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TOWARD STANDARDS HARMONIZATION IN ASEAN ECONOMIC COMMUNITY: A COMPARATIVE STUDY OF NATIONAL STANDARDIZATION BODIES IN INDONESIA AND MALAYSIA

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Abstract

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National Quality Infrastructure (NQI) is the institutional framework that establishes and implements standardization practices, including service conformity assessment, metrology and accreditation. Along with the implementation of the ASEAN Economic Community, the strength and endurance of standards development organizations should be strengthened to compete in international markets and be able to keep abreast of the time. However, there are still differences in the internal conditions and external standards development organizations in some ASEAN countries. It is then important to understand these differences. This research was aimed at measuring them by conducting a comparative analysis between standards development organizations in Indonesia and in Malaysia. The reason is that Malaysia as a neighbouring country of Indonesia has been quite far beyond it in terms of the development of the national quality infrastructure. This research was based on literature study and interviews. It is expected that Indonesia can learn the existing weaknesses and follow the positive aspects from the experience of Malaysia. The analyses used the SWOT method, IFAS-EFAS and QSPM Matrices. Results of this research are some strategies that should be prioritized in Indonesia as a consequence of learning the adoption of the policy in Malaysian institutions. The strategies are essential to improve the institution in Indonesia.

Keywords: ASEAN, National quality infrastructure, National standardization body, Standard development body, Standardization.

1. Introduction

Human daily activities cannot be separated from the benefits of implementing standards. Standards specify how the product, process, and people interact to come to environmental features and performance standards needed. They also provide information and a means of communication. Under the right conditions, the standards provide tremendous benefits for the trading activity, productivity, and technological advances. The standards also support the governmental efforts to protect consumers and the environment, as well as to improve safety and health [1].

The ASEAN Economic Community (AEC) Blueprint in Article 19 calls upon ASEAN Member States (AMSs) to “Harmonize standards, technical regulations and conformity assessment procedures through their alignment with international practices”. Chapter 7 of the ASEAN Trade in Goods Agreement (ATIGA) requires AMSs to harmonize their national standards with the international standards as a means of removing unnecessary trade barriers. [2]

Indonesia is in a period of rapid economic growth, in which international trade activities play a major role. This condition, as a result of the ASEAN Economic Community (AEC), has been there since 2015. Good principles and practices must be adopted in the preparation of standards to compete better in the global market, one of which is through the existence of a national standardization body that should be maintained and continuously improved. Therefore, in this context, standards and national standardization bodies should be developed on par with the international standards. Standards implementation in an organisation (company) is thus related to the organisation performance. [3]

It has been indicated that institutions of national quality infrastructure are not yet working as a system. Each institution tends to operate on its own, rarely coordinating with the divisions of legal, policy making and operations. In addition, standards development organizations have fairly weak relationships with the private sectors, both as suppliers and developers of services’ standards and as recipients of services. Consequently, although Indonesian standards development organizations can make a major contribution, it has not been as expected due to the unbalance between the expectations, which are too big, and the attention, which is lacking, to the dynamics of change in the situation of international trade regulations. The dynamics of the internal and external situation in Indonesia have led to the importance of an efficient improvement of the structure of standards development organizations, so that profits can be gained by utilizing synergies in a well-functioning system [4].

Countries like Thailand, Malaysia and Singapore, have realized that the full involvement of trade and investment (including significant foreign investment) is a powerful way to reduce poverty and increase revenue across all areas. These countries have strengthened the structure of standards development organizations through the development of a broad partnership between governments and the private sector, where entities are encouraged to provide the most appropriate services offered at competitive prices [2].

Based on the data of research conducted by Liedtke and Di Matteo [5] and also the calculation of the Quality Infrastructure Index, Indonesia is ranked 44th on the global scale with a score of 26.4. It means that Indonesia has been quite good in terms of its performance in National Quality Infrastructure (NQI).

However, Indonesia is still behind Malaysia, which is ranked, 39th with a score of 29.5. Among the ASEAN countries, the highest position is Singapore, followed by Malaysia and then Indonesia. This study has focused on the comparative analysis between the standards development organizations in Indonesia (namely BSN) and Malaysia (namely SIRIM Berhad and Standards Department of Malaysia). These cases have been chosen because of the similarity in the structure of the countries' trade that is relatively open. For example, the government controls are on certain commodities only (fuel and electricity), and the rest is handed over to the private sectors. Therefore, it is considered a need to conduct a comparative analysis using the methods of IFAS-EFAS Matrix to determine the position of the institutions, SWOT strategy for the selection steps, and QSPM Matrix in determining priority strategies in an effort to ensure better standards development organization (SDO) in Indonesia.

2. Research Methods

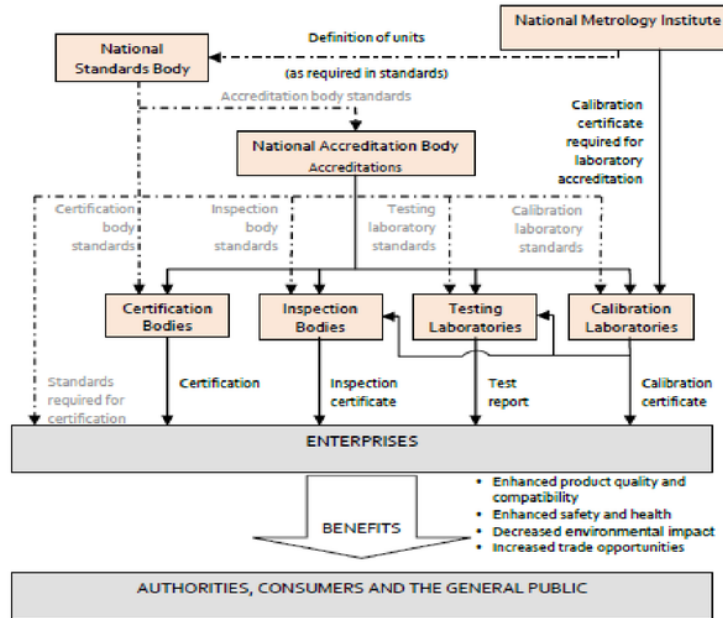
This study has used a mix of descriptive qualitative and quantitative methods utilising descriptive data in the form of words written or spoken by people and observed behaviours. Qualitative research is inductive in its approach to the preparation of research and contribution to knowledge emphasising the subjectivity and meaning of individual experiences [6]. Based on [6], the three main components of qualitative data are interpretation procedures both written and oral reports. This study has collected data in two stages. The first stage has been a literature study and interviews with relevant parties, in the case is of BSN. Meanwhile, the second stage has involved interviews with the DSM and SIRIM Berhad. The results of the interviews have then been analysed using quantitative methods in terms of weighting analysis, SWOT analysis is used and its score calculation and the calculation of QSPM are to comprehend the advantages and disadvantages of each institution and to be compare between them.

3. Theory

National Quality Infrastructure (NQI) is very important in reducing the technical barriers to trade. This is the key to achieving better integration of countries to the international trading system [7]. The three pillars of NQI, which are separated but interrelated and dependent on each other, are important to build quality and sustainable infrastructure leading to full participation in the international trade. It means that the NQI meets the technical requirements of the multilateral trading system. The three pillars are accreditation (to include standards development) conformity assessment (to include certification), and metrology (to include calibration). Prior to discussing the respective roles and structure of the function of the national standards bodies, Figure 1 shows the relationships between these three pillars.

Other relationships like the system of accreditation for the laboratories cannot work in the absence of reference materials and metrology system function. However, Figure 1 has been made simple to highlight the central role of standardization as well as to describe the national standards bodies in the overall process. As a priority, governments in all countries should be included in maintaining basic infrastructure to ensure the safety, health and welfare of the citizens, which include aspects like food security, equitable access to health and education services, social security, and affordable transport and telecommunications systems. After all these aspects have

been applied, the need to build an efficient trading system becomes essential. Economic growth cannot be ensured without trades. Therefore, it is important that the building blocks are put in place to facilitate access to goods and services to the market, both internally and externally. Easy access to markets and the creation of an efficient trading system are the goals to be achieved while metrology, accreditation and conformity assessment are the pillars to achieve the goals. Therefore, these pillars need more elaboration on how they act as supporting and interrelating elements.



Source: World Bank 2007

Fig. 1. National quality infrastructure system.

3.1. Standardization

The standard can be used as the technical basis for the trade of products and services among potential buyers and sellers, or as a means of facilitating the technical regulations. At the macro level, the standard is also used by various companies in the field of production, products, services and scope of the process. The standard should be created by a process that is transparent, open consensus-based involving the consent of all concerned parties. Standards in management systems assist organizations in managing their operations.

Standardization bodies at the national level develop the corresponding national standards. They may also adopt international standards resulted by the international consensus and published by one of the main international standards organizations such as ISO, IEC, ITU, and Codex Alimentarius Commission. The advantage of the

12er is mainly a simplified trading system among countries with the same standards. 12 develops international standards in all areas except the electrotechnical field covered by the IEC and telecommunications covered by ITU. The three organizations have together formed the World Standards Cooperation (WSC).

3.2. The Situation in Indonesia

The Indonesian Law No. 20/2014 regarding Standardization and Conformity Assessment gives the duties and responsibilities to the government through its National Standard Body (*Badan Standardisasi Nasional/BSN*). BSN reports to the President through the Ministry of Research, Technology and Higher Education. Meanwhile, the accreditation of conformity assessment 24 is the duty and responsibility of the government that is delegated to the National Accreditation Committee (*Komite Akreditasi Nasional/KAN*). KAN provides reports to the President through the Head of BSN. The BSN main duty is to establish Indonesian National Standards (SNIs) applied across Indonesia. SNIs are complying with the conformity assessment activities carried out by KAN [4] through testing, inspection and/or certification. These activities are carried out in accordance with the requirement of the international standards of competence.

3.3. The Situation in Malaysia

Standards generally used in almost all sectors of the society in Malaysia. The National Standardization Body utilises a consensus process to create a new standard that allows producers, traders, consumers, and government to give input and consideration one among the others in 4e manufacturing process. Malaysia has adopted the Standard Code of the WTO Technical Barriers to Trade (TBT). SIRIM Berhad, formerly known as the Standards and Industrial Research Institute of Malaysia, is a government-owned agency that provides institutional and technical infrastructure for the government [8].

In addition to SIRIM Berhad, there is also the Department of Standards Malaysia (DSM). The National Bureau of Standards of 16 Malaysia that has been established under the Standards of Malaysia Act 1996, SIRIM Berhad, has been appointed as the sole national standards development agency by DSM. DSM is responsible for all policy issues relating to standardization while the operational responsibility is delegated to SIRIM Berhad. DSM role is in policy development and standards implementation as well as participating in Regional and International Organizations and Laboratory Accreditation and Certification institutions. Meanwhile, SIRIM Berhad's tasks include managing the infrastructure development of standards and Malaysian representation in regional and international standards bodies, and publishing, printing, selling and distributing of the Malaysian standards.

4. Results and Discussion

Based on the interviews with the BSN, SIRIM Berhad, DSM, and the literature review of previous studies, special challenges in the development and use of standards are faced, whether they should develop national standards or adopt the international or regional regulations. The development of national standards requires resource persons who are experts in their fields and highly focusing on national needs. On the other hand, application of international standards can lead

to better trading opportunities and reduce the disposal of goods with inferior quality. However, it may also raise problems for industries in developing countries that may not be ready to produce goods satisfying the international standards, thus, losing share to export. Moreover, developing countries may not have the technical expertise or the resources to make a meaningful contribution to the content of the international standards. Indonesia is not an exception in facing the problems.

Meanwhile, based on the previous studies of [4] and [9], the variables and indicators are listed in Table 1. They have been confirmed by interviews with the BSN experts.

Table 1. The variables and indicators of interviews and literature studies.

Internal Variable	Indicators' Code (IC)	Indicator	Source of indicators
-Financial Support	1.1	- Financial structure	[4]
	1.2	- Amount of financial	
-Standard Implementation	2.1	- Number of standards	[4]
	2.2	- Standards implementation	
-Relationships among units	3.1	- Work specifications	[4] and [9]
	3.2	- The division of labour based on their respective fields	
-Human Resource	4.1	- Development of supporting bodies	[4] and [9]
	4.2	- The number and qualifications of workers needed	
External Variable	Indicators' Code (IC)	Indicator	Source of indicators
-Relations with international organizations with regard to standards	5.1	- Organization's participation in international organizations	[4]
	5.2	- The existence of producer countries (competition)	
-Public understanding	6.1	- BSN support organizations	[4]
	6.2	- Development of national standards	
-Implementation of international standards	7.1	- The number of identical or modification of international standards	[4]
	7.2	- The application of international standards	
-Regulation of the division of tasks	8.1	- Official regulations regarding the duties and authority of the organization	[4] and [9]
	8.2	- Function national quality infrastructure bodies	

Based on these variables, four factors have been identified as the strengths, weaknesses, opportunities and threats with regard to BSN and SIRIM Berhad. Each indicator has then been used as the basis of further interviews with BSN and SIRIM Berhad selected experts to result in SWOT factors.

4.1. Internal Strategic Factor Analysis

According to Helms and Nixon [10], in SWOT analysis of a country, which is not an individual company, classification of variables is different. Macro-environmental forces that would be an external threat or opportunity for a company are components that would exist within a country and are thus classified as internal strengths and weaknesses.

The total four categories of the internal factors can be arranged into a matrix framework of internal strategic factors for BSN and SIRIM Berhad. After the data of the internal strategic factors (strengths and weaknesses) were obtained, these data were then used to create a Matrix of Internal Factors and SWOT Matrix. The results are shown in Table 2.

Table 2. Framework strategy matrix internal factors.

Indonesia's		Malaysia's	
IC	Strengths	IC	Strengths
1.1	BSN received full financial support from the government	1.1	SIRIM Berhad received full financial support from the government
2.1	Total number SNIs in Indonesia are 8,592 (until July 2016)	2.1	Number of Standards of Malaysia are as many as 6,059 standards (until July 2016)
3.1	The presence of clear regulations regarding the division of tasks between work units in BSN	3.2	Strong coordination among the agencies that have been specified duty, so that the body can work well although there are many agencies involved
4.1	BSN has established MASTAN as a means for society to participate in proposing standards	4.2	The number of qualified workers and participants has met the needs of the agency itself, this is because many people are interested in pursuing a career in the field of standards
IC	Weaknesses	IC	Weaknesses
1.2	Limited government budget, so it is quite impeding the operations of the institution	1.2	The limited budget of the government, so it is quite impeding the operations of the institution
2.2	Percentage of SNI implementation is still low and the majority applied by new businesses is in the form of compliance with technical regulations	2.2	Percentage of implementation of Standards of Malaysia is still low and the majority applied by new businesses is in the form of compliance with technical regulations

3.2	The absence of any specification or division of target for the entire category of SNI is limiting to be more focusing on respective fields	3.1	There are still some categories that have not established as required by institutions specifications
4.2	The limited number of relevant human resources working in the BSN because there are still few people who really understand and are interested in the field of standards.	4.1	The complexity of the structure of the national standards bodies of non-profit making institutions such as the Standards Users of Malaysia into a reduced position of existence

4.2. External Strategic Factor Analysis

From a total of four categories for the external factors, they can be arranged in a matrix framework of the internal strategic factors for both BSN and SIRIM Berhad. The data of external environmental factors (opportunities and threats) were used to create a matrix of External Factors and SWOT Matrix, the results of which are shown in Table 3.

Table 3. External strategy framework matrix factor Indonesia.

Indonesia		Malaysia	
IC	Opportunities	IC	Opportunities
5.1	Indonesia has become a member and play an active role in all international organizations concerned with the quality infrastructure so as to improve the existence in the world BSN International	5.1	Malaysia has been a member and play an active role in all international organizations concerned with the quality infrastructure so as to improve the existence of SIRIM Berhad in the international organizations
6.1	There is MASTAN institution that fully supports and assists BSN in proposing and formulating standards	6.1	There are Standards Users' agencies that fully support and assist the performance of SIRIM Berhad in formulating standards
7.1	There are as many as 1001 SNIs that have been adopted as identical or modified from international standards	7.1	There are as many as 3373 Standards Malaysia have been adopted as identical or modified from international standards, of the total standard as 6059
8.1	There are clear regulations between BSN and other institutions associated with the national quality infrastructure	8.1	There are clear regulations between SIRIM and other institutions associated with the national quality infrastructure

Indonesia		Malaysia	
IC	Threats	IC	Threats
5.2	Producer's countries which encourage agreement to single market have had robust national quality infrastructure		There is a limited number of international organizations joined by SIRIM Berhad so that the body's existence is threatened
6.2	Most of SNIs developed are still initiated by the government due to the low cultural standard level in society	6.2	Most of SNIs developed are still initiated by the government due to the low cultural standard level in society
7.2	Still relatively small number of adoption of international standards by companies in Indonesia	7.2	Still relatively small number of adopted international standards applied by companies in Malaysia
8.2	There is a conflict of interests between the agency BSN with other national quality infrastructure institutions which causing a lack of clarity in the functioning of each agency	8.2	There is a conflict of interest between standards institutes in Malaysia due to the complexity of the structure of standards development organizations in Malaysia

4.3. SWOT questionnaire

The purpose of this questionnaire is to gain the respondents' assessment in determining the level of importance of each factor, so the weights and ratings for each factor are obtained. In assessing the weights, pairwise comparisons method was used. For the determination of rating, questionnaires were developed based on the level or rating of importance.

4.4. Results of SWOT questionnaire

The respondents for the pairwise comparisons questionnaire for BSN were: 1. Analysts of the standard formulation of SNI; 2. Junior Researchers; 3. Institutional Analysts. Meanwhile, the respondents for DSM and SIRIM Berhad SWOT analysis were:

- i. Head of The Standards Development Section;
- ii. The Director of Strategic Planning, DSM;
- iii. Senior General Manager, Standards Department of SIRIM Berhad.

The results of the weighting questionnaire were then processed with Expert Choice software to determine the weight of each factor. After getting the factor weights, then the rating was determined based on the average rating obtained from the questionnaire. The next step was to determine the score of each factor to get the IFAS EFAS matrix.

Having known the internal and external factors of BSN, the next step has been compiling the internal and external factors matrix of SIRIM Berhad. The matrix is a tool to determine how important the role of the internal and external factors is at SIRIM Berhad, Malaysia. Based on the two matrices, the obtained calculations have been used in mapping the SWOT analysis diagram. It could then describe the BSN and SIRIM Berhad positions in formulating appropriate strategies to be applied to the agencies based on their current conditions. Fig. 2 and Fig. 3 present the results:

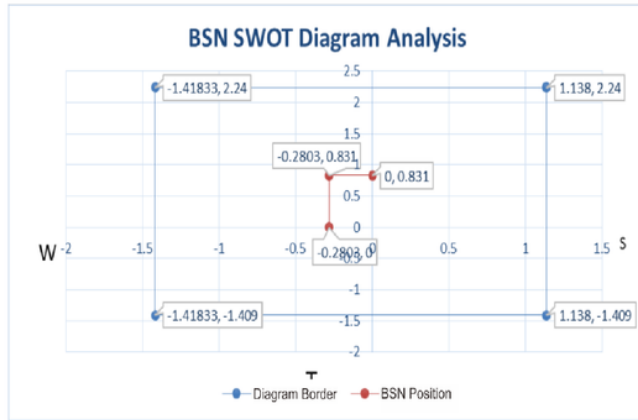


Fig. 2. BSN SWOT Diagram Analysis.

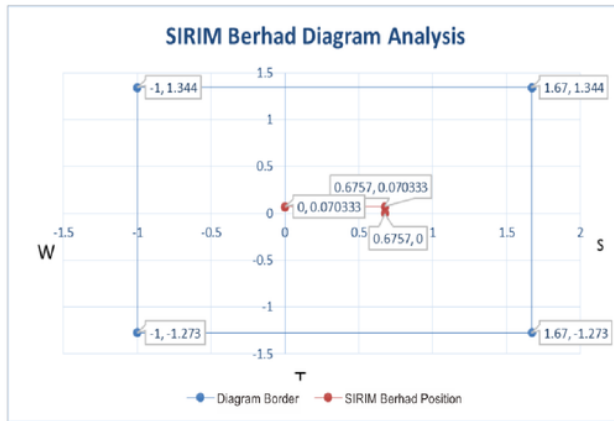


Fig. 3. SIRIM Berhad Diagram Analysis.

Based on the SWOT diagram, SIRIM Berhad is in the first quadrant, while BSN is in quadrant 2. It indicates that BSN can use the strategy of WO

(Weakness-Opportunity). BSN can fix its weaknesses by exploiting opportunities as far as possible and improving better quality service continuously so that it can compete with other countries' agencies. Meanwhile, SIRIM Berhad is directed to use SO (strength-opportunity) strategy utilising all its strengths to take advantage of the opportunities.

4.5. SWOT matrix

SWOT matrix is a tool that can help to formulate strategies after considering several factors: Strength, Weakness, Opportunity and Threat. The formulation of the SWOT Matrix is based on the results of discussions and interviews. BSN can come up with several strategies. For the strategies of SO, S (Strategy) 1 and O (Opportunity) 1 should be realised by two combined strategies: financial support and relations with international organizations related to standards.

BSN needs to show to the government that it has had a rather high performance that should be maintained and improved to sustain its existence and functioning among other countries' national standards institutions. S2 and O3 categories, which are the implementation of standards and of international standards, should be taken to continually increase the number of standards adopted from the international standards. S3 (relationships between organizations) and O4 (regulatory division of tasks) strategies are combined to continue to control and evaluate the rules that are already existing to avoid conflicts. S4 (human resources) and O2 (understanding public) will be integrated to continually optimise MASTAN (Indonesia's Society of Standard) that has shown excellent actions in supporting the performance and sustainability of BSN.

W (weakness) 1 strategy and its related O3 strategy in the implementation of standards aim to solve, in general, the situation of low adoption of SNIs in companies by utilising as many opportunities as possible of already adopted international standards to maintain the competitiveness of companies. W2 and O4 strategies, which are related to the relationships between organizational units as well as rules on the division of tasks, should be combined to implement a strategy targeting many sectors of standards implementation. W3 and O1 strategies are pertaining to overcome the problem of limited funds by making effective use of the funds obtained and applying business principles at work. W4 and O2 strategies can overcome the problems related to the lack of workers who are interested in the field of standards. The help of MASTAN should be taken as a bridge between BSN and the society.

S1, S2, T1 and T3 strategies are related to improving coordination with the government to raise awareness of the importance of standards. S3, S4, T2 and T4 strategies are concerned with improving organizational performance by strengthening coordination among units within the organization and with external organizations.

W1, W3, T3 and T1 strategies are related to the allocation of government funds that focuses on increasing awareness and adoption of international standards to maintain the existence of the standard body. W2, W4, T2 and T4 strategies are related to the establishment of agencies or enhancing coordination with other institutions to take responsibility for the formulation and evaluation of standards to avoid conflict of interests. The results of the strategies are presented in Table 4.

Table 4. The results of strategies.

WO Strategies	
<p>W1. Percentage of SNI implementation is still low and mainly implemented by new businesses as a form of compliance to technical regulations</p> <p>O3. There are at least 1001 SNIs that are adopted identically or modified from international standards</p>	<p>Increase the dissemination at the community level as well as at companies to implement standards, particularly international standards to improve the competitiveness of Indonesian products</p>
<p>W2. The absence of specification or division of targets for all categories of SNIs</p> <p>O4. The existence of regulations of BSN and other institutions is still much associated with the national quality infrastructure</p>	<p>To target and control agencies that work correctly in accordance with all categories of existing standards in order to be more organized and BSN performance can be optimized. Next step is the formulation of the regulation needed to specify the authority and responsibilities of each organization.</p>
<p>W3. The limited budget of the government that quite impedes the operations of the standard body</p> <p>O1. Indonesia has become a member and plays an active role in all international organizations related to quality infrastructure.</p> <p>W4. The limited number of relevant human resources working in the BSN</p> <p>T2. There is a duplication of interest between BSN and other national quality infrastructure institutions regarding the development of standards</p> <p>T4. Producer countries which encourage single market agreement have had strong national quality infrastructures</p>	<p>Allocate funds effectively and efficiently from the government budget, and improve the performance of BSN at the national and international levels in order not to depend on the government funding, and applying business-like principles at work.</p>

4.6. QSPM Matrix

After processing the matrix of internal and external factors, the next step has been to develop a Quantitative Strategic Planning Matrix (QSPM). The step has required respondents to determine the value of the attractiveness of each of the

Strategy that has been formulated against each internal and external factor of the SWOT analysis. Based on the analysis of SWOT matrix strategy, WO strategies have been considered appropriate in the case study of BSN. The strategies are as follows:

- i. Strategy 1: Increase the dissemination at the community level as well as at companies to implement standards, particularly the international standards to improve the competitiveness of Indonesian products.
- ii. Strategy 2: Target and control agencies that work correctly in accordance with all categories of the existing standards to be more organised and so BSN performance can be optimized, then formulate regulations aiming at the clear authority and responsibilities of each organization.
- iii. Strategy 3: Allocate funds from the government budget effectively and efficiently, improve the performance of BSN in the national and international levels so it does not depend on the government funding only, and apply business-like principles at work.
- iv. Strategy 4: Continue to conduct standards' socialisation in through seminars or other activities to raise public awareness and enhance community interest in the implementation of standards so that people can participate in the BSN programs properly.

Based on the results of Total Attractiveness Score (TAS) calculated from the questionnaires (as seen in Appendix A), the strategies have been ranked starting from the highest to the lowest TAS values. Here are the order of the strategies:

- i. Strategy 2 that has a TAS of 6.71875.
- ii. Strategy 1 that scores 6.6125.
- iii. Strategy 4 with a TAS value of 6.439.
- iv. Strategy 3 with a TAS of 6.4015.

It can be seen which strategy that should be prioritised and the order of the prioritisation. The higher the value of TAS the more the strategy is to be prioritised. Strategy 2 is the one that has been applied by SIRIM Berhad. BSN can learn the organizational structure of SIRIM Berhad. It is because SIRIM Berhad has formed divisions and has been cooperating with several agencies and even with educational institutions to assist in formulating and evaluating standards in accordance with their respective competencies. For example, SIRIM is cooperating with Institute of Chemistry, Malaysia, which is a professional organization established under the law of Chemists Act 1975 under the jurisdiction of the Ministry of Science, Technology and Innovation (MOSTI). SIRIM delegates the responsibility and authority to the institute in formulating and evaluating the specific standards in the category of Chemicals and Materials for SMEs.

5. Conclusions

The research findings have led to the following points of conclusion:

- i. The coordinating system of the National Standardization Agency of Indonesia that is responsible directly to the President of this republic is based on the Law No. 20 of 2014. Meanwhile, the system in Malaysia is quite different because SIRIM Berhad Standardization Board is appointed directly by the Department of Standards, Malaysia to manage national standardization at the technical level

while the DSM function is at the policy level. DSM is directly responsible to the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia. Many private sector entities have successfully become part of the standards' development organisations in Malaysia for their harmonious cooperation and relationships between those organisations in the private sector. This kind of involvement and coordination can be adopted as a strategy for Indonesia to advance the current state of the standards' institutions.

- ii. The results of the SWOT analysis of BSN have highlighted its advantages, which are the governmental financial support for BSN, the significant number of SNIs in Indonesia that is around 8592 (until July 2016), and the presence of clear regulations regarding the division of tasks between working units within BSN and its founded Indonesia Society of Standardization (MASTAN) as a partner to enhance public participation in the formulation of standards. However, disadvantages are apparent in four aspects. First, the limited budget of the government can hamper the operations of the institution. Then, the majority number of the application of SNIs is done by new businesses just as a form of compliance with the technical regulations. The third is the lack of specification or target division for the entire categories of SNIs to be more focused on their respective fields. The fourth is the limited number of human resources working in the BSN because of not too many people really understand and are interested in working in this field. Then, when looking at the opportunities, Indonesia has become a member and played an active role in the 8 international organizations related to standards, i.e., WTO, ITU, IEC, ISO, OIML, BIPM, IAF and ILAC, which can improve the existence of BSN at the international level. Also, there is MASTAN institution that is fully supporting and helping the performance of BSN in formulating the standards. Then, there are as many as 1001 ISO standards that have been adopted, whether identical or modified, from the international standards. Furthermore, the existence of a clear regulation for BSN and other institutions relevant to the national quality infrastructure is a kind of opportunity. On the other hand, threats faced by BSN are firstly from the producing countries that encourage single market agreement and have strong national quality infrastructure such as Malaysia, Singapore and Thailand. The second is that many of the SNIs were developed as the initiative of the government due to the of standards' cultural level in the society that is still relatively low. Also, there is still relatively small number of international standards adopted by companies in Indonesia, and the last one is the conflict of interest between BSN and other national quality infrastructure institutions causing a lack of clarity in the proper functioning of each institution.
- iii. Analysis on the various factors that have been formulated based on the interviews has led to the findings of some differences with regard to financial support. BSN's budget on the current condition has been decreasing due to some cutting off by the government while this situation has never been there in Malaysia. The second factor is that only 1,001 out of 8,592 standards in Indonesia are international standards, far below Malaysia's adoption of 3,368 international standards out of 6,059 Malaysian standards. The next factor is the limited number of people interested in working in the field of standards. The number of workers in the BSN is approximately 400 people. It is smaller if compared with that of Malaysia with 4,700 total workers at

DSM and SIRIM Berhad. Another factor is the relationships with the international organisations where Indonesia is participating in eight organisations while Malaysia is with one organization less as shown in the Infrastructure Quality Index.

- iv. Based on the results of the strategy selection using QSPM, WO strategy is chosen as a strategy within BSN. Strategies of BSN if they are sorted by priority are as following: targeting and controlling all agencies that work correctly conforming all categories of the existing standards to be more organized and then BSN performance can be optimized. Next strategy is establishing regulations regarding the authority and responsibilities of each organization (TAS = 6.71875), then the strategy of increasing the awareness program at the community's level as well as at companies' level to encourage implementation of standards, particularly international standards to improve the competitiveness of Indonesian products (TAS = 6.6125), then the strategy of continuously conducting socialization in the form of seminars or any other form to raise public awareness of the importance of standards, and foster community interest and understanding of standards, so that more people can participate in the work and programs of BSN (TAS = 6.439), and last strategy is allocating and executing funding from the government budget effectively and efficiently, leading to the improvement of the performance of BSN nationally and internationally so that later on not too dependent on the government budget, step by step applying business-like principles (TAS = 6.4015).

6. Recommendations

Among the concerns for future research are the issues of harmonization of ASEAN standards. By knowing that there are structural differences between the respective states' structures and functions, it can then be analysed the impacts of ASEAN harmonization of standards and how to make it happen. The second is to improve the performance of national standardization body of a country by having dispersed standard knowledge distribution between regions in the country that can be associated with the implementation of standards. It is important to continuously encourage more people to be aware with the importance of standards implementation.

The harmonization of standards which are referenced in technical regulations conformity assessment procedures associated with the ASEAN mutual recognition arrangements and the ASEAN harmonized regulatory regimes should be assigned a higher priority in the plans for harmonization as stated clearly in [2].

Abbreviations

ASEAN	Association of South East Asia Nations
BSN	National Standardization Body of Indonesia
BIPM	International Bureau for Weights and Measures
OIML	International Organization for Legal Metrology
DSM	Department of Standards Malaysia
IAF	International Organization for Accreditation Bodies in the fields of management systems
IEC	International Electrotechnical Commission

IFAS- EFAS	22 External Factors Analysis Strategy – Internal Factors Analysis Strategy
ILAC	International Organization for Accreditation Bodies in the fields of calibration and testing
ITU	International Telecommunication Union
ISO	International Standard Organization
QSPM	Quantitative Strategic Planning Matrix
WTO	World Trade Organization

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Appendix A
Total Attractive Score Calculations

No	Attractive Score (AS)	Weight	Strategy 1		Strategy 2		Strategy 3		Strategy 4	
			AS	TAS	AS	TAS	AS	TAS	AS	TAS
Strengths										
1	BSN received full financial support from the government	0.111	0	0.36075	3.00	0.333	2.50	0.2775	3.00	0.333
2	Total SNIs in Indonesia are around 8.592 (until July 2016)	0.239	3.50	0.8365	3.50	0.8365	3.25	0.77675	3.25	0.77675
3	There are clear regulations regarding the division of tasks between working units in BSN	0.101	3.00	0.303	3.25	0.32825	3.00	0.303	2.75	0.27775
4	BSN has established MASTAN as a means for society to participate in the formulation of standards	0.067	3.25	0.21775	3.50	0.2345	3.25	0.21775	2.75	0.18425
Weaknesses										
No		Weight	AS	TAS	AS	TAS	AS	TAS	AS	TAS
1	The limited budget of the government is quite affecting the operations of the institution	0.067	2.75	0.18425	3.75	0.25125	4.00	0.268	4.00	0.268
2	Percentage of SNI implementation is still low and the majority applied by new businesses as a form of compliance with technical regulations	0.239	3.50	0.8365	3.50	0.8365	3.75	0.89625	3.75	0.89625
3	The absence of specification or division of a target for the entire category of SNIs needs to be more focusing on their respective fields	0.096	3.00	0.288	3.50	0.336	2.75	0.264	2.75	0.264
4	The limited number of human resources working in the BSN because there are not too many people who really understand and are interested in the field of standards,	0.08	2.75	0.22	3.75	0.3	2.50	0.2	3.50	0.28
TOTAL TAS				3.24675		3.456		3.20325		3.28
Opportunities										
No		Weight	AS	TAS	AS	TAS	AS	TAS	AS	TAS
1	Indonesia has become a member and play active roles in all international organizations concerned with the quality infrastructure so that to improve the BSN existence in the international level	0.29	5	1.0875	3.25	0.9425	3.25	0.9425	3.00	0.87
2	There are MASTAN institution that fully support and assist BSN in formulating standards of performance	0.085	3.25	0.27625	3.25	0.27625	3.50	0.2975	3.75	0.31875
3	There are as many as 1001 SNIs that have been adopted from international standards which are identical or modified	0.11	3.00	0.33	3.50	0.385	3.00	0.33	2.75	0.3025
4	There are some clear regulations between BSN and other institutions associated with the national quality infrastructure	0.34	3.50	1.19	3.00	1.02	2.75	0.935	2.50	0.85
Threats										
No		Weight	AS	TAS	AS	TAS	AS	TAS	AS	TAS
1	Producer countries encouraging single market agreement have already had strong national quality infrastructures	0.29	5	0.9425	3.50	1.015	3.50	1.015	3.50	1.015
2	The majority of SNI was developed at the initiative of the government since the society cultural level of standards is still relatively low	0.034	3.00	0.102	3.00	0.102	3.25	0.1105	3.00	0.102
3	Relatively small number of adoption of international standards by the companies in Indonesia	0.072	3.75	0.27	3.50	0.252	3.25	0.234	3.50	0.252
4	There is a conflict of interest between BSN with other national quality infrastructure institutions causing a lack of clarity in the functioning of each	0.085	3.00	0.255	2.50	0.2125	3.25	0.27625	3.75	0.31875

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