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Analyzing trends in APEC using data analytics

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Analyzing Trends in APEC Using Data Analytics

Raymond Freth A. Lagria and Brenda A. Quismorio



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Analyzing Trends in APEC Using Data Analytics

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Abstract

This paper shows that advanced analytics and traditional statistical techniques on available unstructured and structured data can be utilized to understand the themes put forward in APEC's yearly meetings and how member economies have supported these topics through the conduct of APEC projects.

The application of text mining algorithms such as topic modeling on the proceedings of APEC-level annual meetings, namely APEC Economic Leaders' Meeting (AELM), APEC Annual Ministerial Meeting (AMM), and Senior Officials' Meeting (SOM) generated themes from the text which insight to have been discussed. The topic models generated broad themes from AELM+AMM documents and more specific from SOM documents. These generated themes tended to be in the discussion for an average of 3 consecutive years. The theme that was observed to be in discussion in the longest (i.e., 5 consecutive years) was Youth and Globalization. These generated themes were found to be consistent with the actions APEC has pursued in the past years.

Member economies support policies directions of APEC Economic Leaders and Ministers by implementing projects that are beneficial to the Asia-Pacific region. The 5-Stage APEC Project Cycle ensures that only projects that are aligned to APEC policy directions are approved and encourages collaboration among member economies. A *level of support* score on weighted project attributes was formulated to rank the 50 topics that categorized the 2,144 APEC projects which member economies carried out between 2006 and 2020. Based on this score, the top five (5) topics were *Energy*, *Human Resources Development*, *Trade Facilitation*, *Small and Medium Enterprises*, and *Standards*. The support on *Energy* came mostly from the United States, China, and Japan. *Culture* was the least supported topic with only one project by one proposing economy.

The Philippines sponsored 74 APEC Projects on 26 topics: 12 (or 16%) were on *Small and Medium Enterprises (SME)*; 16 (or 21%) were self-funded, mostly on *Science and Technology* (4 projects); 13 (or 18%) were co-sponsored mostly with Chinese Taipei on SME. The Philippines attended all the annual APEC-level meetings and is one of the nine economies that have hosted an APEC year at least twice.

Using text mining algorithms, voluminous documents data can be processed and analyzed with relative ease for actionable insights and policy and decision making of individuals, companies, governments, and groups like APEC. Such advanced techniques make these insights from public documents and data more accessible to the general public and new researchers. However, the results generated by these advanced data science techniques require the contextualization of domain experts and complemented by traditional statistical techniques. In APEC, these insights can help members in formulating policies for the betterment of their economies and in collaborating on supporting specific themes/topics.

Keywords: Text Mining, Topic Modeling, APEC Meetings, APEC Topics, APEC Projects

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Analyzing Trends in APEC Using Data Analytics

Raymond A. Lagria* and Brenda A. Quismorio**

I. Introduction

The Philippines hosted and chaired the Asia-Pacific Economic Cooperation (APEC) annual meetings in the year 2015. These meetings included the APEC Senior Officials' Meeting (SOM) and Related Meetings, the APEC Ministerial Meeting (AMM) and Sectoral Ministerial Meetings (SMM), and the APEC Economic Leaders Meeting (AELM) under the theme of 'Building Inclusive Economies, Building a Better World.' The year-long hosting was concluded with the APEC Economic Leaders' Meeting held on 18-19 November in Pasay City, Philippines.

To ensure the successful hosting, the late President Benigno "Noynoy" Aquino III created the National Organizing Council (NOC) by virtue of Administrative Order No. 36 (Series of 2012)¹ to manage and supervise all tasks and activities related to the Philippine hosting. The Philippine government allocated approximately Php 10 billion pesos for the hosting.²

The APEC-NOC included the Executive Secretary as Chairperson, the Secretary of Foreign Affairs as the Co-Chairperson, the Secretary of Trade and Industry, the Director-General of the National Economic and Development Authority, the Secretary of Budget and Management, the Secretary of Finance, the Secretary of Transportation and Communications, the Secretary of Tourism, the Secretary of Public Works and Highways, the Secretary of the Interior and Local Government, the Secretary of National Defense, the Cabinet Secretary, the Secretary of the Presidential Communications Operations Office (PCOO), the Secretary of the Presidential Communications Development and Strategic Planning Office (PCDSPO), the National Security Adviser, the Head of the Presidential Management Staff (PMS), the Chairperson of the Cultural Center of the Philippines (CCP), and the Chairperson of the APEC 2015 – Private Sector Advisory Council (APSAC) as its members.

During the Philippines' hosting, it was observed that there was no single repository of the proceedings that conspired during the various meetings. Thus, the NOC initiated the development of three (3) strategic policy tools that aim to:

- consolidate the information about APEC that are scattered across agencies, officials, and staff;
- have a system that government agencies can easily access, search, and use; and,
- enhance the country's capacity to craft responsive and evidence-based policy positions in APEC and other international fora.

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¹ Republic of the Philippines, Embassy of the Philippines, Oslo, Norway. President Aquino Creates the National Organizing Council for the Philippine Hosting of the 2015 ASIA-PACIFIC Economic Cooperation Meetings (Pub. December 8, 2012). <https://oslope.dfa.gov.ph/2012/484-president-aquino-creates-the-national-organizing-council-for-the-philippine-hosting-of-the-2015-asia-pacific-economic-cooperation-meetings> [accessed October 16, 2019]

² In Wikipedia. https://en.wikipedia.org/wiki/APEC_Philippines_2015 [accessed October 16, 2019]

At the time of initiation, the APEC PH Policy Tools (APT) were able to cater to the first two goals of APEC-NOC. The APT are composed of the following:³

- a. APEC Policy Database – envisioned to be a user-friendly and easily-searchable database of the policy positions taken by the APEC members on key issues tackled in APEC
- b. PH Commitments Dashboard – a master list of Philippine commitments in APEC; with an initial status of our compliance
- c. Monitoring and Evaluation (M&E) Tool for PH Initiatives – an M&E tool that maps out the annual milestones necessary to translate the Philippine initiatives to concrete policies and programs and their intended outcomes

In 2016, upon the termination of NOC's mandate, these policy tools were turned over to the Philippine Institute for Development Studies (PIDS) with its expertise in policy research and membership in the APEC Study Center Network.

II. Statement of the Problem

Since the turnover of the APEC PH Policy Tools to PIDS, these APT have been enhanced to be an IT/web-based information system that is easily accessible to its users. Hyperlinks to other resources such as PIDS' Socio-Economic Research Portal for the Philippines (SERP-P) have been incorporated. Likewise, the system continues to be updated with data and information primarily from the Technical Board of APEC Matters (TBAM). TBAM is one of the four sub-Cabinet level Technical Boards of the Philippine Council for Regional Cooperation (PCRC) with DFA as its Chairperson and composed of departments and agencies concerned with APEC Matters⁴. These updates are on APEC and the Philippines' initiatives and commitments on APEC.

As stated, the current version of APT adequately fulfills APEC-NOC's first two goals i.e., a repository of data and information on APEC and a system that is easy to access, search and use for its users. However, it was deemed necessary for the Philippines to enhance its capability of generating insights on topics and issues of interest to individual economies which are seen to affect future decisions and priorities among APEC Leaders.

III. Objectives of the Study

APEC-level meeting documents and APEC projects data exist in different data repositories across the different Philippine agencies and on the APEC website. These lied dormant since its founding year without advanced processing for the betterment of decision-making, research, and presentation. APEC makes these documents and projects data available to anyone. The general public and researchers new to APEC may find these data difficult to consume. Hence, using appropriate data analytics tools and algorithms on available documents and projects data, this paper aims to understand the themes put forward in APEC, how economies support APEC topics, how the Philippines, in particular, fair towards its participation in APEC and present these in a summative discussion format.

³ Philippine APEC Study Center Network: APEC Policy Tools. <https://pascn.pids.gov.ph/files/apecph/about> [accessed on October 16, 2019]

⁴ The LawPhil Project, Arellano Law Foundation, Philippine Laws and Jurisprudence Databank, Section 5. https://www.lawphil.net/executive/ao/ao2011/ao_20_2011.html [accessed October 16, 2019]

IV. Research Questions

Specifically, to aid the public and new researchers in understanding the themes put forward in APEC as well as understanding how the economies perceive topics, the following research questions are established:

1. What are the themes put forward in APEC? (RQ1)
2. What themes have been predominantly observed in APEC meetings over the periods covered? (RQ2)
3. How have the economies supported topics in APEC? (RQ3)
4. What are the Philippine project initiatives on these topics? What is the status of each project initiative? (RQ4)
5. How active were the Philippine economy in attending the APEC meetings? (RQ5)

Themes from Documents and Topics of Projects Data

To enforce distinction between the usage of terms, RQ1 and RQ2 used the term “themes”. The themes are the general subjects that are to be generated by the methodology used in answering RQ1 and RQ2.

On the other hand, RQ3 and RQ4 will use the term “topics” to refer to the subject tagged by APEC on the source data to be used.

Section 3 – Methodology elaborates the different datasets and methods used to answer these questions.

V. Scope and Limitations

Given that this research is geared towards the application of analytics tools in understanding APEC generated data, the following limitations provide boundaries for which the results are confined to:

1. The study only focuses on the meeting documents covered by the Leader’s Meeting, Ministerial Meetings and the Senior Officials’ Meeting as these compose the main branch of the APEC organizational structure
2. Relevant datasets provided by PIDS will only be analyzed with the aim of directly answering the research questions
3. The results of the analytics tools and models may not be able to explain the inherent behavior of the data
4. The results may also be confined as to how the algorithms of certain models work (i.e., the results have shown to behave this way because that is how the probabilistic manner of the model made it)
5. Even after substantial cleansing has been conducted on the datasets, analytics tools and models may still include noise which can provide discrepancies or errors in results

VI. Significance of the Study

With the advancement of analytics in recent years, organizations, governments, research centers, and academic institutions should embrace and follow the paved way for analytics to thrive. This research makes use of analytics on themes being discussed in the APEC meetings and on topics indexed by projects data. The analysis and results also attempt to obtain important insights on the importance of these topics to APEC economies. Finally, this research ultimately lays the basis for analytics' usefulness and suitability in providing data-driven results in a regional wide (e.g., APEC) produced documents and projects data.

VII. Review of Related Literature

In 2017, almost 90% of the world's data has been produced in the last two years and it has been growing exponentially. Much of these data are unstructured in nature – images, videos, and text (Sridhar, 2017). This pushed many organizations and businesses to yield to data analytics to edge out competitors and seek insights for profitability through better data management and processing.

Since most data are unstructured in form, including government offices and agencies' data, "text mining" methods have been gaining traction for processing, analyzing, and visualizing data in most applications. Text mining applications have been used in government setting where decision-makers are mostly frontline workers (e.g., policemen for a crime). These range from emergency management, to financial regulation and security. Textual databases have been built for better data management and data retrieval, especially for crime investigation. Classification algorithms have also been used to classify online articles related to outbreaks of diseases, fraudulent activities, and bankruptcy detection. These research papers claim that text mining tools can be used to detect terms of interest like fraud and default.

Governments have also been observed to adopt the Big Data phenomenon such as data-driven decisions for creating policies. The applications and potential benefits of big data in policy-making gather around answering critical questions for governance, centralized data management, and data-driven policies (Williams, 2018).

Some researchers focused on building frameworks for text-based electronic governance. These frameworks are usually composed of categorization of documents into topics, clustering similar documents, tracking of topics based on user behavior, and text summarization techniques (Rao, 2011). When policy databases, social networks, and printed materials are data sources for data-driven policy-making, their frameworks mostly have the same structures. These data sources are then pre-processed and stored in textual databases. Information visualization and other text analysis tools can then be adopted and implemented on pre-processed data.

Other text-based analysis systems incorporate the voice of the customers (e.g., public) in policy-making. A system was proposed to incorporate the public comments before actually finalizing the proposed regulations among the constituents. (Kwon, et. al. 2017). These public comments are then considered opinions that are generally sourced from the constituents of a government.

A text mining method was introduced to classify documents for meetings and multi-party spoken discourse (Purver, 2006). Multi-party discourse transcripts were segmented into topics using Bayesian inference. Another research used a Support Vector Machine (SVM) classifier to identify the general sentiment or polarity of a document (Sheeba, et. al, 2012). The resulting classes were positive, negative, or neutral sentiments.

The researchers of this paper will use an established text mining algorithm on documents data to process, analyze, and visualize themes from APEC-related meeting documents as well as utilized descriptive analytics tools on projects data to further understand how economies support topics.

VIII. Research Design and Methodology

The research was designed to answer the stated five research questions. RQ1 and RQ2 aim to understand the themes discussed in APEC. RQ3, RQ4, and RQ5 aim to understand the level of support member economies have on topics relevant to APEC.

The themes discussed in APEC are captured in APEC meetings. For purposes of this research, themes would refer to the general subject or idea of these meetings. Thus, the dataset used to answer RQ1 and RQ2 came from the APEC Meeting Documents and proceedings. Furthermore, since the APEC meeting documents hold participation and attendance data, to some extent, these are also used to answer RQ5 – determining the level of participation of the Philippines in APEC Meetings.

On the other hand, the level of support economies has on APEC topics is best shown through the conduct or implementation of APEC projects by member economies. Likewise, for this research, the term “topics” refers to the label or tag given to the APEC projects in the projects database. Therefore, the dataset to be used in answering RQ3 and RQ4 comes from the APEC Projects database.

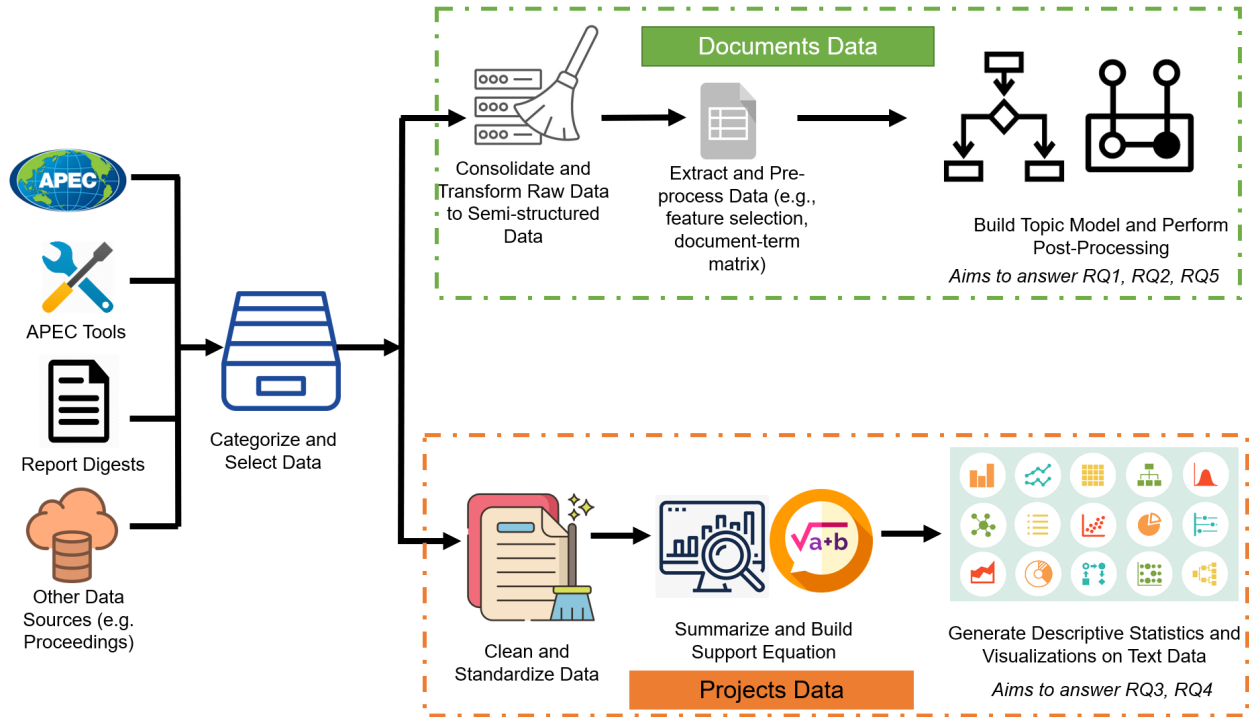
Usage of Projects Data for Showing Support to a Topic

Different evidences – implemented projects and policy changes - were considered to determine the level of support of an economies has on a topic. The researchers opted to make the most out of the projects data because (1) of its availability and (2) interpretability (i.e., tangible actions) of the attributes.

The researchers also considered using “policy changes” proposed or made by economies as a measure of showing their support to certain topics. However, since APEC is a consensual and non-binding organization, APEC can only suggest, cajole, and encourage policy moves but certainly it cannot force its member economies to act on the commitment. Even if leaders agree on a certain action, there is still no legal mandate that all economies should implement these actions in terms of passing a law as an implementing issue. Furthermore, economies carry out APEC projects or act on certain policies not only because they agree with APEC but because the economies’ domestic concerns warrant it. Hence, the researchers find it difficult to prove that the domestic policy change are result of APEC commitments.

This research utilized a typical analytics methodology that branches into two different paths which enable the researchers to answer the different research questions cited above. The figure below displays the framework used.

Figure 1. Research Methodology



Step 1: The methodology framework starts with consolidation and assessment of data sources to be used in the analysis and modeling. Initially, the provided datasets were a combination of the following: APEC website data, documents database, meetings and proceedings data, report digests, and other data coming from the APEC PH tools. All the data were provided by PIDS.

Step 2: The next step was to categorize and select the data that will be used in the pre-processing and modeling steps. The datasets then formed two major categories: documents data and projects data.

Step 3a. Topic Modeling for Documents Data (See Documents Path in Figure 1)

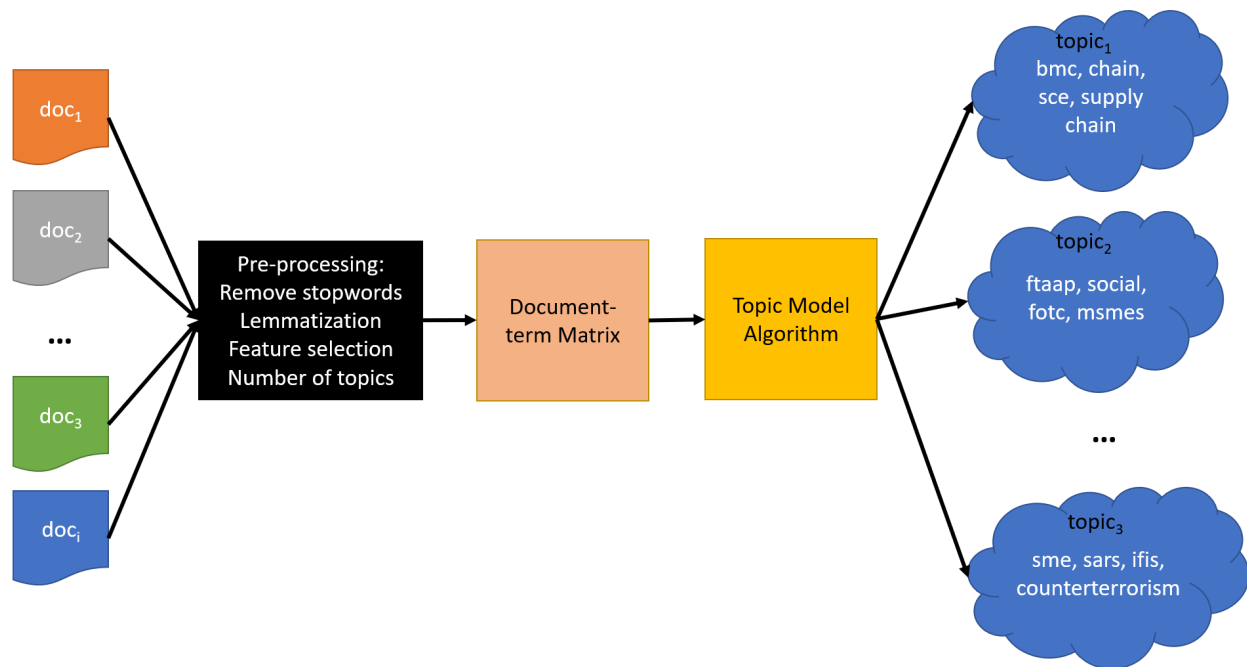
The majority of the datasets provided were meeting proceedings and statement documents. These datasets were text data in document form or unstructured form. This part of the methodology consolidated, transformed, and pre-processed these data into a semi-structured form applicable for further processing and modeling.

Transformation and pre-processing of documents data included the following: cleaning, organization of files, feature selection, and construction of the document term matrix (DTM). Once the documents data have been pre-processed, the selected topic modeling (TM) algorithm was performed on the data. This procedure generated a topic model that produced the themes to answer research questions RQ1 and RQ2.

Topic modeling (TM) uses statistical models to automatically discover topics in a large set of documents (Li, 2018). This collection of documents is also known as a corpus. A corpus can be formally defined as a set of documents containing the same themes (e.g., medical journals, medical notes, medical laws). There are different algorithms used in topic modeling and most of these

algorithms are similar to clustering methods where topics are clustered according to a degree of similarity. Topic models learn topics from unlabeled documents in an unsupervised way. This means that before modeling, these documents are untagged of what themes they represent. After which, the algorithm will work on generating clusters of terms (e.g., a high frequency of instances for two words in a document would likely consider these two words as part of a topic). Figure 2 shows a simplified version of how topic modeling works.

Figure 2. Topic Modeling Simplified



The documents contained words (also known as terms) and each document contain themes. These documents are then pre-processed (e.g., removal of stopwords, stemming). After the pre-processing, a DTM is constructed to provide a structure to the documents. A DTM is a matrix that captures the frequencies of appearances of the terms in the documents. A DTM simply lists down how many times a particular term appears in a document.

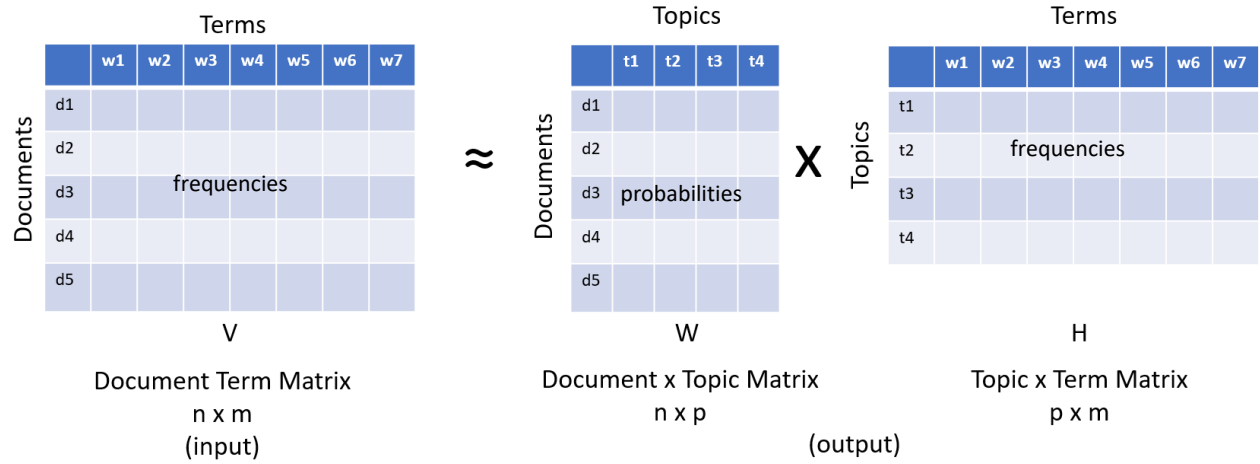
A topic model algorithm utilizes the DTM and a set of rules that generate a group of words or topics. The generated topics are in the form of clustered words. These topics can provide insights on what these documents generally say i.e., the themes that have been put forward in APEC (RQ1) through the years in APEC (RQ2).

The topic model algorithm used in this paper is the Non-negative Matrix Factorization (NMF) algorithm. The NMF algorithm transforms a group of undifferentiated documents into ones that can be summarized as a combination of topics that are also a mix of terms. The main reasons for using NMF are its interpretability and its ability to extract sparse factors.

NMF is a linear algebraic algorithm that transforms the original DTM into two matrices. Essentially, it works similarly to the Lower-Upper (LU) decomposition (solving linear systems of equations). NMF starts with an original matrix (DTM) that is decomposed into two low-dimensional matrices which are easier to work with. The underlying equation is $V \approx WH$ where V is the original matrix, W represents clusters, and H which represents weights of the clusters in each

document. It is called non-negative because it takes only non-negative vectors, of which a DTM can be an example. The resulting matrices can then be used to reconstruct the input corpora and then approximate the topics thereby modeling the topics of the original corpora. Figure 3 shows how the matrices are generated from the DTM.

Figure 3. NMF Diagram Example



To further explain how NMF works with generating a topic model, suppose that the documents on the V matrix are the APEC documents. There are certain terms that the analysis is interested in and so not all terms are to be included in the V matrix. The V matrix can then approximate the W and H matrices using the NMF optimization algorithm given by equation (1). Existing Python packages for NMF are will be used.

$$\min_{w \geq 0, H \geq 0} \|V - WH\|_F \quad (\text{eq. 1})$$

The resulting matrices from the approximation will yield the following:

1. W matrix (Weights) – each row represents an APEC document but this time, the matrix considers the supposed topics that are in the documents. The values are then the unnormalized probabilities of these topics among the documents. Take note that the topics are just combinations of terms.
2. H matrix (Hidden) – each row represents a topic or a semantic feature that is now composed of the term's frequencies. The concept would be: if two terms occur frequently together then they form a topic. The terms give the contextual meaning of the topic. Then, if a term occurs frequently in several topics, then the topics are probably related.

After these 2 lower dimensional matrices are approximated, the topics with the highest word frequencies per topic are deemed to be the topics most relevant to the documents. These topics can then be inferred from the H matrix. Note that when running an NMF algorithm, the number of topics to be selected is also an input. There is no standard way to choose the right number of topics. A trial and error can be done however, this research employs a commonly used method to generate the number of topics to be used - the coherence score.

The coherence score is used to evaluate the best number of topics. It is an intrinsic quality measure of topics generated based on the semantic similarity between high-scoring words in a topic. Topic coherence helps distinguish between topics that are semantically interpretable and topics that are artifacts of statistical inference. In essence, if a group of texts is coherent then they must be supporting each other. The following is an ideal example of a coherent set of texts.

- Basketball is a team sport
- Basketball is played with a ball
- Basketball demands great physical efforts

Generally, the higher the coherence score, the better. A high coherence score can be generated when more topics are considered. However, having more topics may produce many repeating topics. Thus, one must intelligently select the number of topics to consider.

Step 3b. Descriptive Analytics for Projects Data (See Projects Path in Figure 1)

The other type of data that was provided to the researchers was the projects data. The projects data was in structured form with multiple columns (attributes) and rows containing data values such as project name, funding amount, and economy who proposed the project. As mentioned previously, the projects data were ~~also~~ labeled (or tagged) to fall under certain topics. Thus, “topics” was just one of the attributes of the projects data. This path of the methodology caters to the processing of projects data i.e., cleaning and standardizing the data to improve data quality and data integrity

The next step features the application of the different methods in descriptive analytics. Descriptive analytics (also known as Exploratory Data Analysis) is a type of analytics application that describes and summarizes data using basic statistical tools, summarization techniques, generation of pivot tables, and production of data visualizations. It aims to answer questions such as “what is happening right now?”.

In this research, the generation of descriptive measures explored the support of an economy to a certain topic (RQ3 and RQ4) using the projects data. A scoring model was established to scale an economy’s support to the APEC topics using the relevant project attributes.

Step 3c. Summarizing Documents Data for RQ5

In answering RQ5, the data concerned were the documents data. However, contrary to Step 3a, RQ5 utilized summarization and tallying of participation and attendance data of the Philippines. This involved the generation of descriptive analytics measures on semi-structured documents data.

Data Understanding

Datasets Selection

The documents data and projects data that were received from PIDS were reduced to determine the datasets used to answer the research questions. The steps done to reduce these datasets are presented below.

Selecting the Documents Dataset

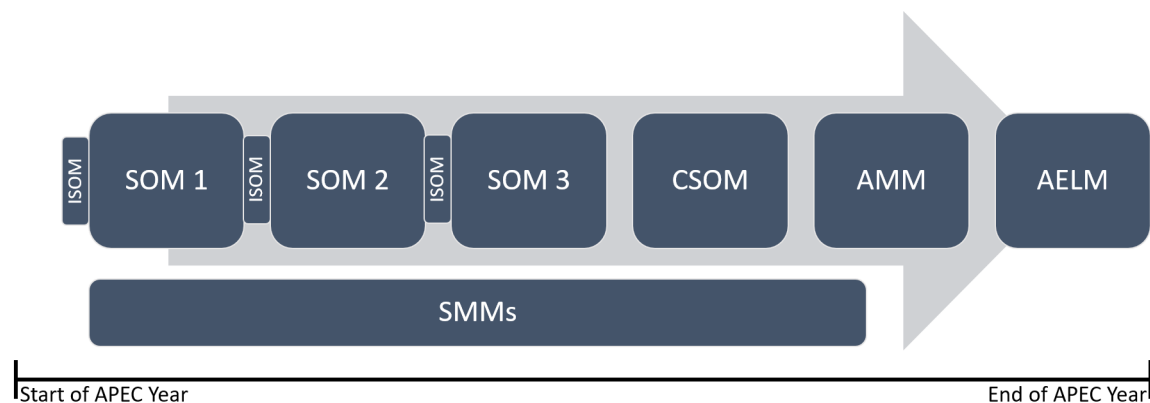
The documents data are meeting documents and proceedings of APEC. The nature of an APEC year follows a series of meetings conducted throughout the whole year. Generally, these APEC meetings start with Informal Senior Official's Meetings (ISOMs). Agenda items in these ISOMs are prepared and are discussed in succeeding Senior Officials' Meetings (SOMs) which are distributed throughout the APEC year. Usually, there are 4 SOMs conducted (SOM1, SOM2, SOM3, and the Concluding SOM). These SOMs generally lay the groundwork for the proposals to ministers and implement policies made from the Ministerial Meetings. SOMs supervise and coordinate budget and APEC programs. Lastly, SOMs coordinate the implementation of APEC declarations and directives⁵.

After the SOMs, the APEC Annual Ministers' Meeting (AMM) is conducted which is generally attended by the foreign and trade ministers. AMMs provide the final recommendations⁶ to be presented at the final meeting of the APEC year – the AELM. Aside from the AMM, Sectoral Ministerial Meetings (SMM) are also conducted throughout the year. However, not all sectors are being discussed yearly. The common sectors that meet every year are the Ministers of Energy and Ministers of Finance.

The APEC year is then closed with the APEC Economic Leaders' Meeting (AELM). The AELM is attended not only by the economies' representatives but also by the heads of the governments. AELM serves to bring out the work done during the APEC year and is considered as the final opportunity for the leaders to form the plans of the region. A “family photo” is also taken where the leaders wear garments selected by the host nation.

The figure below roughly shows the current structure of APEC-level meetings held in a year.

Figure 4. APEC-level Meetings in the Year



⁵ <https://www.apec2021nz.org/apec-nz-2021/meeting-calendar/second-senior-officials-meeting-som2> [accessed on September 28, 2021]

⁶ <https://www.apec.org/about-us/how-apec-operates/policy-level> [accessed on September 28, 2021]

Generation of Figure 4. APEC Level Meetings

The researchers met with representatives from the Department of Foreign Affairs (DFA) and Department of Trade and Industry. These two agencies were led by Asec. Eric Tamayo and Ms. Lyn Aquia, respectively. The researchers were aided in understanding these meetings in APEC (structure, objectives, conduct, attendees, etc.) and were thus, helped in refining the scope of the paper.

On each type of meeting, several documents are generated. These documents can be summary conclusions from SOMs, joint statements from AMM, and leaders' declaration statements from AELM. However, it is noted that certain APEC rules could change the type of documents generated from these meetings (e.g., instead of a joint statement, a chair's statement is produced). The documents from the SOM, AMM, and AELM from different years are used.

Due to the nature of the research methodology where the researchers try to identify themes at the APEC level, the researchers, with guidance from the domain experts, chose only the APEC-level data sources as the primary datasets. This research excluded local-level documents as these may limit the comparisons among different economies. This also gives the research an APEC-level perspective which can equally compare economies and themes on an APEC-level scale.

Limiting the Number of APEC Documents

Domain experts from PIDS also assisted the researchers in limiting the number of datasets. Inputs were gathered from Dr. Francis Mark Quimba, Mr. Mark A. Barral, and Ms. Melalyn Mantaring, who are all representatives from PIDS. The domain experts also provided clarifications on how these documents are generated by different agencies and how these are stored in different locations and formats.

Appendix 1 lists down the year, the type of meeting, and the availability of documents for a particular document-year. The SMM column refers to the availability of at least 1 document related to a particular SMM. The SMM data can either be any sectoral meeting (energy, trade, etc.) across the APEC year. On the other hand, CSOM corresponds to the Concluding SOM of the APEC year which aims to resolve remaining issues coming from the previous SOMs. CSOMs also serve as preparation for the AMM and AELM. Given the nature of SMM having inconsistent availability and the content structure of CSOM which summarizes previous SOMs, these two are excluded from the documents data to be used.

Table 1 summarizes the final selected documents data used in the topic modeling i.e., the APEC Economic Leaders' Meeting documents, Annual Ministerial Meeting documents, and Senior Officials Meeting documents. Table 1 also presents the intended research question to be answered. Note that these meeting documents were used also to answer RQ5, but a different procedure was used (refer to the Analysis and Results section for details). The years covered by the AELM, AMM, and SOM as indicated in Table 1 became the final document years used in the modeling.

Table 1. Final Documents Datasets and Research Questions

Data Source	Years Covered	Research Question	Remarks
AELM Documents	1993-2018	RQ1, RQ2, RQ5	To be combined as 1 dataset
AMM Documents	1993-2018	RQ1, RQ2, RQ5	

Data Source	Years Covered	Research Question	Remarks
SOM Documents	2001-2018	RQ1, RQ2, RQ5	Merged SOM1, SOM2, and SOM3 Excluded CSOM since CSOM is a summary of the other SOMs

Selecting the Projects Dataset

APEC Projects data from 2006 to 2020 have also been provided to the researchers. A total of 2,144 projects were given. The projects data has the following attributes or columns.

Table 2. Projects Data Attributes

Project Title	Topics
Project Number	Committee
Status	Other Fora Involved
Project Year	Other Non-APEC Stakeholders Involved
Sponsoring Forum	Proposing Economy(ies)*
Proposing Economies	Co-Sponsoring Economies
Fund Account	Expected Start Date
Sub-fund	Expected Completion Date
Project Year	Days
Project Session	Declaration
APEC Funding	Project Cost (US\$)
Co-funding Amount	Project Summary
Total Project Value	Relevance
Sponsoring Forum	Objectives

*Complete list of proposing economies

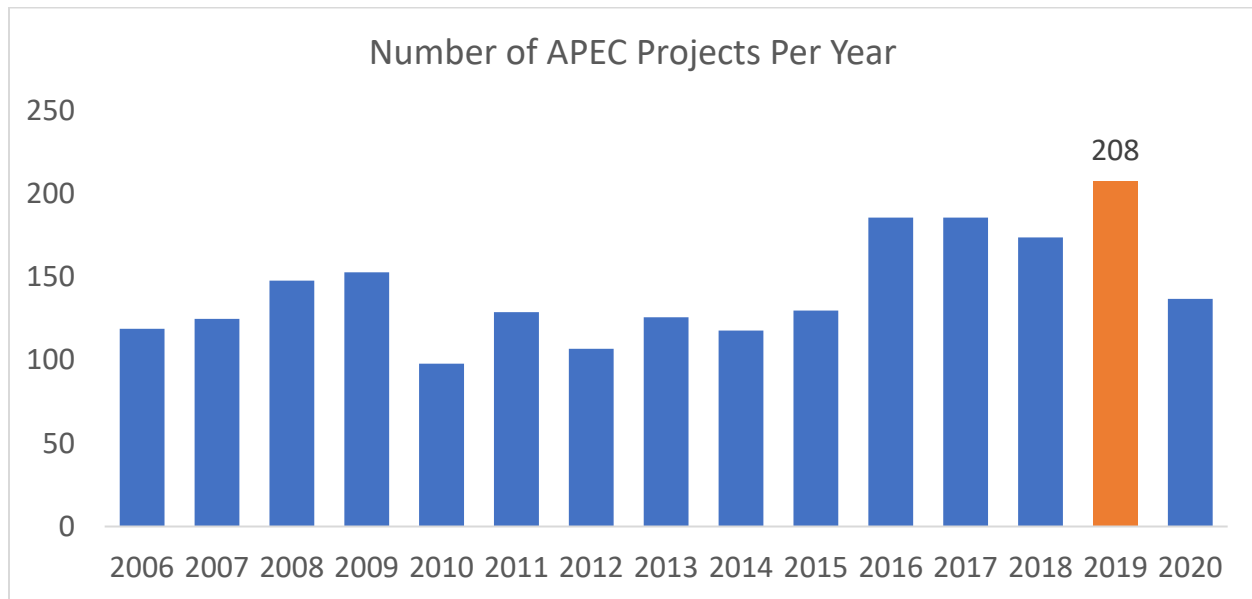
Additional descriptive summary characteristics of the projects data are displayed below in Table 3.

Table 3. Other Projects Data Attributes

Attribute	Value
Number of Projects	2,144
Number of Unique Topics	50
Proposing Economies	21
Co-Sponsoring Economies	21
Average APEC-funded Amount	USD 102,747.61
Percentage of Self-funded Projects	656/2144 (30.60%)

Figure 5 additionally shows the number of projects conducted annually from 2006 to 2020. The highest number of projects was conducted in the year 2019.

Figure 5. Number of APEC Projects per Year



Not all project data attributes were used in answering the research questions. Projects data were primarily used to determine the support that the economies show for certain topics. The researchers, upon consultation with the domain experts, determined that it was appropriate to use a combination of project attributes (e.g., funding, proposing economy) to quantify an economy's level of support to a topic mainly because these projects are tangible actions worked upon by the economies. In this sense, the following table was generated to indicate which research questions were answered using the projects data.

Table 4. Final Projects Datasets and Research Questions

Data Source	Years Covered	Research Question	Remarks
APEC Projects	2006-2020	RQ3, RQ4	Quantification of topic support

Data Preparation

Having finalized, pre-processing steps were performed on both datasets. Different methods were used accordingly on each type of dataset.

Documents Dataset Preparation

The documents dataset was pre-processed using common methods in text mining. Like any other text analytics activity, the documents data went through text analytics pre-processing. In addition, the tagging of the actual document year was also performed. The complete steps are listed below:

- Gather documents data
- Sort and tag the year of the document (e.g., SOM 1 for the year 1990)
- Remove numbers

- Remove punctuations
- Remove stopwords
- Perform stemming (reduces words to their inflectional forms e.g., car, cars, cars → car)
- Remove whitespaces
- Merge relevant datasets (e.g., AMM + AELM)
- Generate a document-term matrix (DTM)

After preparing the documents data, a DTM was built for each type of document category (AMM + AELM and SOM) for the topic models to be induced. Several python packages have the capabilities to build these topic models. The results of the topic models are discussed in the RQ1 and RQ2 sections below.

Projects Data Preparation

Projects data, on the other hand, were cleaned and standardized using standard steps in cleaning structured data. In APEC projects data, each attribute value was examined and then cleansed. The list below summarizes the pre-processing steps followed in cleaning projects data.

- Remove whitespaces
- Eliminate duplicate projects data extracted from the APEC website
- Standardize column values (e.g., topics, project numbers, dates, amounts, etc.)
- Fill in missing values if any
- Ensure values are consistent (e.g., Total sum of funding amount is equal to the sum of APEC funding amount and Self-funding amount)
- Merge different categories that refer to the same meaning (e.g., “Liberalization and Trade Facilitation” is merged with “Trade Facilitation and Liberalization”)
- Transform dataset according to utilization (e.g., multiple topics, single projects, multiple proposing economies)

After preparing the projects dataset, several pivot tables were generated in MS Excel to calculate the needed measures in indicating support from the economies to the topics. A support equation was also formulated to include relevant attributes from the projects data that would quantify the level of support. This is discussed in RQ3 and RQ4 sections.

IX. Results and Discussion

The analysis and results discussion is divided into 5 subsections. Each subsection describes the research question involved and ultimately provides an answer to the question. The process of the analysis and generation of insights are also discussed.

RQ1 – What are the themes put forward in APEC?

This paper implemented a topic modeling algorithm using NMF to generate themes from documents. The NMF algorithm generated themes by producing a cluster of terms that were labeled after by the PIDS domain experts. The domain experts noted some words that did not contribute to the general theme and thus, a few iterations of the same labeling process were conducted until such time when the labeling of themes was considered final by the labelers. The experience and knowledge of the labelers contributed to the level of detail or subjectivity of each theme.

Similar to any topic modeling algorithm, the number of topics (number of themes, k) to be generated was a required input. The researchers used a coherence score as the basis for selecting the number of topics. Coherence scores were obtained for both documents datasets (AMM + AELM and SOM). The calculation was run using the gensim package in Python, particularly the CoherenceModel function. The parameters used were based on several iterations until a good topic model was determined to be produced. The coherence score used the C_v measure because it proved to be most aligned with the interpretability of topics. The generated coherence scores are displayed using a Coherence Chart in Figures 6 and 7.

These figures suggest that the best numbers of topics for the NMF are 40 and 10 for the AMM+AELM dataset and SOM dataset, respectively. For the AMM+AELM dataset, the researchers agreed on using 40 as this is a workable number of topics. As for the SOM dataset, the researchers in agreement with the PIDS domain experts, used the same number i.e., 40, for convenience and simpler model processing.

Figure 6. Coherence Score for AMM+AELM Dataset

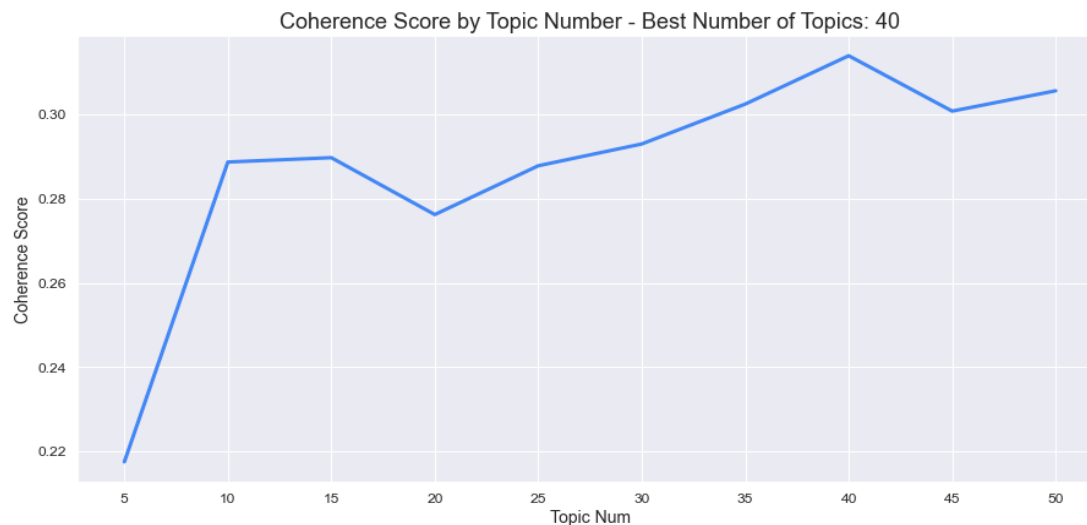
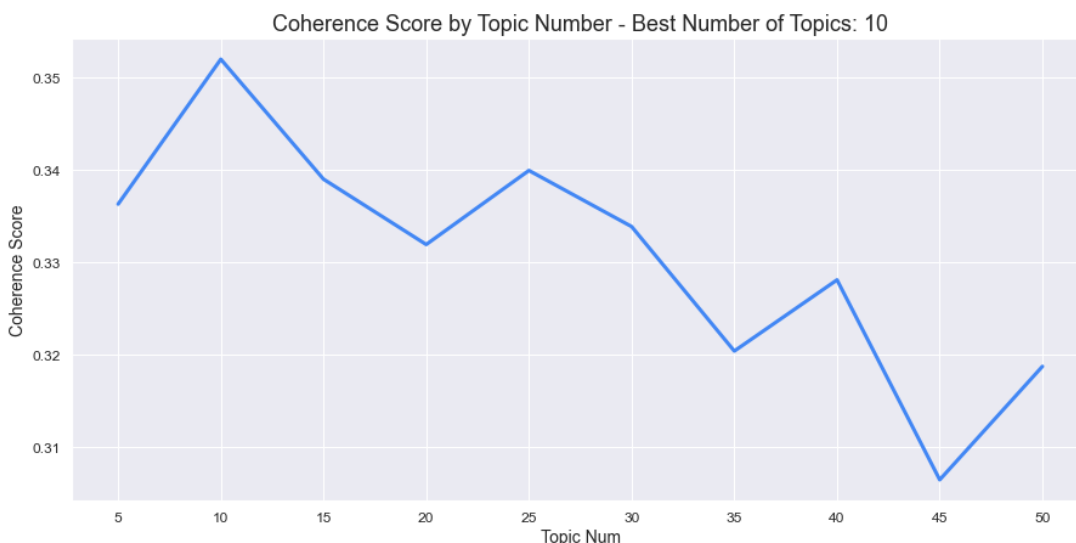
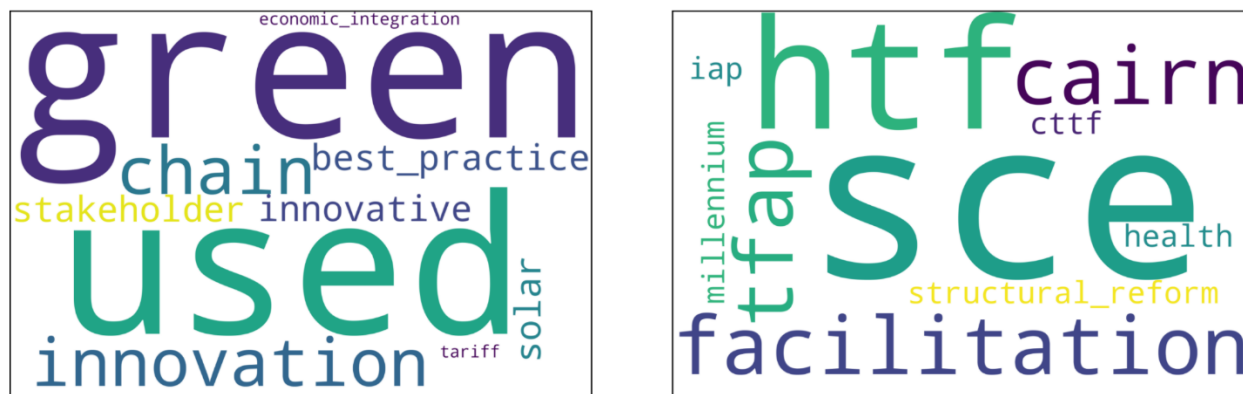


Figure 7. Coherence Score for SOM Dataset



After running the model with the required input, the final themes were generated. Sample themes generated for the two datasets before the labeling process can be seen in Figure 8.

Figure 8. Sample Generated Themes for AMM+AELM and SOM Datasets



The rest of the topic modeling process used the scikit-learn package for the other steps in further processing. The first five generated sample themes based on the NMF algorithm for the AMM + AELM and SOM datasets are listed in Tables 5 and 6 respectively. Appendices 1 and 2 provide the complete set of topics along with the labels given by the domain experts.

Table 5. AMM + AELM Sample Themes

Term	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
1	Capacity building	noi	emission	green	pfp
2	innovation	ha	climate	used	Liberalization facilitation
3	internet	Ha noi	Climate change	innovation	candidate
4	experience	pandemic	forest	chain	Business private sector

Term	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
5	enforcement	influenza	Capacity building	Best practice	Business private
6	innovative	Influenza pandemic	Clean development	innovative	draft
7	Structural reform	Model measure	greenhouse	solar	Bogor declaration
8	chain	avian	Greenhouse gas	stakeholder	Facilitation trade
9	Best practice	Avian influenza	gas	Economic integration	osaka
10	center	busan	Gas emission	tariff	bac
Theme Label	Capacity Building on Innovation and Internet Development	Prevention and Response to Influenza Pandemics	Addressing Climate Change	Green Innovation for Economic Integration	Economic and Technical Cooperation in APEC

Table 6. SOM Sample Themes

Term	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
1	capacity building	esc	data	msmes	cttf
2	wto	wto	survey	connectivity	esc
3	security	facilitation	economic trend	psu	htf
4	facilitation	iaps	bangkok	millennium	tel
5	mrt	trade facilitation	staff	structural reform	ifis
6	trade facilitation	bmc	uruguay	service competitiveness	reform fotc
7	bmc	deliverable	uruguay round	competitiveness roadmap	disaster
8	strategy	iap	trade promotion	urban	rtasftas
9	best	social	regional trade	roadmap	control
10	amm	executive secretariat	trend	raasr	tfep
Theme Label	Enhancing Free Trade and Trade Facilitation	APEC Individual Action Plan on WTO Progress	Regional Economic Trend and Uruguay Round Implementation	Structural Reform in APEC	Cooperation on Issues Related to Terrorism, Education, Health, Finance and Disaster Preparedness

Tables 5 and 6 reveal differences in the themes discussed in AMM + AELM and SOM. Furthermore, the most frequently labeled themes under the AMM + AELM dataset lean toward broad constructs and focus on capacity building for innovation and development, climate change and green revolution, and digital economy. As for the SOM dataset, labeled themes revolve around trade security (terrorism, disaster preparedness), enabling MSMEs, and the digital economy. It is also interesting to note that the SOM dataset generated the theme “Food Supply Chain and Food

Security”. The SOM dataset can be observed to have more specific generated themes as compared to the broader themes generated by the AMM + AELM dataset.

Moreover, while the themes do generate specific actions, it can be inferred that APEC economies are discussing and working on making the APEC trade better and able to cater to its constituents’ needs.

RQ2 – What themes have been predominantly observed in APEC meetings over the periods covered?

The generated themes from the topic models in RQ1 were the same labels used to label the document per year. In this sense, we can get the theme of a particular year. In addition, the topic models permitted the researchers to identify multiple themes in a year. This part of the analysis used the generated dominance score - from the same methodology used in RQ1 - to assign the dominant themes on each document per year. Listed in Tables 7 and 8 below are the first three generated yearly themes (whenever available) for the AMM + AELM and SOM datasets, respectively.

Table 7. AMM + AELM Dominant Themes

Year	Theme 1	Theme 2	Theme 3
1993	Free Trade and Regional Integration	Investment Liberalization	
1994	Investment Liberalization		
1995	Economic and Technical Cooperation in APEC	Investment Liberalization	
1996	Free and Open Trade and Investment		
1997	Climate Change	Trade and Investment Liberalization, Economic and Technical Cooperation	
1998	Maximizing the Use of Technology and E-commerce to Address Crisis		
1999	Stronger and Competitive Market in APEC	Market Liberalization	
2000	Business and Employment Growth, Free and Open Markets	E-commerce	
2001	Digital APEC and Electronic Transactions	Structural Reform in APEC	Capacity Building on Innovation and Internet Development
2002	Ensuring Free and Open Market by Addressing Counterterrorism	Investment Liberalization	
2003	Transparency in Trade and Investment Liberalization	Sustainable Development and Prosperity, Secure and Favorable	

Year	Theme 1	Theme 2	Theme 3
		Business Environment (Terrorism, Health, Structural Reform)	
2004	Trade and Investment Liberalization, Human Security, Knowledge-based Society	Sustainable Development and Prosperity, Secure and Favorable Business Environment (Terrorism, Health, Structural Reform)	Supporting the Multilateral Trading System and Health Security
2005	Advancing Freer Trade	Supporting the Multilateral Trading System and Health Security	
2006	Prevention and Response to Influenza Pandemics	Supporting the Multilateral Trading System and Health Security	
2007	Climate Change		
2008	Disaster Risk Reduction and Climate Change		
2009	Inclusive Growth and Sustainable Development		
2010	Economic and Regional Integration	Sustainable Development and Prosperity, Secure and Favorable Business Environment (Terrorism, Health, Structural Reform)	
2011	Green Innovation for Economic Integration	Green Manufacturing and Green Development	
2012	Services in Global Value Chains, Wastewater Treatment	Sustainable Clean and Green Development	
2013	Green Infrastructure Development		
2014	Supply Chain Connectivity and Digital Trade	Regional Integration and Free Trade Area in APEC	Capacity Building on Innovation and Internet Development
2015	Disaster Risk Reduction	Regional Integration and Free Trade Area in APEC	Climate Change, Capacity Building, Supply Chain Development, MSME
2016	Food Market Liberalization and Food Trade	Climate Change, Capacity Building, Supply Chain Development, MSME	Regional Integration and Free Trade Area in APEC
2017	E-commerce for MSMEs and minorities	Climate Change, Capacity Building, Supply Chain Development, MSME	
2018	Green and Blue Infrastructure Development	Structural Reform in APEC	

Table 8. SOM Dominant Themes

Year	Theme 1	Theme 2	Theme 3	Theme 4
2001	SME and IFIS	Emergency Preparedness		
2002	Health-related Trade	Emergency Preparedness	Enhancing Free Trade and Trade Facilitation	
2003	Cross border Connectivity to Address Economic Crisis and Promote Inclusive Growth	Enhancing Free Trade and Trade Facilitation		
2004	MSMEs and Digital Trade	Blueprint for promoting GVCs for the realization of FTAAP and addressing middle-income trap and urbanization-related issues	Enhancing Free Trade and Trade Facilitation	
2005	Human Capacity and Digital Economy and E-commerce	Blueprint for promoting GVCs for the realization of FTAAP and address middle-income trap and urbanization-related issues	Enhancing Free Trade and Trade Facilitation	Digitalization of MSMEs
2006	IAP, Economic Outlook, Sectoral Liberalization, TILF	Blueprint for promoting GVCs for the realization of FTAAP and address middle-income trap and urbanization-related issues	Digitalization of MSMEs	
2007	Supply Chain Security			
2008	Regulatory Cooperation and Practices to Promote Green Growth	Digitalization of MSMEs	Connectivity and Cooperation on Cross-border Education	Blueprint for promoting GVCs for the realization of FTAAP and address middle-income trap and urbanization-related issues
2009	HRD for Electronic Trade and Enterprises	Youth and Globalization	Connectivity and Cooperation on Cross-border Education	
2010	Cooperation Issues Related to Terrorism, Education, Health, Finance and Disaster Preparedness	Youth and Globalization		
2011	Regional Economic Trend and Implementation of Uruguay Round	Youth and Globalization		

Year	Theme 1	Theme 2	Theme 3	Theme 4
2012	Woman and Health	Strengthening Supply Chain Connectivity	Youth and Globalization	
2013	Strengthening Supply Chain Connectivity	Trade Arrangement	Youth and Globalization	Promotion of MSME Connectivity in APEC
2014	Regional Economic Integration, FTAAP, WTO Doha's Global Trade Liberalization Agenda	Strengthening Supply Chain Connectivity	Promotion of MSME Connectivity in APEC	
2015	Strengthening Supply Chain Connectivity	Food Supply Chain, Food Security		
2016	Growth and Human Security	Youth and Globalization		
2017	Trade Liberalization	Structural Reform in APEC	Enhancing Free Trade and Trade Facilitation	Youth and Globalization
2018	Structural Reform in APEC	Structural Reform in APEC	Enhancing Free Trade and Trade Facilitation	

The themes that the domain experts assigned to for at least 2 consecutive years are identified below for the AMM+AELM and SOM yearly documents datasets, respectively.

AMM+AELM:

- Investment Liberalization (1993-1995)
- Supporting the Multilateral Trading System and Health Security (2004-2006)
- Climate Change (2007-2008)
- Green Innovation and Green Development (2011-2013)
- Regional Integration and Free Trade Area in APEC (2014-2016)
- Climate Change, Capacity Building, Supply Chain Development, MSME (2015-2017)

SOM:

- Enhancing Free Trade and Trade Facilitation (2002-2005, 2017-2018)
- Blueprint for promoting GVCs for the realization of FTAAP and address middle-income trap and urbanization-related issues (2004-2006, 2007)
- Digitalization of MSMEs (2005-2006, 2008)
- Connectivity and Cooperation on Cross-border Education (2008-2009)
- Youth and Globalization (2009-2013)
- Promotion of MSME Connectivity in APEC (2013-2014)

- Strengthening Supply Chain Connectivity (2012-2015)
- Structural Reform in APEC (2017-2018)

An average of 3 years is the observed period for a theme to be discussed consecutively. The AMM + AELM theme is observed to produce general themes such as Investment Liberalization over the first few years and this evolved to Multilateral Trading System and Health Security in the 2000s. Then, Green Innovation/Development, as well as Climate Change, are observed to be dominant in the year 2010s. This observation supports actions taken by APEC when it started to promote green growth as a key focus in 2011⁷. One of the agreements that the Economy Leaders acknowledged was the reduction of energy intensity by 45% by the year 2035. Such agreement revolves around the region or a certain group of economies.

It is likewise interesting to note that the topic model was able to generate a theme that is specific to addressing influenza. Flu seasons have been observed annually, especially in the United States. Additionally, there was a regional outbreak of influenza during the year 2006-2007⁸. The generated theme supported the actual APEC response during the flu seasons, which was the testing of an influenza pandemic response activity in 2006⁹. This indicates that in the 2006 AMM + AELM documents, several discussions on influenza have been prevalent.

For the SOM dataset, Enhancing Free Trade and Trade Facilitation has been observed to be discussed in the 2000s as well as in the 2010s. The generated theme with the greatest number of consecutive years is found to be Youth and Globalization (5 years). The Youth has been consistently discussed in APEC throughout its existence. Youth camps, the youth in the digital age, and youth leaders' meetings are just some of the activities and features of the theme Youth¹⁰.

It is also acknowledged that while the SOM topic model did not predict MSME to be dominant in a number of consecutive years, "MSME" has been observed to be scattered throughout different years. The generated themes support the idea that aside from the promotion of MSME Connectivity, different APEC programs have been directed towards strengthening the MSME sector. The presence of MSMEs in the generated themes supports the existence of APEC MSME projects like business continuity plan counseling and improving MSME business ethics¹¹.

Finally, the SOM dataset also produced the term "Connectivity" found in different themes throughout the years. This would indicate that this might be a general strategy in connecting different components of Trade and Supply Chain in the region. Aside from that, "Connectivity" has been linked to other sectors such as Education and Addressing Economic Crisis.

The analysis done for RQ2 postulates that the topic models used were able to identify the span of years that a theme was discussed consecutively. Further, generated themes were also found to be consistent among the different actions and features that the APEC has implemented or pursued in the past years.

⁷ https://www.apec.org/press/features/2012/0103_greengrowth [accessed December 5, 2021]

⁸ <https://www.cdc.gov/flu/pastseasons/0607season.htm> [accessed December 5, 2021]

⁹ https://www.apec.org/press/features/2006/0701_apecs_response_to_the_threat_of_pandemic_influenza [accessed December 5, 2021]

¹⁰ <https://www.apec.org/press/listings/features?keyword=youth&year=&page=1&category=&group=&location=> [accessed December 5, 2021]

¹¹ https://www.apec.org/press/features/2014/0626_ethics [accessed December 5, 2021]

RQ3 – How have the economies supported these topics?

RQ3 utilized the projects dataset to answer the question. In this subsection, APEC Projects and how they relate to APEC policies are discussed first. Then, a formula that quantifies the support of economies on projects is presented. Lastly, discussions on the top supported topic and the least supported topics are also conducted.

APEC Policies are concretized by APEC Projects

Economies support policy directions (‘or topics’) of APEC Economic Leaders and Ministers by implementing projects that “help create tangible benefits for people living in the Asia-Pacific region¹².” Projects go to the 5-stage APEC project cycle¹³ as seen in Figure 9.

Figure 9. 5-Stage APEC Project Cycle



The first three stages comprise the approval phase where projects go through checkpoints to ensure that only proposals aligned to APEC policy directions are approved.

In Stage 1, the Concept Note is reviewed and endorsed by the proposing forum. This endorsement is based on a relevance that is typically assessed in terms of the following:

- APEC’s capacity building goals and principles,
- Leaders, ministerial, and SOM priorities,
- Strong alignment with the forum’s strategic plan, work plan, collective action plan, or equivalent,
- Potential for positive contribution to APEC’s and the relevant Committee’s priorities, and
- APEC value-for-money principles, and how the activity complements previous work undertaken by APEC.

In the first half of Stage 2, when applicable, the Concept Note is checked for its eligibility to be funded by the APEC funding account it is seeking funding from. APEC’s three funding accounts and their eligibility criteria are as follows¹⁴:

1. **General Project Account (GPA).** GPA projects must be aligned to the GPA funding priorities which change each year as determined by combining the host year’s priority themes of the incoming and outgoing APEC Host.¹⁵
2. **Trade and Investment Liberalization and Facilitation Account (TILG).** TILG projects must clearly contribute to achieving trade and investment liberalization and facilitation

¹² APEC Overview, retrieved from <https://www.apec.org/projects/projects-overview> [accessed on June 28, 2021]

¹³ Guidebook on APEC Projects Edition 15, retrieved from <https://www.apec.org/Projects/Forms-and-Resources> [accessed on June 16, 2021]

¹⁴ <https://www.apec.org/Projects/Funding-Sources> [accessed December 5, 2021]

¹⁵ The final list of priorities is endorsed by Senior Officials at the Informal Senior Officials Meeting (ISOM) [accessed December 5, 2021]

objectives that are articulated by Leaders' or Ministers' directives or relate to at least one of the 15 areas of the Osaka Action Agenda¹⁶.

3. **APEC Support Fund (ASF).** ASF projects must address the capacity-building^{17,18} needs of APEC developing economies in agreed high-priority areas for economic and technical cooperation. ASF fund can come from either the ASF-General fund or from one of the sub-funds. ASF – General Fund projects must support one or more of ECOTECH Priority Themes articulated in the Manila Framework. ASF Sub-Fund projects, on the other hand, must meet the specific criteria of the sub-fund. The 13 ASF Sub- Funds are:
- a. Sub-Fund on Human Security
 - b. Sub-Fund on Energy Efficiency, Low Carbon, and Energy Resiliency Measures.
 - c. Sub-Fund on Supply Chain Connectivity.
 - d. Sub-Fund on Free Trade Area of the Asia-Pacific and Global Value Chains.
 - e. Sub-Fund on Innovative Development, Economic Reform, and Growth.
 - f. Sub-Fund on Connectivity.
 - g. Sub-Fund on Micro, Small and Medium Enterprises.
 - h. Sub-Fund on Women and the Economy.
 - i. Sub-Fund on Economic Development in Remote Areas.
 - j. Sub-Fund on Digital Innovation.
 - k. Sub-Fund on Marine Debris Management and Innovation.
 - l. Sub-Fund on Strengthening Economic Legal Infrastructure.
 - m. Sub-Fund on APEC Cooperation on Combating COVID-19 and Economic Recovery.

In the second half of Stage 2, the Concept Note is rated in these 5 scoring criteria¹⁹:

- a. Supports the Priorities of the APEC Fund to which it is applying (20/60 points)
- b. Quality Appears Strong (15/60 points)
- c. Supports My Economy's Priorities (10/60 points)
- d. Supports Capacity Building (10/60 points)
- e. Supports Cross Fora Collaboration and Benefits to Multiple Economies (5/60 points)

The fifty per cent of the total score allotted for criteria (a) and (b) show that the project must support the priorities of the APEC fund to which it is applying.

¹⁶ <https://www.apec.org/Publications/1995/12/Osaka-Action-Agenda-1995> [accessed on June 28, 2021]

¹⁷ Capacity building in APEC is the process of enabling member economies - particularly developing economies - to obtain, share, strengthen, maintain and develop knowledge, abilities, skills and technical know-how to improve their policies and regulations or their institutional structures or processes. In APEC, capacity building activities include (but not limited to) workshops, symposia, seminars and training events. <https://www.apec.org/Projects/Funding-Sources> [accessed on June 28, 2021]

¹⁸ Guidebook on APEC Projects, Appendix K on Capacity Building Goals, Objectives and Principles. <https://www.apec.org/Projects/Funding-Sources> [accessed on June 28, 2021]

¹⁹ APEC Scoring template. <https://www.apec.org/Projects/Funding-Sources> [accessed on June 28, 2021]

In Stage 3, the Concept Note undergoes two quality assessments: first, the Quality Assessment Framework (QAF) and second, the APEC Quality Assessment Criteria. APEC assesses project quality using the following five criteria:²⁰

- **Relevance** considers the ability of the proposed project to achieve the APEC's goals, as well as those of the fora and the relevant funding account. This includes the ability of the proposed project to concretize the priorities and objectives of the target group, the recipient member economies, and APEC as a whole.
- **Impact** determines how the project will improve specific conditions of identified beneficiaries.
- **Sustainability** assesses the likelihood that the project's benefits continue to be delivered to the beneficiaries after its completion.
- **Efficiency** weighs the benefits over the cost of the project. The value of the project's outputs must be delivered at the least the cost of resources.
- **Effectiveness** assesses the likelihood of the project meeting its stated objective(s).

Only approved proposals can proceed for implementation (Stage 4) and completion (Stage 5).

Top Economies Who Proposed Projects During Host Year

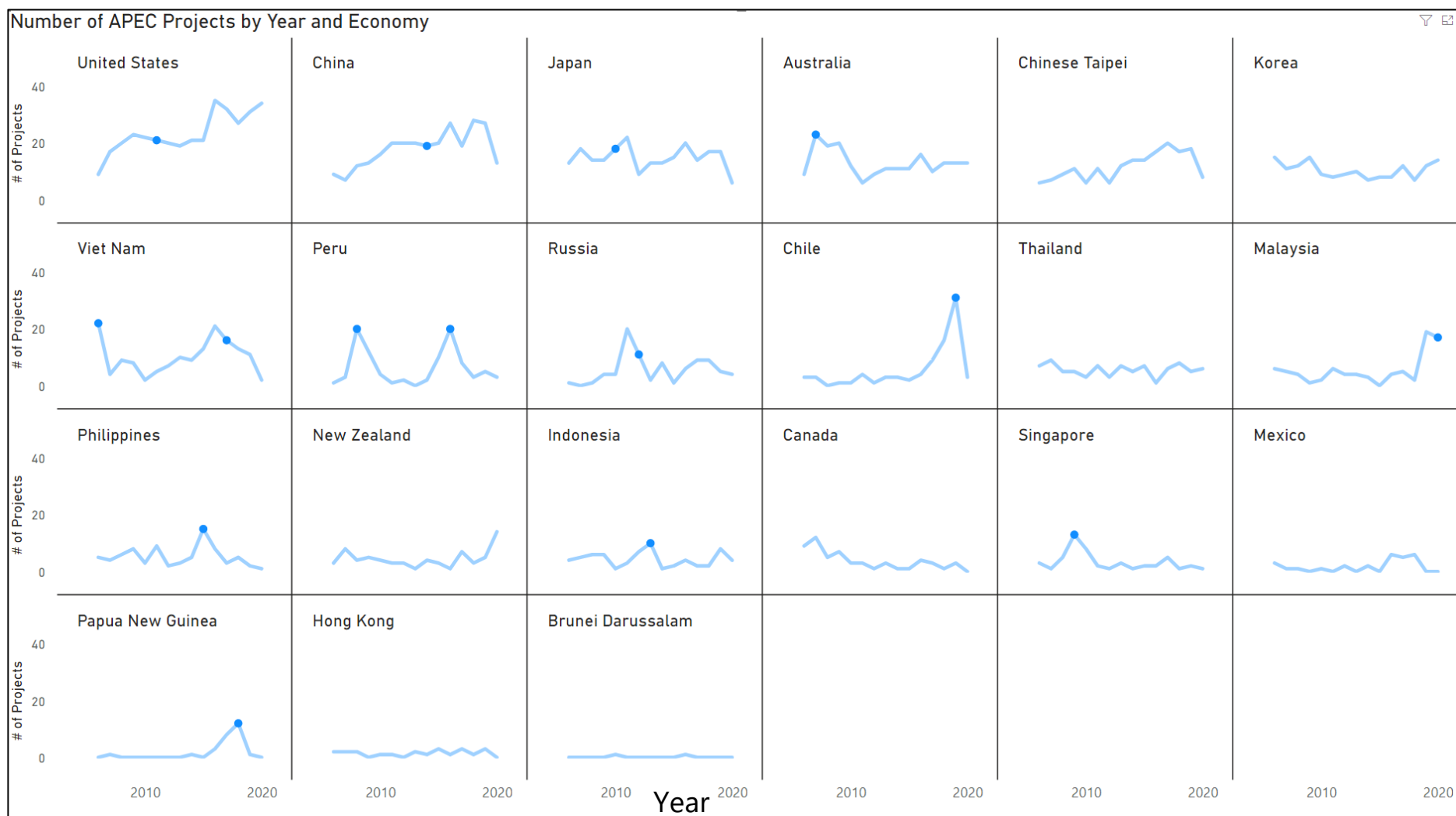
One of the interesting facts that the projects dataset show is how host economies behave in proposing and conducting projects during their hosting year. Figure 10 shows the number of proposed projects across the years in a small multiples chart.

Based on the figure, the following insights can be implied:

1. The top three (3) economies that proposed the greatest number of projects during the research period were the United States, China, and Japan.
2. These three (3) top projects proposing economies did not propose their greatest number of projects during their hosting year.
3. Eight (8) out of 13 economies from 2006-2020 were found to have the greatest number of proposed projects during their hosting year.
4. In general, the three (3) of the top five (5) economies with the greatest total number of projects were observed to have an increasing number of proposed projects from 2006 to 2020 except for Australia (e.g., United States, China, Japan, Australia, and Chinese Taipei).
5. Finally, in most years, the United States has consistently proposed the highest number of projects.

²⁰ Guidebook on APEC Projects Edition 15, Appendix D. <https://www.apec.org/Projects/Funding-Sources> [accessed June 28, 2021]

Figure 10. Topics Proposed by Host Economies (Sorted by Total Number of Projects)



Notes: The highlighted dots show the year that the economy was designated as a host. Furthermore, the number of projects has been counted on an individual economy. Since there are projects that may have multiple proposing economies, then the project will be counted for both economies, hence, the number of projects presented here is greater than 2,144.

Economies implement projects on important topics

Member economies implement projects on topics that are deemed most beneficial. Economies allocate more resources – effort and funds – to projects that tackle more important topics. Using the APEC project’s attributes, this paper deciphers the implied importance of these topics to member economies. These attributes are the number of projects carried out, proposed, co-sponsored, or self-funded. In this paper, the proponents devised a formula that aims to quantify the support of economies to the topics.

Member economies may propose or co-sponsor projects. The proposing and co-sponsoring economies are expected to be engaged in the development of proposals and the implementation of projects. Their involvement could be in providing voluntary contributions in form of financial, personnel, hosting support, or in-kind contributions. The proposing economy and/or co-sponsoring economy are responsible for any increases in costs at the full proposal stage.

Projects may be funded through a combination of APEC funds and self-funding as required by the APEC funding account²¹ or fully self-funded by the proposing economy. “Self-funding” refers to any project funding amount that is provided by the economy that is proposing the project. Projects can be partially self-funded or fully self-funded²².

Most and least supported topics to member economies according to the Level of Support score equation.

Using the project attributes of “No. of Projects”, “% of Self-funded projects”, “No of Proposing Economies”, “No of Co-sponsoring Economies”, this paper ranks the top 5 topics according to their degree of support to member economies. The researchers weighted these attributes with 40% (No. of Projects), 30% (No of Self-funded Projects), 20% (No of Proposing Economics), and 10% (No of Co-sponsoring Economies) to quantify the varying impact these attributes have on importance. The values were scaled to range between 0 and 1. Equation (1) displays the working equation for the calculation of the most and least important topics.

$$\begin{aligned} \text{Level of Support Score} & \qquad \qquad \qquad \text{Eq. (1)} \\ &= (0.4) * \text{No.ofProjects} + (0.3) * \text{No.ofSelffundedProjects} + (0.2) \\ &\quad * \text{No.ofProposingEconomies} + (0.1) * \text{No.CoSponsoringEconomies} \end{aligned}$$

²¹ There is no self-funding requirement for GPA and ASF. TILF, on the other hand, requires member economies to self-fund a percentage of the overall project cost. Guidebook on APEC Projects Edition 15, paragraph 3-13. <https://www.apec.org/Projects/Funding-Sources> [accessed June 28, 2021]

²² Guidebook on APEC Projects Edition 15, paragraph 3-21. <https://www.apec.org/Projects/Funding-Sources> [accessed June 28, 2021]

Table 9 details the scores of each individual attribute as well as the level of support score. The top 5 topics are Energy, Human Resources Development, Trade Facilitation, Small and Medium Enterprises, and Standards.

Table 9. Top 5 Topics by Level of Support Score

	Topics	weights	0.4	0.3	0.2	0.1	Score	Rank scores
		# of projects (normalized)	% of self-funded projects	# of proposing economies (normalized)	# of co-sponsoring economies (normalized)			
1	Energy	1.00	0.21	0.90	1.00	0.74	1	
2	Human Resources Development	0.61	0.52	0.81	1.00	0.66	2	
3	Trade Facilitation	0.62	0.23	1.00	1.00	0.62	3	
4	Small and Medium Enterprises	0.63	0.23	0.95	1.00	0.61	4	
5	Standards	0.48	0.29	0.86	1.00	0.55	5	

Variable Selection in the Level of Support Scoring Equation

This paper earlier established that the research questions particularly, RQ3 and RQ4, are to be answered using the projects dataset. The researchers opted to utilize only attributes available in the projects data that are deemed applicable to the scoring equation. Based on the discussion with the domain experts, the *Number of Projects* relating to a topic, the *Number of Self-funded Projects* which provides willingness of an economy to support that project relating to a topic, the *Number of Proposing Economies* being the economies who proposed and made all preparations for the proposal, and the *Number of Co-sponsoring Economies* were determined to contribute to the importance of a topic to the member economies. The weighting system used in the scoring equation is considered an ad-hoc method and highly depends on the availability of projects data attributes and how the researchers make the most use out of it.

Hence, according to this research, this is the only viable option available to the researchers where the determination of the most and least important topics can be generated. Other researchers can explore other methods to determine importance of topics.

Table 10 displays the total number of projects and the percentage of topics related to the top 5 most supported topics. It is observed that an average of 12% each year, the projects are related to energy while the Human Resources Development, Trade Facilitation, and SME projects are conducted for an average of 7% of the total projects per year.

Table 10. Top 5 Topics Against the Total Number of Projects per Year

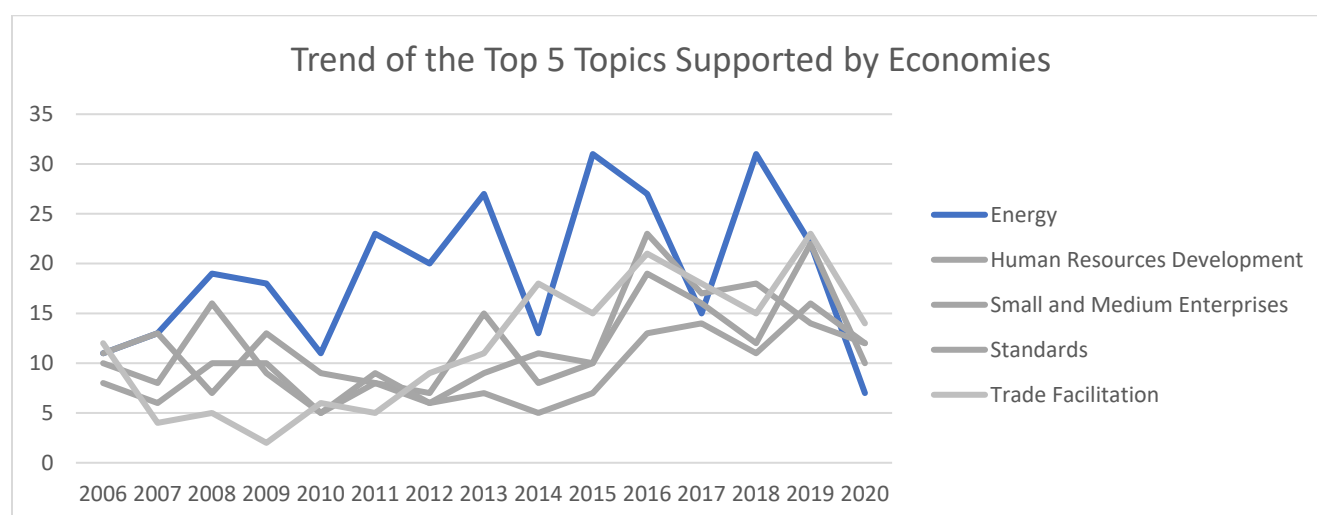
Row Labels	Total Number of Projects	Energy		Human Resources Development		Small and Medium Enterprises		Standards		Trade Facilitation	
		Count	%	Count	%	Count	%	Count	%	Count	%
2006	144	11	8%	10	7%	11	8%	8	6%	12	8%
2007	140	13	9%	8	6%	13	9%	6	4%	4	3%

Row Labels	Total Number of Projects	Energy		Human Resources Development		Small and Medium Enterprises		Standards		Trade Facilitation	
2008	177	19	11%	16	9%	7	4%	10	6%	5	3%
2009	168	18	11%	9	5%	13	8%	10	6%	2	1%
2010	111	11	10%	5	5%	9	8%	5	5%	6	5%
2011	149	23	15%	8	5%	8	5%	9	6%	5	3%
2012	127	20	16%	6	5%	7	6%	6	5%	9	7%
2013	143	27	19%	9	6%	15	10%	7	5%	11	8%
2014	134	13	10%	11	8%	8	6%	5	4%	18	13%
2015	148	31	21%	10	7%	10	7%	7	5%	15	10%
2016	218	27	12%	23	11%	19	9%	13	6%	21	10%
2017	219	15	7%	17	8%	16	7%	14	6%	18	8%
2018	204	31	15%	18	9%	12	6%	11	5%	15	7%
2019	243	22	9%	14	6%	22	9%	16	7%	23	9%
2020	168	7	4%	12	7%	10	6%	12	7%	14	8%
Grand Total	2493	288	12%	176	7%	180	7%	139	6%	178	7%

The Top Supported Topic: Energy Projects

In addition to the topics deemed top by the Level of Support scoring equation, Energy garnered the highest number of projects (288) and captured the biggest proportion of the total proposed projects (12%). Except in 2006 and 2014, Energy projects garnered the highest number of projects across the years as seen in Figure 11.

Figure 11. Top 5 Topics Supported by Economies Across the Years



The researchers also delved deeper into the top topic, Energy, by generating the projects distribution related to it. Figure 12 shows the distribution of Energy projects against the total number of projects per year. Figure 13, on the other hand, looks into how Energy projects are

distributed across the top 3 proposing economies for Energy projects per year. Based on Figure 13, the United States generates the greatest number of Energy projects on a yearly basis.

Figure 12. Distribution of Energy Projects Against Total Projects Across the Years

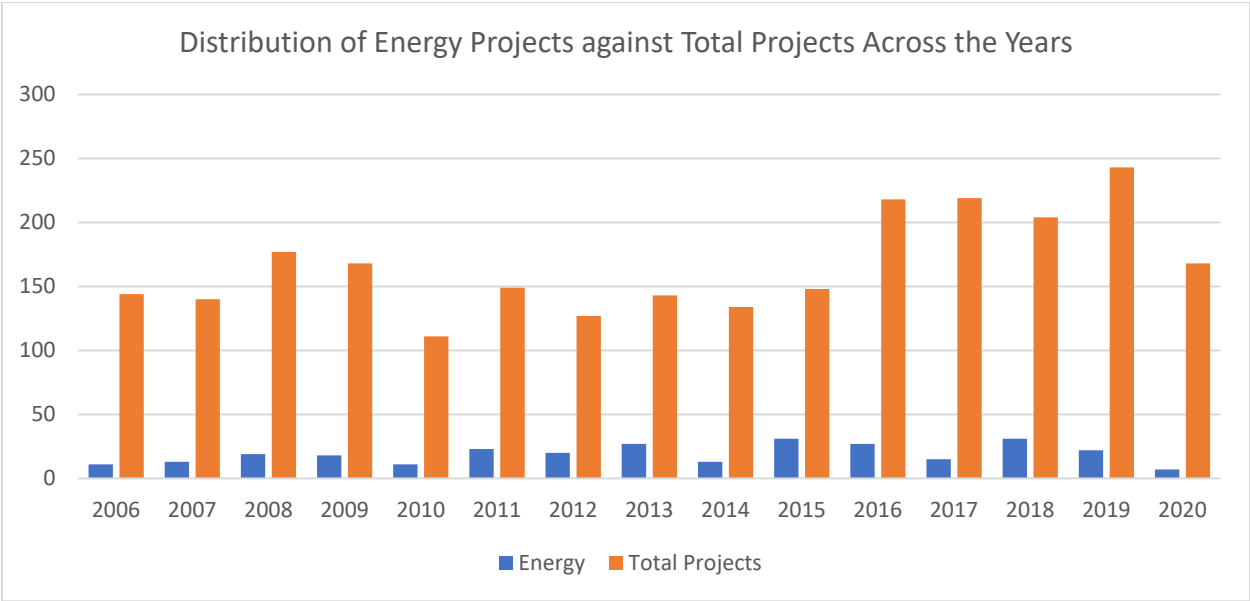
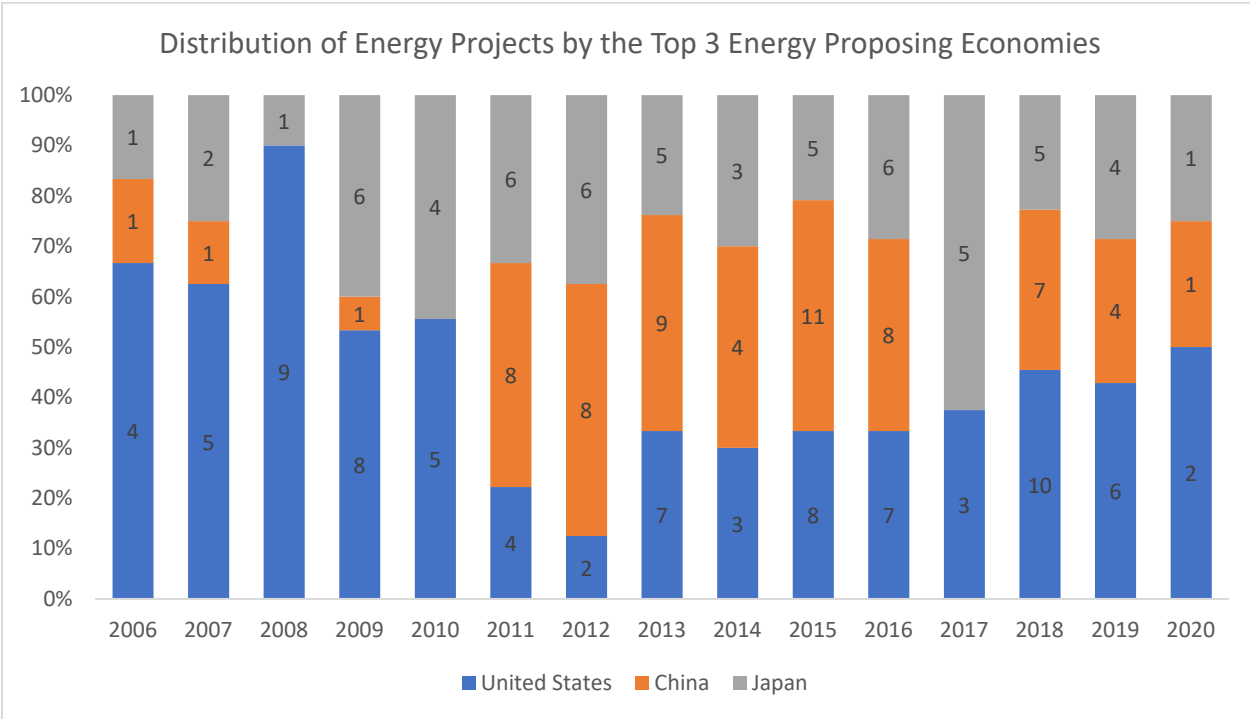


Figure 13. Distribution of Energy Projects by Top 3 Energy Proposing Economies



There could be several reasons why Energy was highly supported by member economies. Some of these reasons are detailed below.

1. With the depletion of the limited conventional energy being limited and its growing environmental concerns, there is worldwide interest in increasing the share of renewable energy in energy consumption for enhancing sustainability, as evidenced both by the United Nations' Sustainable Energy for All (SE4ALL) initiative and the APEC Leaders' 2014 commitment to double renewable energy in APEC's energy mix by 2030 (over 2010 levels). Renewable energy is widely recognized as an efficient replacement to "address many other pressing needs, including improving energy security; reducing the health and environmental impacts associated with fossil and nuclear energy; mitigating greenhouse gas emissions; improving educational opportunities; creating jobs; reducing poverty; and increasing gender equality" (REN21 2014, p.3).
2. With over 40% of the world's population and more than 60% of global energy consumption, it is especially important for APEC economies to accelerate the deployment of renewable energy. The Energy Working Group (EWG) is developing projects and activities to promote innovation, reduce costs, improve sustainability of renewable energy, and share lessons learned to support this goal for the APEC region as a whole. 98% of the energy projects have EWG as the sponsoring forum. These projects promote the exchanges of experience gained and best practices in implementing policies and plans focused on renewable energy to increase the overall share of renewable energy in energy consumption
3. APEC economies face 70 percent of all global natural disasters, making them highly prone to climate change effects. APEC 2015 aimed to foster cooperation as well as solidify the APEC region in energy resilience that are affected by disasters. Hence, the appropriate theme for such project is "Building Sustainable and Resilient Communities" (Li 2016).
4. Energy systems are further stressed by exploding growth and urbanization across the APEC region. As member economies are experiencing fast development, while energy and environmental problems are becoming notable. The fast development of urbanization in the Asia-Pacific region could trigger the increased Green House Gas (GHG) emissions, the problems of waste management, pollution, and the shortages of energy, resources, water and food supplies, etc. Leaders in the 2014 APEC Energy Ministerial Meeting in Beijing, China, likewise agreed the urbanization was thriving in the Asia-Pacific region. The declaration demonstrates the great demand of APEC economies to grow low-carbon towns, thus, the promotion of low-carbon model towns is in urgency.
 - a. Launched in 2010, the "Energy Smart Communities Initiative (ESCI)" has contributed greatly to the advancement of green growth, sustainable development, long-term job creation.
 - b. Promotion of low-carbon town developments to manage rapidly growing energy consumption especially in residential or industrial areas in the APEC region.
 - c. Electric Vehicles (EVs) are an important component of the Asia-Pacific's transition to low-carbon economies and reduced dependence on fossil fuels
 - d. Application of modern green energy, especially wind power and solar technologies boosts the implementation of cleaner energy sources and technologies thereby, reducing significant electricity costs.

Profile of member economies who are leading in energy projects. Majority of the world's energy can be accounted for four of the APEC member economies namely, China, Japan, Russia, and USA. Three of these 4 large energy users proposed or co-proposed the highest number of energy projects in APEC: US (82), China (61), and Japan (60). All three economies take key responsibilities in the four expert groups that assist the Energy Working Group (EWG) which sponsored 96% of the energy projects.

- The United States, through the U.S. Department of Energy's Office of Fossil Energy, has been chairing the EWG's Expert Group on Clean Fossil Energy (EGCFE) since its establishment. EGCFE leads the EWG's work on clean fossil energy, supporting EWG's overall efforts to promote economic growth, energy security and resilience, and environmental sustainability in the APEC region.
- China has been actively involved in the EWG's Expert Group on Energy Efficiency and Conservation (EGEEC) which was established in 1993 to assist in achieving energy security, conservation and energy technologies.
- Japan houses the central data collection point of the EWG's Expert Group on Energy Data and Analysis (EGEDA) at the Energy Data and Modelling Center of its Institute of Energy Economics in Tokyo. All of EGEDA's Presidents and General Managers have been Japanese.

The Least 5 Supported Topics

The least supported topics produced by the scoring equation are Biotechnology, Culture, Education, Government Procurement, and Youth. Looking at the components why these least supported topics garnered the lowest scores, only a very small number of projects were proposed as shown in Table 11.

Table 11. Least Supported Topics Components

Topic	# of Projects	# of Self-funded Projects	# of Proposing Economies	# of Co-sponsoring Economies
Biotechnology	3	0	2	9
Culture	1	0	1	2
Education	3	0	2	13
Government Procurement	3	0	3	8
Youth	3	0	2	13

Upon checking the economies that proposed projects related to these topics, the top proposing economies the United States, China, and Japan were found to lead these topics. Going deeper into these projects and searching for topics on the APEC website, the following observations are also gathered.

- a. Biotechnology projects are composed of Agricultural Biotechnology policies and perceptions.

- b. Education and Youth projects are actually sponsored by the Human Resource Development Working Group. Furthermore, Education and Youth projects are also tagged together with Human Resources Development topic.
- c. Government Procurement projects are usually focused on enhancing the understanding of government procurement issues, e-procurement capabilities, and updates of government procurement systems and policies.
- d. The sole Culture project is a standalone project sponsored by the Cultural Focal Point Network. In this project, the focus was to strengthen the spirit of the community and maintain a dynamic community.

With these observations, the researchers note that although the projects related to these topics were pre-tagged in the projects database, 3 of them are actually part of a broader topic group. For instance, Biotechnology can be part of Agriculture while Education can be part of Human Resources Development. This inference is evidenced by the multiple topics tagged to these projects (i.e., projects under Biotechnology has Agriculture as another topic tagged to them). The only standalone project topic was Culture. Culture addresses a very important aspect of APEC which is enhancing the economies' spirit of community. Given this, one cannot explicitly conclude that these topics were least supported by the member economies. Thus, the researchers recommend the conduct of future studies to investigate the labeling of these projects as well as implementing a standardization scheme on topics.

RQ4 – What are the Philippine initiatives on these topics? What is the status of each initiative?

Between 2006 and 2020, the Philippine economy initiated 74 projects in APEC. Nearly all the Philippine-initiated projects have been completed as shown in Table 12. The three ongoing projects commenced only either in 2019 or 2020 which signals that they are within schedule.

Table 12. Project Status of Philippine Initiated Projects

Status of Project	# of PH Proposed Projects	Percentage
Completed	71	95.95%
Project in Implementation	3	4.05%
Total	74	100.00%

The majority (14 or 19%) of these projects were initiated in 2015 (Table 13) when the Philippines played as host to APEC with the theme, "Building Inclusive Economies, Building a Better World". Also, this year, most of these projects (8 or 50%) were self-funded.

Table 13. Philippine Initiated Projects Across the Years

Year Proposed	# Project Proposed	% Project Proposed
2006	4	5.41%
2007	3	4.05%
2008	6	8.11%
2009	8	10.81%
2010	2	2.70%

Year Proposed	# Project Proposed	% Project Proposed
2011	8	10.81%
2012	2	2.70%
2013	3	4.05%
2014	5	6.76%
2015	14	18.92%
2016	8	10.81%
2017	3	4.05%
2018	5	6.76%
2019	2	2.70%
2020	1	1.35%
Grand Total	74	100.00%

The 74 projects tackled 26 topics as seen in the table below, with Small and Medium Enterprises (12 projects) having the most number of projects proposed.

Table 14. Topics of Philippine Initiated Projects

Topics	# of PH Proposed Projects	Count of Project Number
Agriculture	5	6.76%
Anti-Corruption; Transparency	1	1.35%
Automotive	2	2.70%
Chemicals	1	1.35%
Conformance; Standards	4	5.41%
Counter-Terrorism	1	1.35%
Emergency Preparedness	2	2.70%
Energy	1	1.35%
Finance	1	1.35%
Gender	1	1.35%
Health	1	1.35%
Human Resources Development	7	9.46%
Intellectual Property	2	2.70%
Investment	5	6.76%
Life Sciences	1	1.35%
Mining	1	1.35%
Science and Technology	5	6.76%
Services Trade	5	6.76%
Small and Medium Enterprises	12	16.22%
Standards	3	4.05%
Structural Reform	3	4.05%
Telecommunications and Information	2	2.70%

Topics	# of PH Proposed Projects	Count of Project Number
Tourism	2	2.70%
Trade Facilitation	2	2.70%
Transportation	4	5.41%
Grand Total	74	100.00%

Fifty-eight (or 78%) of these projects were funded by APEC amounting to US\$ 8.9M²³ that was channeled through its 3 funding accounts: APEC Support Fund (61.62%), General Project Account (14.51%), and TILF Account (23.88%). Almost half of the projects (30 or 41%) were APEC Support Fund projects (40.54%) which mostly were on Small and Medium Enterprises (8 projects). Four of the seventeen (or 23%) TILF were on Services Trade. Four of the sixteen (or 22%) self-funded projects were on Science and Technology as seen in Table 15.

Table 15. Funding Sources of Philippine Initiated Projects

Topics by APEC Funding Account	# of PH Projects	% (PH Project)	Project Value	% (Project Value)
APEC Support Fund	30	40.54%	5,479,882	61.62%
Agriculture	2	2.70%	350,010	3.94%
Anti-Corruption; Transparency	1	1.35%	120,000	1.35%
Conformance; Standards	1	1.35%	149,358	1.68%
Emergency Preparedness	2	2.70%	393,509	4.42%
Energy	1	1.35%	284,594	3.20%
Gender	1	1.35%	57,000	0.64%
Human Resources Development	4	5.41%	407,464	4.58%
Intellectual Property	2	2.70%	229,811	2.58%
Mining	1	1.35%	209,234	2.35%
Science and Technology	1	1.35%	92,000	1.03%
Small and Medium Enterprises	8	10.81%	2,241,702	25.21%
Structural Reform	3	4.05%	509,950	5.73%
Tourism	1	1.35%	92,000	1.03%
Trade Facilitation	1	1.35%	134,000	1.51%
Transportation	1	1.35%	209,250	2.35%
General Project Account	11	14.86%	1,290,236	14.51%
Conformance; Standards	1	1.35%	111,626	1.26%
Finance	1	1.35%	98,500	1.11%
Human Resources Development	2	2.70%	237,950	2.68%
Services Trade	1	1.35%	91,088	1.02%
Small and Medium Enterprises	2	2.70%	360,879	4.06%
Telecommunications and Information	1	1.35%	63,164	0.71%
Tourism	1	1.35%	156,526	1.76%
Trade Facilitation	1	1.35%	67,280	0.76%
Transportation	1	1.35%	103,223	1.16%

²³ This included the co-funding amounts as required by the three APEC Funding Accounts.

Topics by APEC Funding Account	# of PH Projects	% (PH Project)	Project Value	% (Project Value)
Self-Funded	16	21.62%		0.00%
Agriculture	1	1.35%	-	0.00%
Chemicals	1	1.35%	-	0.00%
Conformance; Standards	1	1.35%	-	0.00%
Counter-Terrorism	1	1.35%	-	0.00%
Health	1	1.35%	-	0.00%
Human Resources Development	1	1.35%	-	0.00%
Investment	2	2.70%	-	0.00%
Life Sciences	1	1.35%	-	0.00%
Science and Technology	4	5.41%	-	0.00%
Small and Medium Enterprises	2	2.70%	-	0.00%
Telecommunications and Information	1	1.35%	-	0.00%
TILF Special Account	17	22.97%	2,123,585	23.88%
Agriculture	2	2.70%	250,121	2.81%
Automotive	2	2.70%	369,910	4.16%
Conformance; Standards	1	1.35%	125,825	1.41%
Investment	3	4.05%	347,002	3.90%
Services Trade	4	5.41%	534,057	6.00%
Standards	3	4.05%	284,330	3.20%
Transportation	2	2.70%	212,340	2.39%
Grand Total	74	100.00%	8,893,703	100.00%

The Philippine economy sponsored projects either on its own (singly) or with other economies (co-sponsor). Sixty-one (or 82%) projects were sponsored alone while 13 (or 18%) projects were co-sponsored. Appendix 4 provides the details of the co-sponsored projects per year. Overall, twelve economies co-sponsored with the Philippines. Of those twelve, Chinese Taipei has co-sponsored with the Philippines the greatest number of projects. All of these co-sponsored projects with Chinese Taipei focused on Small and Medium Enterprises (SME).

This study concludes that the Philippine economy has been actively supporting APEC policies and directives by implementing 26 topics of the 50 topics put forward in APEC projects. Of these topics, Small and Medium Enterprises and Science and Technology were the most relevant to its needs.

RQ5 – How active was the Philippine economy in attending the APEC meetings?

Philippine Attendance in APEC Meetings Through the Years

The Philippines has been an APEC member economy since November 7, 1989, when the APEC was first established. The APEC cooperative process is mainly concerned with trade and economic issues in the region. Hence, the groundwork for APEC activities is mostly the responsibility of trade and economic leaders of these economies. Aligned with the agenda to be discussed in APEC-level meetings, cooperation, and the consensus²⁴ are usually the operative

²⁴ <https://www.apec.org/about-us/about-apec> [accessed December 1, 2021]

processes that govern APEC. In this regard, the Philippines typically sends out its Secretaries from its Department of Trade and Industry (DTI) and the Department of Foreign Affairs (DFA) as its representatives.

Aside from having to host 2 APEC years, the Philippines' active participation can also be evidenced by its attendance in APEC-level meetings. The SOMs and the AMMs are the usual APEC-level meetings that these secretary-level representatives attend. However, when it comes to the AELM, it is the head of the economy (e.g., President) that leads the delegation. To be able to track the Philippines' participation in APEC level meetings, a text-mining search strategy was done against all the SOM, AMM, and AELM datasets.

There were meeting documents that did not contain attendance and as such, tracking the attendance of the Philippines did not provide sufficient evidence for the completeness of data. In this regard, the researchers correspondingly used a manual method in finding the participation evidence of the Philippines attending these meetings. The manual method includes the following steps but is not limited to photo searching, searching in search engines, and context search in other participation documents. This completed the attendance data of the Philippine economy.

Of three meetings that are in scope in this study, the following summary table was established to show the percentage of attendance of the Philippine economy across these three APEC-level meetings. Table 16 supports the idea that the Philippine economy has been very active in participating in APEC-level meetings. Refer to Appendix 5 for the actual tallies of the attendance of each meeting.

Table 16. Summary of Philippine Attendance in APEC Meetings

APEC Meeting	Period	Count of Meetings	PH Attendance	Percentage
SOM	1990-2018	85	85	100%
AMM	1989-2018	30	30	100%
AELM	1993-2018	26	26	100%

Host Economies Through the Years

The APEC host economy for a particular year is mainly responsible for serving as the chair of the AELM, SOM, several ministerial meetings, the APEC Business Advisory Council, and the APEC Study Centers Consortium. With that, the host economy usually spends a significant amount to be able to take on the responsibilities of a host.

Apart from the attendance in meetings, the researchers also believe that being a host economy significantly supports the level of participation in APEC. Hence, the hosting instance of each economy was then summarized per year as seen in Table 17. This only covers the year 1993 to 2020.

Table 17. Tally of Hosting Instance per Economy

Economy	Years	No. of Hosting Years
Australia	2007	1
Brunei Darussalam	2000	1
Canada	1997	1

Economy	Years	No. of Hosting Years
Chile	2004, 2019	2
China	2001, 2014	2
Indonesia	1994, 2013	2
Japan	1995, 2010	2
Korea	2005	1
Malaysia	1998, 2020	2
Mexico	2002	1
New Zealand	1999	1
Papua New Guinea	2018	1
Peru	2008, 2016	2
Philippines*	1996, 2015 (212 million USD budget allocation)	2
Russia	2012	1
Singapore	2009	1
Thailand	2003	1
United States	1993, 2011	2
Viet Nam	2006, 2017	2

Table 17 suggests that although the data is only limited to the hosting instances and no costs are identified for the other hosting years of other hosts, the Philippines is determined to be one of the nine economies (out of 21) that have hosted APEC for at least 2 years. The rest of the economies have only hosted for 1 year. In addition, the Philippines boasted a 10 billion pesos budget²⁵ for hosting APEC 2015 alone. Therefore, it can also be inferred that the Philippines have participated substantially in APEC.

X. Conclusion

This research attempted to utilize analytics tools in understanding APEC documents and projects data. Several research questions were identified to aid new researchers and the general public in understanding themes and topics in APEC as well as how the APEC economies view these topics.

Two major categories of data were used namely, the documents dataset and the projects dataset. The documents dataset was processed and subjected to a topic modeling algorithm to generate themes that answer RQ1 and RQ2. On the other hand, the projects dataset was processed to generate descriptive analytics measures and data visualizations to answer RQ3 and RQ4. In addition, the documents data was also used as input to answer RQ5 by summarizing attendance data and hosting an instance of the Philippines.

The topic modeling part of the methodology used the Non-negative Matrix Factorization mainly for its high interpretability. Themes such as Green Innovation and Green Development, Enhancing Free Trade and Trade Facilitation, Digitalization of MSMEs, Youth, and Globalization, and

²⁵ <https://pcoo.gov.ph/november-12-2015-news-releases/> [accessed September 28, 2021]

Strengthening Supply Chain Connectivity are observed to be put forward in APEC in at least 2 consecutive years. The topic models generated can also be used to label a particular year's theme.

For the descriptive analytics part, the top 5 topics that APEC economies supported are Energy, Human Resources Development, Trade Facilitation, Small and Medium Enterprises, and Standards. The least 5 supported topics were also identified to be Education, Youth, Government Procurement, Biotechnology, and Culture. However, it was further checked that Education, Youth, and Biotechnology may actually belong to a larger topic (i.e., Human Resources Development and Agriculture). Thus, the level of support economies have on these topics is suggested to be further investigated in future studies.

The Philippines sponsored 74 APEC Projects on 26 topics: 12 (or 16%) were on Small and Medium Enterprises (SME); 16 (or 21%) were self-funded, mostly on Science and Technology (4 projects); 13 (or 18%) were co-sponsored mostly with Chinese Taipei on SME. The level of active participation by the Philippines in APEC was also inferred by performing summarization methods on attendance data and hosting instances. The Philippines has been actively participating by attending 100% of all APEC level meetings that are in scope in this study and also boasted a significant budget when it hosted APEC in 2015. The Philippines attended all the annual APEC-level meetings and is one of the nine economies that have hosted an APEC year at least twice.

This research was able to discuss and answer the research questions raised by using different tools. This study then concludes that analytics tools are indeed feasible in processing, modeling, and analyzing APEC data particularly, documents and projects data.

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Appendices

Appendix 1. Availability of Document Sources

Year	AELM*	AMM*	SMM*	SOM1**	SOM2**	SOM3**	CSOM**
1989	Not Available	Available	Not Available	Not Available	Not Available	Not Available	Not Available
1990	Not Available	Available	Not Available	Available	Not Available	Not Available	Not Available
1991	Not Available	Available	Not Available	Available	Available	Available	Not Available
1992	Not Available	Available	Available	Available	Available	Available	Not Available
1993	Available	Available	Not Available	Not Available	Not Available	Not Available	Not Available
1994	Available	Available	Available	Not Available	Not Available	Not Available	Not Available
1995	Available	Available	Available	Not Available	Not Available	Not Available	Not Available
1996	Available	Available	Available	Not Available	Not Available	Not Available	Not Available
1997	Available	Available	Available	Available	Available	Available	Not Available
1998	Available	Available	Available	Available	Available	Available	Not Available
1999	Available	Available	Available	Available	Available	Not Available	Not Available
2000	Available	Available	Available	Not Available	Not Available	Not Available	Not Available
2001	Available	Available	Available	Available	Available	Available	Not Available
2002	Available	Available	Available	Available	Available	Available	Available
2003	Available	Available	Available	Available	Available	Available	Available
2004	Available	Available	Available	Available	Available	Available	Available
2005	Available	Available	Available	Available	Available	Available	Available
2006	Available	Available	Available	Available	Available	Available	Available
2007	Available	Available	Available	Available	Available	Available	Available
2008	Available	Available	Available	Available	Available	Available	Available
2009	Available	Available	Available	Available	Available	Not Available	Available
2010	Available	Available	Available	Available	Available	Available	Available
2011	Available	Available	Available	Available	Available	Available	Available

Year	AELM*	AMM*	SMM*	SOM1**	SOM2**	SOM3**	CSOM**
2012	Available	Available	Available	Available	Available	Not Available	Available
2013	Available	Available	Available	Available	Available	Available	Available
2014	Available	Available	Available	Available	Available	Available	Available
2015	Available	Available	Available	Available	Available	Available	Available
2016	Available	Available	Available	Available	Available	Available	Available
2017	Available	Available	Available	Available	Available	Available	Available
2018	Available	Available	Available	Available	Available	Available	Available
2019	Not Available	Not Available	Available	Not Available	Not Available	Not Available	Not Available
2020	Not Available	Not Available	Available	Not Available	Not Available	Not Available	Not Available

Appendix 2. AMM + AELM Topics

#	Merged Topics	Topic Label
1	'capacity building', 'innovation', 'internet', 'experience', 'enforcement', 'innovative', 'structural reform', 'chain', 'best practice', 'center'	Capacity Building on Innovation and Internet Development
2	'noi', 'ha', 'ha noi', 'pandemic', 'influenza', 'influenza pandemic', 'model measure', 'avian', 'avian influenza', 'busan'	Prevention and Response to Influenza Pandemics
3	'emission', 'climate', 'climate change', 'forest', 'capacity building', 'clean development', 'greenhouse', 'greenhouse gas', 'gas', 'gas emission'	Climate Change
4	'green', 'used', 'innovation', 'chain', 'best practice', 'innovative', 'solar', 'stakeholder', 'economic integration', 'tariff'	Green Innovation for Economic Integration
5	'pfp', 'liberalization facilitation', 'candidate', 'businessprivate sector', 'businessprivate', 'draft', 'bogor declaration', 'facilitation trade', 'osaka', 'bac'	Economic and Technical Cooperation in APEC
6	'capacity building', 'rtasftas', 'dda', 'influenza', 'viet', 'nam', 'viet nam', 'threat', 'dda negotiation', 'avian'	Supporting the Multilateral Trading System and Health Security
7	'msmes', 'food security', 'chain', 'inclusive', 'quality growth', 'capacity building', 'connectivity', 'best practice', 'supply chain', 'climate'	Climate Change, Capacity Building, Supply Chain Development, MSME
8	'businessprivate', 'businessprivate sector', 'meeting', 'republic', 'investment liberalization', 'uruguay round', 'satisfaction', 'uruguay', 'appreciation', 'investment data'	Investment Liberalization
9	'capacity building', 'innovation', 'structural reform', 'dda', 'dda negotiation', 'digital', 'gender', 'best practice', 'terrorism', 'stakeholder'	Sustainable Development and Prosperity, Secure and Favorable Business Environment (Terrorism, Health, Structural Reform)
10	'structural reform', 'capacity building', 'disease', 'innovation', 'digital', 'tariff', 'dda', 'ecotech', 'enforcement', 'providing'	Sustainable Development and Prosperity, Secure and Favorable Business Environment (Terrorism, Health, Structural Reform)
11	'innovation', 'capacity building', 'tariff', 'structural reform', 'implemented', 'treatment', 'addition', 'law', 'border', 'united state'	Structural Reform in APEC
12	'santiago', 'midterm stocktake', 'rtasftas', 'dda negotiation', 'invasive', 'midterm', 'corruption', 'aid', 'science technology', 'trade liberalization'	Trade and Investment Liberalization, Human Security, Knowledge-based Society
13	'liberalisation', 'electronic', 'capacity building', 'commerce', 'electronic commerce', 'human capacity', 'youth', 'ecotech', 'liberalisation facilitation', 'crisis'	E-commerce
14	'early voluntary', 'investment liberalization', 'capital market', 'feep', 'iaps', 'science technology', 'liberalization facilitation', 'trade liberalization', 'vancouver', 'sustainable city'	Trade and Investment Liberalization, Economic and Technical Cooperation

#	Merged Topics	Topic Label
15	'capacity building', 'shanghai', 'terrorist', 'terrorism', 'globalization', 'micro', 'digital', 'mexico', 'microenterprises', 'shanghai accord'	Ensuring Free and Open Market by Addressing Counter-terrorism
16	'ftaap', 'connectivity', 'gvcs', 'realization ftaap', 'value chain', 'realization', 'global value', 'urbanization', 'inclusive', 'instruct official'	Regional Integration and Free Trade Area in APEC
17	'programme', 'crisis', 'liberalisation', 'strengthening market', 'competition regulatory', 'tariff', 'lumpur', 'kuala lumpur', 'kuala', 'electronic'	Market Liberalization
18	'inclusive growth', 'inclusive', 'programme', 'climate', 'egs', 'climate change', 'capacity building', 'connectivity', 'border', 'singapore'	Inclusive Growth and Sustainable Development
19	'water', 'used', 'machine', 'gas', 'chain', 'article', 'equipment', 'supply chain', 'waste', 'treatment'	Services in Global Value Chains, Waste Water Treatment
20	'msmes', 'crossborder ecommerce', 'ecommerce', 'green', 'crossborder', 'digital', 'ppfs', 'ruralurban', 'age', 'social inclusion'	E-commerce for MSMEs and minorities
21	'electronic commerce', 'electronic', 'commerce', 'liberalisation', 'programme', 'crisis', 'industrial', 'science technology', 'skill development', 'investment liberalisation'	Maximizing the Use of Technology and E-commerce to Address Crisis
22	'smart grid', 'grid', 'remanufactured good', 'remanufactured', 'green', 'green building', 'smart', 'solar', 'regulatory cooperation', 'interoperability'	Green Manufacturing and Green Development
23	'growth strategy', 'green', 'ftaap', 'egs', 'rei', 'inclusive', 'leader growth', 'icts', 'yokohama', 'economic integration'	Economic and Regional Integration
24	'connectivity', 'infrastructure project', 'clean renewable', 'multiyear plan', 'fb', 'workstream', 'multiyear', 'chain', 'infrastructure development', 'job'	Green Infrastructure Development
25	'waste', 'innovation', 'food security', 'instrument', 'used', 'gas', 'water', 'article', 'solar', 'innovative'	Sustainable Clean and Green Development
26	'ppp', 'connectivity', 'chain', 'supply chain', 'data standard', 'internet', 'global data', 'infrastructure investment', 'crossborder', 'chain connectivity'	Supply Chain Connectivity and Digital Trade
27	'water', 'apmen', 'fb', 'ppp', 'digital', 'construction', 'procurement', 'reform infrastructure', 'sce', 'connectivity'	Green and Blue Infrastructure Development
28	'investment liberalization', 'took', 'republic', 'entrepreneur', 'treatment', 'prepared', 'involvement', 'useful', 'recognizing', 'sized enterprise'	Investment Liberalization
29	'strengthening market', 'competition regulatory', 'regulatory reform', 'wto negotiation', 'principle enhance', 'strengthen market', 'thailand', 'ecommerce', 'opportunity business', 'functioning market'	Stronger and Competitive Market in APEC
30	'disaster', 'msmes', 'inclusive', 'disaster risk', 'chain', 'gvcs', 'fish', 'risk reduction', 'strengthening quality', 'supply chain'	Disaster Risk Reduction
31	'oaa', 'philippine', 'feeep', 'osaka', 'hrd', 'atc', 'manila', 'growth equitable', 'osaka agenda', 'iaps'	Free and Open Trade and Investment
32	'ecommerce', 'readiness', 'crisis', 'strengthening market', 'delivering', 'oil market', 'programme', 'house', 'auckland', 'globalisation'	Business and Employment Growth, Free and Open Markets
33	'liberalisation', 'busan', 'disaster', 'organisation', 'liberalisation facilitation', 'investment liberalisation', 'preparedness', 'roadmap', 'model measure', 'natural disaster'	Advancing Freer Trade

#	Merged Topics	Topic Label
34	'csr', 'disaster', 'climate', 'climate change', 'capacity building', 'ftaap', 'economic integration', 'crisis', 'lima', 'corruption'	Disaster Risk Reduction and Climate Change
35	'pacific business', 'uruguay round', 'businessprivate', 'uruguay', 'foreign investment', 'business forum', 'businessprivate sector', 'seattle', 'open multilateral', 'round'	Investment Liberalization
36	'nonmember', 'guest', 'uruguay round', 'uruguay', 'epg', 'gatt', 'businessprivate sector', 'businessprivate', 'round', 'interdependence'	Free Trade and Regional Integration
37	'ftaap', 'quality growth', 'eventual', 'realization ftaap', 'msmes', 'food market', 'tfa', 'eventual realization', 'service competitiveness', 'instruct official'	Food Market Liberalization and Food Trade
38	'transparency standard', 'transparency provision', 'person', 'law', 'los cabos', 'cabos', 'los', 'ruling', 'capacity building', 'microenterprises'	Transparency in Trade and Investment Liberalization
39	'connecting', 'early voluntary', 'applicant', 'remains', 'voluntary liberalization', 'climate change', 'modernization', 'unfccc', 'asiapacific information', 'sectoral'	Climate Change
40	'ict', 'eapec', 'electronic', 'transaction', 'user', 'digital', 'human capacity', 'capacity building', 'consumer', 'internet'	Digital APEC and Electronic Transactions

Appendix 3. SOM Themes

#	Merged Terms	Themes
1	'capacity building', 'wto', 'security', 'facilitation', 'mrt', 'trade facilitation', 'bmc', 'strategy', 'best', 'amm'	Enhancing Free Trade and Trade Facilitation
2	'esc', 'wto', 'facilitation', 'iaps', 'trade facilitation', 'bmc', 'deliverable', 'iap', 'social', 'executive secretariat'	APEC Individual Action Plan on WTO Progress
3	'data', 'survey', 'economic trend', 'bangkok', 'staff', 'uruguay', 'uruguay round', 'trade promotion', 'regional trade', 'trend'	Regional Economic Trend and Implementation of Uruguay Round
4	'msmes', 'connectivity', 'psu', 'millennium', 'structural reform', 'service competitiveness', 'competitiveness roadmap', 'urban', 'roadmap', 'raasr'	Structural Reform in APEC
5	'cttf', 'esc', 'htf', 'tel', 'ifis', 'reform fotc', 'disaster', 'rtasftas', 'control', 'tfep'	Cooperation Issues Related to Terrorism, Education, Health, Finance and Disaster Preparedness
6	'digital', 'msmes', 'psu', 'inclusive', 'post vision', 'ftaap', 'papua', 'papua guinea', 'guinea', 'structural reform'	Digitalization of MSMEs
7	'nam', 'viet nam', 'viet', 'tfep', 'pandemic', 'sce', 'busan', 'act', 'aimp', 'influenza'	Emergency Preparedness
8	'seoul', 'uruguay', 'uruguay round', 'data', 'investment technology', 'trade promotion', 'technology transfer', 'promotion', 'marine', 'investment data'	Investment in Technology Development and Trade Measures in the Uruguay Round
9	'esc', 'programme', 'electronic commerce', 'evsl', 'commerce', 'electronic', 'penang', 'businessprivate sector', 'businessprivate', 'kuching'	E-commerce

#	Merged Terms	Themes
10	'sce', 'cttf', 'tfep', 'model measure', 'bmc', 'millennium', 'emergency', 'preparedness', 'structural reform', 'emergency preparedness'	SCE Initiatives to Counter-Terrorism
11	'fb', 'security', 'chain', 'supply chain', 'disaster', 'russian', 'supply', 'innovation', 'best', 'structural reform'	Supply Chain Security
12	'facilitation', 'iaps', 'feep', 'apecs', 'outlook', 'sectoral', 'economic outlook', 'iap', 'tilf', 'lead shepherd'	IAP, Economic Outlook, Sectoral Liberalization, TILF
13	'connectivity', 'fb', 'chain', 'mit', 'supply chain', 'capacity building', 'supply', 'sce', 'millennium', 'fotc'	Strengthening Supply Chain Connectivity
14	'capacity building', 'afs', 'round', 'strategy', 'mrt', 'urged', 'sme', 'istwg', 'wto', 'shanghai'	Capacity Building for Food System, SME, and Trade in APEC
15	'iap peer', 'ipr', 'terrorism', 'structural reform', 'cttf', 'ecsg', 'transparency standard', 'counter terrorism', 'transparency', 'health'	Counter-Terrorism, Structural Reform, Intellectual Property, Health and Transparency
16	'fb', 'food security', 'russia', 'inclusive growth', 'candidate', 'millennium', 'supply chain', 'supply', 'fb cti', 'inclusive'	Food Supply Chain, Food Security
17	'psu', 'millennium', 'sce', 'fotc', 'global', 'chain', 'food security', 'connectivity', 'security', 'target'	Food Security
18	'cow', 'liberalization', 'feep', 'comparability', 'montreal', 'early voluntary', 'john', 'vancouver', 'apecs', 'study centre'	Voluntary and Comparable Trade and Investment Liberalization
19	'uruguay round', 'uruguay', 'fishery', 'round', 'asia pacific', 'singapore march', 'deputy secretary', 'cooperation senior', 'question', 'asean secretariat'	Fisheries
20	'rei', 'doha round', 'ftaap', 'srmm', 'social responsibility', 'lima', 'room', 'rei agenda', 'doha', 'act'	Regional Economic Integration, FTAAP, WTO Doha's Global Trade Liberalization Agenda
21	'sce', 'htf', 'facilitation', 'cairn', 'tfap', 'structural reform', 'cttf', 'millennium', 'health', 'iap'	Health-related Trade
22	'fb', 'connectivity', 'sce', 'bmc', 'grp', 'capacity building', 'millennium', 'psu', 'education cooperation', 'crossborder education'	Connectivity and Cooperation on Cross-border Education
23	'msmes', 'viet', 'viet nam', 'nam', 'ftaap', 'digital', 'ahsgie', 'ascr', 'roadmap', 'vision'	MSMEs and Digital Trade
24	'programme', 'liberalisation', 'iaps', 'christchurch', 'wto', 'evsl', 'esc', 'facilitation', 'crisis', 'responsible trade'	Trade Liberalization
25	'strategy', 'shanghai', 'beijing', 'globalization', 'human capacity', 'eapec', 'macroeconomic', 'youth', 'outreach', 'hoc'	Youth and Globalization
26	'psu', 'sce', 'growth strategy', 'ed', 'strategy', 'bmc', 'board', 'millennium', 'security', 'human security'	Growth and Human Security
27	'cttf', 'htf', 'transparency', 'structural reform', 'avian', 'avian influenza', 'influenza', 'ipr', 'bmc', 'iap peer'	Health, Counter-Terrorism, Transparency, and Structural Reform
28	'hrd', 'fifth', 'people republic', 'china hong', 'republic china', 'electronic', 'enterprise', 'bangkok', 'trade promotion', 'staff'	HRD for Electronic Trade and Enterprises

#	Merged Terms	Themes
29	'capacity building', 'strategy', 'woman', 'shanghai', 'oaa', 'human capacity', 'afs', 'disease', 'eapec', 'functioning'	Woman and Health
30	'fb', 'connectivity', 'msmes', 'fotc', 'chain', 'inclusive', 'growth strategy', 'psu', 'strategy', 'internet'	Promotion of MSME Connectivity in APEC
31	'sce', 'cttf', 'fotc', 'millennium', 'amm', 'ed', 'programme', 'bmc', 'security', 'tfep'	Work Program on Counter-Terrorism for Trade Security
32	'som', 'regulatory cooperation', 'green', 'fb', 'green growth', 'generation', 'generation trade', 'anssr', 'disaster', 'regulatory practice'	Regulatory Cooperation and Practices to Promote Green Growth
33	'economic crisis', 'crisis', 'ed', 'border', 'inclusive', 'connectivity', 'target', 'inclusive growth', 'branding strategy', 'branding'	Cross border Connectivity to Address Economic Crisis and Promote Inclusive Growth
34	'shanghai', 'human capacity', 'eapec', 'oaa', 'eapec task', 'ecommerce', 'cyber', 'education', 'leader october', 'briefing'	Human Capacity and Digital Economy and E-commerce
35	'cttf', 'evaluation framework', 'roundtable', 'evaluation', 'esc', 'structural reform', 'level conference', 'ftasrtas', 'santiago', 'net'	Structural Reform
36	'blueprint', 'urbanization', 'gvcs', 'ftaap', 'middle', 'middle income', 'realization ftaap', 'trap', 'income', 'income trap'	Blueprint for promoting GVCs for the realization of FTAAP and address middle-income trap and urbanization-related issues
37	'sars', 'afs', 'transaction cost', 'ifis', 'transaction', 'maritime', 'sme', 'ecsg', 'esc', 'atcwg'	SME and IFIS
38	'russian', 'ministry', 'interview', 'russia proposal', 'russia', 'innovative growth', 'chair undertook', 'fb', 'establishing', 'russian federation'	Innovation
39	'los cabos', 'cabos', 'los', 'oaa', 'functioning', 'broadening', 'shanghai accord', 'exchanged view', 'accord', 'mexico city'	Broadening of OAA and recognition of the importance of shanghai accord
40	'bangkok', 'thai', 'principal', 'programme', 'satisfaction', 'achieved implementation', 'conclusion adopted', 'progress achieved', 'tokyo', 'trade arrangement'	Trade Arrangement

Appendix 4. Philippine Projects for each topic with co-sponsoring economies

Projects per Topic		Year	Co-sponsoring Economies	Status
Agriculture				
1	Building Capacity In APEC Economies In Agricultural Biotechnology On Emerging Research, Extension And Development Issues	2006		
2	Climate Change Symposium	2011		
3	Seminar-Workshop on the Assessment of Good Animal Husbandry Practices in APEC Member Economies	2011		
4	Symposium/Workshop on Planning a Collaborative Research, Development and Extension Program on Climate Change among APEC Member Economies	2015 Self-funded		
5	Workshop on Adaptation with Mitigation Initiative in Agriculture	2012		
Anti-Corruption; Transparency				
6	Implementation of the APEC Code of Conduct for Business (Integrity and Transparency Principles of the Private Sector)	2011		
Automotive				
7	Customs Import Automation: A Pilot Project for SMEs and OEMs (formerly Model Port - Automated Import Documentation System)	2007		
8	Phase II - Adoption of Quality Management Systems (QMS) i.e., ISO/TS16949 in Auto Parts and Components Industry	2006		
Chemicals				
9	Sharing Best Practices in Chemical Regulations	2017 Self-funded		
Conformance; Standards				
10	8th Conference on Good Regulatory Practice	2014		
11	APEC Survey on Packaging and Labelling Requirements for Pre-Packaged Food Products	2015 Self-funded		
12	Capacity-Building and Awareness Project on Enhancement of Total Environmental Efficiency (Energy/Carbon and Material Efficiency) through MFCA, ISO 14051	2015	Japan	
13	Improving Transparency of Pre-Packaged Food Packaging and Labelling Laws, Regulations and Best Practices: Workshop and Compendium	2019		On-going
Counter-Terrorism				

Projects per Topic		Year	Co-sponsoring Economies	Status
14	10th STAR Conference: Secure Supply Chain in the APEC Region - Challenges and Opportunities	2016 Self-funded	Japan, Indonesia Russia	
Emergency Preparedness				
15	9th Senior Disaster Management Officials Forum (9th SDMOF)	2015		
16	A Training Course on Quantitative Precipitation Estimation/Forecasting (QPE/QPF)	2011		
Energy				
17	Workshop on Improving Energy Resiliency in Off-Grid Areas in APEC Member Economies	2015		
Finance				
18	Accelerating Financial Inclusion in Asia and the Pacific: An Operational Dialogue on Innovative Financial Inclusion Packages	2010		
Gender				
19	Women as Prime Movers of Inclusive Business	2016		
Health				
20	HTA Workshop: Using Health Technology Assessment (HTA) for Universal Health Coverage (UHC)	2015 Self-funded	Korea	
Human Resources Development				
21	A Workshop on the Comparability of Qualifications in the Health Sector within the APEC Region	2006		
22	Asia-Pacific Economic Corporation Information and Communication Technology for Education Exposition (APEC ICT4E Expo)	2009		
23	Best Practices in Human Resource Capacity Building in Science and Mathematics	2008 Self-funded		
24	Capacity Building of Mining Stakeholders in APEC Economies on Corporate Social Responsibility	2009		
25	Comparability and Benchmarking of Competencies and Qualification Frameworks in APEC Region (Pilot Area: Construction / Welding)	2009	China	
26	Effective Labour Market Signaling: A Strategy for Solving the Problem of Unemployment and Talent Mismatch	2010		
27	Seminar Workshop to Develop A Framework on Mentoring / Coaching Out-of-School Youth on Entrepreneurship	2009		
Intellectual Property				

Projects per Topic		Year	Co-sponsoring Economies	Status
28	Best Practices on Brand Development and IP Protection for Micro, Small and Medium Enterprises (MSMEs)	2016		
29	Promoting Innovation through a Mechanism for IP Valuation, Financing and Leveraging IP Assets	2016		
Investment				
30	APEC-UNCTAD Workshop on Investor-State Dispute Settlement (Core Elements Phase 3 Activity 2)	2009		
31	APEC-UNCTAD Workshop on Investor-State Dispute Settlement (ISDS): Core elements Project - Moving Beyond Phase 3 - Activity 6	2011		
32	Inclusive Business in APEC Study	2016 Self-funded		
33	Inclusive Business Leaders Conference	2018 Self-funded		
34	The Impact of Recent Investor-State Disputes on the Negotiation of Bilateral Investment Treaties (BITs) and FTAs/RTAs in the APEC Region	2007		
Life Sciences				
35	APEC Digital Hub for Mental Health Round Table Meeting on Data Standardization	2018 Self-funded		
Mining				
36	Capacity Building of Mining Stakeholders in APEC Economies on Corporate Social Responsibility (Phase 2)	2011		
Science and Technology				
37	APEC Workshop on Commercialization and Popularization of Research and Market-based Innovations through Policy Translation	2015 Self-funded		
38	APEC Workshop on Strategies to Address Non-Communicable Diseases (NCDs) through Science, Technology, and Innovation - Nutrigenomics Approach	2014 Self-funded		
39	APEC Workshop on Strategies to Address Non-communicable Diseases (NCDs) through Science, Technology, and Innovation: Nutrigenomics Approach	2015 Self-funded		
40	Establishment of Regional Database on Herbal Medicine	2015 Self-funded		

Projects per Topic		Year	Co-sponsoring Economies	Status
41	Improving Micro, Small and Medium Enterprises (MSMEs) Competitiveness through Low Carbon Economy	2015		
Services Trade				
42	APEC Seminar on Trade in Health Services	2009		
43	APEC Training Seminar on Trade in Energy Services	2008		
44	Capacity - Building Seminar on Transnational Education Services	2008		
45	Capacity Building Seminar-Workshop on the Measurement of International Trade in Services	2008		
46	Developing the Overseas Expansion Capabilities of Micro, Small and Medium Enterprise (MSME) Franchises in APEC	2012		
Small and Medium Enterprises				
47	APEC Cross-Domain Innovation Ecosystem Initiative: Facilitate the Inclusive Growth of SMEs through the Digital Platform Across the APEC Region	2020	Chinese Taipei	On-going
48	APEC Local Innovation Ecosystem Initiative: Revitalization for Inclusive Growth and Sustainable Future	2018	Chinese Taipei, Thailand, Russia	
49	APEC Online-to-Offline (O2O) Initiative - Empower SMEs to Embrace Digital Transformation	2018	Chinese Taipei, Malaysia, Thailand, Chile	
50	APEC Online-to-Offline (O2O) Initiative - Enhancing SME Digital Competitiveness and Resilience towards Quality Growth	2016	Chinese Taipei, Malaysia	
51	APEC Online-to-Offline (O2O) Initiative - Unleash the Potential of SMEs through Digital Transformation for a Shared Future	2017	Chinese Taipei, Malaysia, Thailand, Vietnam	
52	APEC SME Business Matching and Internship Consortium for Global Value Chain Integration	2014		
53	APEC SME Finance Forum	2015		
54	Enhancing the Competitiveness of Women-Led Micro, Small and Medium Enterprises (MSMEs) in the Garments and Textile Sector through Innovation and Entrepreneurship	2017		
55	Facilitating SME Trade through Better Understanding of Non-Tariff Measures in the Asia-Pacific Region	2014		

Projects per Topic		Year	Co-sponsoring Economies	Status
56	Greening Micro, Small and Medium Enterprises (MSMEs): A Pathway Towards Sustainable Economic Growth in the APEC Region	2016 Self-funded	Brunei Darussalam, Mexico, Peru, Chinese Taipei	
57	SME Technology Entrepreneurship Conference (SlingshotMNL 2015)	2015 Self-funded		
58	Towards MSMEs Internationalisation: Study on the Final Review of the Boracay Action Agenda and Forum on Building Global MSMEs	2019 In-Progress		
Standards				
59	APEC Scientific Workshop on Food Safety Risk-Benefit Analysis	2011		
60	Capacity Building Training on Food Safety Risk Communication for APEC Developing Member Economies	2008		
61	Seminar-Workshop on the Development and Strengthening of Food Recall System for APEC Member Economies	2009		
Structural Reform				
62	Capacity-Building for SMEs on Competition Policy and Law	2014		
63	Comprehensive Review of Potentially Anti-Competitive Laws and Regulations	2018		
64	Improving the Capacity of Competition Authorities of Developing Economies in Competition Policy Assessment and Advocacy	2013		
Telecommunications and Information				
65	APEC Seminar on Using ICT for Rural Community Capacity Building	2008		
66	APEC Workshop on ICT for Disaster Risk Reduction and Management (DRRM)	2015 Self-funding		
Tourism				
67	An Assessment of the Role of Taxation in Promoting Travel and Tourism Growth in the APEC Region	2013		
68	Connecting APEC - A Conference on Enhancing Tourism and Air Transport Connectivity in the Asia-Pacific Region	2011		
Trade Facilitation				
69	SOM Dialogue on Regional Trade Agreements (RTAs)/Free Trade Agreements (FTAs)	2015		

Projects per Topic		Year	Co-sponsoring Economies	Status
70	Workshop to Discuss Best Practices on Practical Solutions/Programmes to Integrate SME Suppliers into Automotive Global Value Chains (GVCs)	2016	Malaysia	
Transportation				
71	2nd APEC Training Course on Common Principles to Shipping Policy	2013	Japan	
72	Intermodal Skills Seminar: Developing Core Competencies and Leadership Skills in Planning and Managing Intermodal Systems and Technology	2006		
73	Land International Security and Commuters' Advocacy Protocol (Land IS-CAP)	2007		
74	Survey of Supply Chain Workforce Development Needs & Conducting Seminars on Managing Operations and Risk in Intermodal Global Supply Chain Operations	2009	Indonesia	

Appendix 5. Attendance Count for Philippine Participation in APEC Meetings

SOM

Year	SOM	Economy	PH Attendance	Source
1990	SOM 1	Singapore	✓	APEC Key Action Documents (1990-2006)
1991	SOM 1	Korea	✓	APEC Key Action Documents (1990-2006)
1991	SOM 2	Korea	✓	APEC Key Action Documents (1990-2006)
1991	SOM 3	Korea	✓	APEC Key Action Documents (1990-2006)
1992	SOM 1	Thailand	✓	APEC Key Action Documents (1990-2006)
1992	SOM 2	Thailand	✓	APEC Key Action Documents (1990-2006)
1992	SOM 3	Thailand	✓	4th APEC AMM
1997	SOM 1	Canada	✓	APEC Key Action Documents (1990-2006)
1997	SOM 2	Canada	✓	APEC Key Action Documents (1990-2006)
1997	SOM 3	Canada	✓	APEC Key Action Documents (1990-2006)
1998	SOM 1	Malaysia	✓	APEC Key Action Documents (1990-2006)
1998	SOM 2	Malaysia	✓	APEC Key Action Documents (1990-2006)
1998	SOM 3	Malaysia	✓	APEC Key Action Documents (1990-2006)
1999	SOM 1	New Zealand	✓	APEC Key Action Documents (1990-2006)
1999	SOM 2	New Zealand	✓	APEC Key Action Documents (1990-2006)
2001	SOM 1	China	✓	APEC Key Action Documents (1990-2006)
2001	SOM 2	China	✓	APEC Key Action Documents (1990-2006)
2001	SOM 3	China	✓	APEC Key Action Documents (1990-2006)
2002	SOM 1	Mexico	✓	APEC Key Action Documents (1990-2006)

Year	SOM	Economy	PH Attendance	Source
2002	SOM 2	Mexico	✓	APEC Key Action Documents (1990-2006)
2002	SOM 3	Mexico	✓	APEC Key Action Documents (1990-2006)
2002	CSOM	Mexico	✓	APEC Key Action Documents (1990-2006)
2003	SOM 1	Thailand	✓	APEC Key Action Documents (1990-2006)
2003	SOM 2	Thailand	✓	APEC Key Action Documents (1990-2006)
2003	SOM 3	Thailand	✓	APEC Key Action Documents (1990-2006)
2003	CSOM	Thailand	✓	APEC Document Database
2004	SOM 1	Chile	✓	APEC Document Database
2004	SOM 2	Chile	✓	APEC Document Database
2004	SOM 3	Chile	✓	APEC Document Database
2004	CSOM	Chile	✓	APEC Document Database
2005	SOM 1	Korea	✓	APEC Document Database
2005	SOM 2	Korea	✓	APEC Document Database
2005	SOM 3	Korea	✓	APEC Document Database
2005	CSOM	Korea	✓	APEC Document Database
2006	SOM 1	Vietnam	✓	APEC Document Database
2006	SOM 2	Vietnam	✓	APEC Document Database
2006	SOM 3	Vietnam	✓	APEC Document Database
2006	CSOM	Vietnam	✓	APEC Document Database
2007	SOM 1	Australia	✓	APEC in the New Millennium
2007	SOM 2	Australia	✓	APEC in the New Millennium
2007	SOM 3	Australia	✓	APEC in the New Millennium
2007	CSOM	Australia	✓	APEC in the New Millennium
2008	SOM 1	Peru	✓	APEC in the New Millennium
2008	SOM 2	Peru	✓	APEC in the New Millennium
2008	SOM 3	Peru	✓	APEC in the New Millennium
2008	CSOM	Peru	✓	APEC in the New Millennium
2009	SOM 1	Singapore	✓	APEC Document Database
2009	SOM 2	Singapore	✓	APEC in the New Millennium
2009	CSOM	Singapore	✓	APEC in the New Millennium
2010	SOM 1	Japan	✓	APEC in the New Millennium
2010	SOM 2	Japan	✓	APEC in the New Millennium
2010	SOM 3	Japan	✓	APEC in the New Millennium
2010	CSOM	Japan	✓	APEC in the New Millennium
2011	SOM 1	The United States	✓	APEC in the New Millennium
2011	SOM 2	The United States	✓	APEC in the New Millennium
2011	SOM 3	The United States	✓	APEC in the New Millennium

Year	SOM	Economy	PH Attendance	Source
2011	CSOM	The United States	✓	APEC in the New Millennium
2012	SOM 1	Russia	✓	APEC in the New Millennium
2012	CSOM	Russia	✓	APEC in the New Millennium
2013	SOM 1	Indonesia	✓	APEC in the New Millennium
2013	SOM 2	Indonesia	✓	APEC in the New Millennium
2013	SOM 3	Indonesia	✓	APEC in the New Millennium
2013	CSOM	Indonesia	✓	APEC in the New Millennium
2014	SOM 1	China	✓	APEC in the New Millennium
2014	SOM 2	China	✓	APEC in the New Millennium
2014	SOM 3	China	✓	APEC in the New Millennium
2014	CSOM	China	✓	APEC in the New Millennium
2015	SOM 1	Philippines	✓	APEC in the New Millennium
2015	SOM 2	Philippines	✓	APEC in the New Millennium
2015	SOM 3	Philippines	✓	APEC in the New Millennium
2015	CSOM	Philippines	✓	APEC in the New Millennium
2016	SOM 1	Peru	✓	APEC in the New Millennium
2016	SOM 2	Peru	✓	APEC in the New Millennium
2016	SOM 3	Peru	✓	APEC in the New Millennium
2016	CSOM	Peru	✓	APEC in the New Millennium
2017	SOM 1	Vietnam	✓	APEC in the New Millennium
2017	SOM 2	Vietnam	✓	APEC in the New Millennium
2017	SOM 3	Vietnam	✓	APEC in the New Millennium
2017	CSOM	Vietnam	✓	APEC in the New Millennium
2018	SOM 1	Papua New Guinea	✓	APEC in the New Millennium
2018	SOM 2	Papua New Guinea	✓	APEC in the New Millennium
2018	SOM 3	Papua New Guinea	✓	APEC in the New Millennium
2018	CSOM	Papua New Guinea	✓	APEC in the New Millennium
2000	SOM 1	Brunei Darussalam	✓	APEC in the New Millennium
2000	SOM 2	Brunei Darussalam	✓	APEC in the New Millennium
2000	SOM 3	Brunei Darussalam	✓	APEC in the New Millennium

AMM

Year	PH Attendance	Source
1989	✓	AMM Statement
1990	✓	AMM Statement
1991	✓	AMM Statement
1992	✓	AMM Statement
1993	✓	AMM Statement
1994	✓	AMM Statement
1995	✓	AMM Statement
1996	✓	AMM Statement
1997	✓	AMM Statement
1998	✓	AMM Statement
1999	✓	AMM Statement
2000	✓	AMM Statement
2001	✓	AMM Statement
2002	✓	AMM Statement
2003	✓	AMM Statement
2004	✓	AMM Statement
2005	✓	AMM Statement
2006	✓	AMM Statement
2007	✓	AMM Statement
2008	✓	AMM Statement
2009	✓	APEC Website
2010	✓	Philippine Official Gazette
2011	✓	APEC Website
2012	✓	Philippine Official Gazette
2013	✓	Philippine News Outlet
2014	✓	AMM Statement
2015	✓	AMM Statement
2016	✓	AMM Statement
2017	✓	AMM Statement
2018	✓	PCOO News

AELM

Year	PH Attendance	Source
1993	✓	APEC Website
1994	✓	APEC Website
1995	✓	Philippine Official Gazette
1996	✓	Philippine Official Gazette
1997	✓	Philippine Official Gazette

Year	PH Attendance	Source
1998	✓	Other External Website
1999	✓	Other External Website
2000	✓	Other External Website
2001	✓	AELM Statement
2002	✓	Other External Website
2003	✓	AELM Statement
2004	✓	AELM Statement
2005	✓	AELM Statement
2006	✓	AELM Statement
2007	✓	AELM Statement
2008	✓	AELM Statement
2009	✓	AELM Statement
2010	✓	AELM Statement
2011	✓	AELM Statement
2012	✓	AELM Statement
2013	✓	PCOO News
2014	✓	AELM Statement
2015	✓	AELM Statement
2016	✓	PCOO News
2017	✓	AELM Statement
2018	✓	AELM Statement