		  • Number of beds per 1000 population
		  • Number of Doctors per 1000 population.
		  • Water and air quality.
		  • Infant death
		  • Cancer mortality rate
		  • City emergency services
		▪ Personal safety
		  • Rate of police involvement
		  • Community area patrols
		  • The effectiveness of the justice system in

Index	Definition	Parameter
		combating crime

Happy Index (*Indeks Kebahagian*)	Various studies have been used by the Gallup group responsible for the production of this happiness index, among them are social experiments to measure the happiness rate of a person or a country [27].	The variables involved are:
		▪ Welfare data
		▪ Social support
		   • How satisfied the population feels with life on a scale from zero to ten
		▪ Life expectancy
		   • Average life expectancy

Global Health Index (*Indeks Kesihatan Global*)	This global health index measures the readiness of a country to face several scenarios in health aspects such as pandemics, infectious diseases and others [28].	▪ Detection and reporting ▪ Appropriate response ▪ Health system ▪ Comply with international norms ▪ Risk environment
Security and Public Order Policy (*Dasar Keselamatan dan Ketenteraman Awam*)	To be the security index for Malaysia which consists of 6 main cores [23].	Covers 6 cores namely: ▪ Defending the supremacy of the constitution, the rule of law and the main institutions of the country. ▪ Improve the governance and integrity of security enforcement agencies ▪ Strengthen national border security controls. ▪ Ensuring security and public order ▪ Combat drug symptoms ▪ Protect important assets and targets of the country.
People's Welfare Index (*Indeks Kesejahteraan Rakyat*)	The Malaysian People's Welfare Index (IKRM) provides an overview of the well-being of the people using 14 components that include the economic well-being sub-composite and social	Consists of 14 components namely: ▪ Family ▪ Environment ▪ Health ▪ Culture ▪ Governance ▪ Social participation ▪ Public safety ▪ Holiday ▪ Housing

Index	Definition	Parameter
	well-being sub-composite [29].	▪ Work environment ▪ Income ▪ Education ▪ Communication ▪ Transportation
Corruption Perception Index (*Indeks Persepsi Rasuah*)	An index used to measure the level of corruption of a country recognized by the Malaysian anti-corruption commission [30].	▪ Selection of data sources: • Measure the risk or perception of corruption in the public sector • Comes from a trusted source • From a known organization • Always updated
Syariah Index (*Indeks Syariah*)	In this index, the principles of economics, finance, politics, law and social Islam have been represented by 67 proxies which is the practice of good governance standards and good economics applicable to all countries regardless of their religious orientation [31].	Putting the *maqasid Shariah* as a measure of the Shariah index: ▪ *Qawa'id Maqasidiyyah* (methods of achieving goals) ▪ *Jalb Al-Masalih Wa Dar 'Al-Mafasid* (guarding the welfare and rejecting harm) ▪ *Fiqh Al Awlawiyyat* (fiqh of virtue).
Global Peace Index (*Indeks Keamanan Sejagat*)	This index is used in determining the level of security for a country. [32]	Consists of 3 main domains: ▪ International conflicts and current domestic relations. • Relations with neighboring countries. ▪ Level of national harmony • The extent of crime in society • Number of refugees and the percentage of citizens and refugees • Crime of violence • Number of murder cases per 100,000 people • A number of the population imprisoned per 100,000 people. ▪ Military • Military costs. • Number of armed personnel per 100000

CONCLUSION

The increasing rate of criminal threats either external or internal to the country such as extremists, foreigners, smugglers and even corruption has justified the importance of this study. There were a few developed countries that already

have their security index. Thus, it is time to follow in the footsteps of those developed countries. Also, this study is to meet the needs of Malaysia according to the Sustainable Development Goal (SDG) and the Vision of Common Prosperity 2030. The development of the Perception of the Malaysian Security Index should be carried out as it will be in line with the changes in the current socio-political of the country. On the other hand, this paper is also supportive of the 12th Malaysia Plan and industrial revolution 4.0 inspiration. Furthermore, this paper has proposed how to cover the whole country through the zoning method as a whole in a society. This study also using the global peace index, crime index, happiness index and Shariah index, as well as aspects of drugs, PATI & PA problems, religion and crime which were divided into two parts, namely physical crime and cybercrime.

It can be concluded that the safety of the people plays a significant role in the perception of the people. Therefore, the development of a more comprehensive security index is very crucial in ensuring security always be in a sustainable condition. Other countries or researchers could use this paper as the basis of their study in improving the safety perception.

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