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**Characteristic of Successful Energy Policy from
Politics, Economics, Social and Technological
Perspective - a qualitative analysis**

Yuzran Bustamar
Ian Lange
Elizabeth Van Wie Davis

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Colorado School of Mines
Division of Economics and Business
1500 Illinois Street
Golden, CO 80401

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Author(s):

Yuzran Bustamar
Division of Economics and Business
Colorado School of Mines
Golden, CO 80401
ybustamar@mymail.mines.edu

Ian Lange
Division of Economics and Business
Colorado School of Mines

Elizabeth Van Wie Davis
Division of Humanities, Arts and Social Sciences
Colorado School of Mines

ABSTRACT

This paper creates a conceptual framework that analyzes successful characteristics of energy policy defined by PEST (Politics, Economics, Social and Technological) determinant indicators. Energy policy that is promoted by a government is meant to ensure reliable energy supply by stimulating energy growth or promoting energy efficiency. Yet, not every policy is successfully implemented or even passed by the lawmakers even one with a clear potential benefit. We performed a qualitative assessment of a review published by International Energy Agency (IEA) of energy policies implemented by the 28 OECD country members within 2003-2014 period. This conceptual framework contributes to our understanding of successful energy policies and lays the foundation for future study to investigate empirical evidence of the determinants of policy success that may lead to security of energy in OECD countries.

JEL classifications: Q48, P48

Keywords: Energy Policy Characteristics, Successful Policy, Policy Design, PEST Analysis

*Bustamar is corresponding author.

Characteristic of Successful Energy Policy from Politics, Economics, Social and Technological Perspective – a qualitative analysis

Yuzran Bustamar^a, Ian Lange^a, Elizabeth Van Wie Davis^b

^a Colorado School of Mines, Department of Mineral and Energy Economics, Golden, CO, United States

^b Colorado School of Mines, Division of Humanities, Arts, and Social Sciences, CO, United States

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This paper creates a conceptual framework that analyzes successful characteristics of energy policy defined by PEST (Politics, Economics, Social and Technological) determinant indicators. Energy policy that is promoted by a government is meant to ensure reliable energy supply by stimulating energy growth or promoting energy efficiency. Yet, not every policy is successfully implemented or even passed by the lawmakers even one with a clear potential benefit. We performed a qualitative assessment of a review published by International Energy Agency (IEA) of energy policies implemented by the 28 OECD country members within 2003-2014 period. This conceptual framework contributes to our understanding of successful energy policies and lays the foundation for future study to investigate empirical evidence of the determinants of policy success that may lead to security of energy in OECD countries.

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1. Introduction

There are many well-intentioned energy policies proposed by governments which are not passed by lawmakers or fail in the implementation process despite having clear potential for social benefit and economic impact. Recent large-scale examples that are generally believed to have net beneficial

outcomes include: Regulation of Mercury and Air Toxic Standards (MATS) from coal-fired power plants in United States (2011)¹, and renewable energy feed-in tariffs in Indonesia (2016)².

Policy formulation and implementation is obviously as important as the policy content itself. The literature provides examples of how to strengthen energy policymaking and sustain the outcomes (Chapman McLellan and Tezuka, 2016) and how to frame public and social acceptance (Dermont, Ingold, Kammerman, & Stadelmann-Steffen, 2017 and Butler, Demski, Parkhill, Pidgeon, & Spence, 2015). However, most research focuses only on a specific aspect of the policy cycle and the frameworks are not holistically identifying indicators that influence the relevant aspect to the successfulness of energy policy formulation and implementation. We argue that the framework offered is very narrow and ignores other influential aspects such as technology, economics and political support. Therefore, a broader analysis on the politics, economics, social and technological (PEST) aspects may be helpful in the formulation of successful energy policy. This approach may lead to a more robust process for successful energy policy formulation.

Extensive discussions on the natural relationship between energy policy and economic growth have been shown by many researchers. Policies are typically meant to either stimulate growth in production (to fill an energy gap) or to reduce the amount of energy use (energy efficiency), in order to boost economic performance. For example, by analysis of the dynamics of electricity consumption, Shahbaz, Sarwar, Chen, & Malik (2017) show a valid cointegration between electricity consumption and economic growth in developing countries from 1960 to 2014. Another analysis by Alp (2016) also shows a positive relation between growth and energy consumption in OECD countries from 1980-2012.

¹ Environment Protection Agency (EPA) claims MATS could generate \$37-\$90 billion economic benefit and avert up to 11,000 premature deaths; 4,700 heart attacks; and 130,000 childhood asthma attacks each year (www.ewg.org, 2017).

² According to press conference from Directorate General of New and Renewable Energy Republic of Indonesia, this feed-in tariffs could generate electricity of 478 MW (Agustinus, 2016) and deliver economic growth of 5.1% (APBN, 2017)

Regarding policymaking processes, most OECD countries³ have identical governance structure (Chapman, McLellan, & Tezuka, 2016). Before approval by parliament and congress, bill is first initiated and discussed and formalized by monarch or a president. Different circumstances apply in the USA and Chile, where USA presidential have veto powers and Chile presidential is authorize to initiate bills and set the legislative agenda.

In practice, policy is often vaguely written, which results in ambiguity and confusion in implementation. This may confuse and slow down the implementation process because each interest group and government agency may be interpreting the policy differently. Europe has a “negotiation process” to resolve its implementation complications, while in the United States, ambiguous legislation ends up in court where the constitutionality or authority of the government may be challenged. The law for mercury reduction in the US, for example, led to a long-lasting “battle” between a government agency, NGOs, and industry. The litigation started in 1999, when industry sued for relief from the burden of compliance; it continued in 2005 when NGOs got involved, along with the state governments; and finally, it was resolved in 2015 by the Supreme Court which rejected MATS because the US Environmental Protection Agency (EPA) had not sufficiently considered the potential cost of imposing the regulations.

During the 2003-2014 period, the IEA reviewed 44 energy policies endorsed by its 28 member countries, and identified common objectives of successful policies, which include:

- a. Attempts to ensure reliable energy supply because of economic shifts and technological advancement.
- b. Proactive efforts to inform and engage stakeholders as critical to the success of their policy initiatives.
- c. Empowering consumers and raising public awareness by means of transparent procedures.
- d. Reducing greenhouse gas (GHG) emissions by both improved energy efficiency and a higher

³ All International Energy Association (IEA) countries are member of Organization for Economic Co-operation and Development (OECD).

share of renewables in the energy system.

To find an answer to our question, a multistage research approach, such as the qualitative methods developed by Rahbauer, Menapace, Menrad, & Decker (2016) in *Literature Review, Adoption of Framework*, and *Successful Characteristic Review and Analysis*, was undertaken. Figure 1 shows the study process of this paper.

The characteristics of successful energy policies were sampled from data published by the IEA from the 2003-2014 period (Hoeven, 2015). Adopting the Politic, Economic, Social and Technological (PEST) framework, we reviewed 44 policies from 28 IEA Countries, and qualitatively evaluated why such policies were considered to be successful. These qualitative results are then converted into a quantitative metric. Finally, we highlighted the key aspects for successful implementation of an energy policy, as demonstrated by being the most frequently observed qualities.

As a result from the above mapping and analysis, the key aspects which are identified as dominant indicators from the PEST framework suggest that a successful energy policy should attribute characteristic of social attitudes and belief, government leadership, globalization and technologically neutral.

This paper enriches the application of PEST (Politics, Economics, Social and Technological) framework from preceding literature by Newton (2013) and Aguiler (1967). It also contributes to the methodology regarding framing social and public acceptance on energy policy from literature by Dermont, Ingold, Kammerman, & Stadelmann-Steffen (2017) and Butler, Demski, Parkhill, Pidgeon, & Spence (2015). It generates a broader conceptual framework from more comprehensive aspects of politics, economics, social and technological to explain the successful characteristics of energy policy.

In summary, investigation of characteristics in energy policy helps to provide a conceptual framework (figure 2) to serve as a methodology to formulate successful energy policy. Our review and analysis on IEA publication revealed relevant indicators that policymakers have taken to achieve a successful energy

policy. These relevant indicators can be investigated further as variables to find empirical evidence on how such characteristics may lead toward a reliable energy supply.

2. Literature Review

2.1 Policy Making Process in OECD Countries

Harold Laswell in 1956 proposed the seven stages of *intelligence, promotion, prescription, invocation, application, termination and appraisal* for the “policy cycle”. However, in recent studies by Howard (2005), Howlett and Ramesh (2003), and Jann and Wagrich (2007), the *termination* phase was no longer relevant because often issue will continue to develop over time. Table 1 shows an overview of the policy cycle using these newer perspectives.

As Chapman, McLellan, & Tezuka (2016) suggest, the process for policymaking will be as follows: *Agenda setting* is the identification of policy problems within society and political institutions, addressing all relevant issues to be endorsed as the policy agenda, and significance within the political debate. *Policy formulation* involves consolidating issue and feasibility analysis within government ministries, interest groups, legislative committees, special commissions and policy think tanks. *Implementation* is how to perform the policy; that is, the “street-level” bureaucrats need to understand the procedure from central authorities and provide day to day solution to ensure an effective implementation. *Evaluation* as the ultimate stage is to test whether the proposed intentions are met and control any inconsistency and impact of policies; this leads to a finding for any potential needs to adjust or dismiss the policy.

2.2 Environment Analysis Technique

The initial phases for problem identification and policy formulation entail policy experts to assess potential solutions and prepare them for legislative debate or regulatory orders. At this phase, it is still unclear how to ensure public policy formulation reaches its goals. There is insufficient aptitude within society and

political institutions to address all possible observations to identify the critical problems. Therefore, rigorous analysis to assess policy environment is important. Commonly-used strategic tools and framework to analyze the environmental factors influencing decision include: Five forces from Michael Porter (Porter, 1980), “SWOT Analysis” by Christiansen et al., (Christensen et al, 1969), and “PEST Analysis” by Thompson, Aguilar (Thompson, 1967).

Five Forces Framework explains how organizations study their environment's characteristics. Organization's economic value defines by the related industry structure (ProvenModel, 2017). Industry structure changed almost overnight affecting organization's strategic decision-making process. *Pro*: Model emphasizes an external analysis of the organization's environment over an internal focus and the share of values among relevant groups. *Con*: Model emphasis on industry's competition and ignores other rationales, and thereby less relevant to address public policy analysis.

SWOT Analysis Framework portrays the strategic fit between an organization's internal, unique capabilities and external possibilities, and how to prioritize actions. *Pro*: Makes the solution space explicit; it provides a tool to coordinate direction, action and external events related to internal capabilities. *Cons*: The model is process based. It provides no insight into what each of the SWOT categories should contain, or which alternative strategies are appropriate. It may create an excessively long list of topics that require analysis.

PEST Analysis Framework determines the systematic organization environment indicators that influence their decision. These systematic indicators are often not controllable by the organization, which is why they need to be constantly tracked and analyzed. *Pro*: The framework tries to estimate the context in which predictive indicators are more significant than the result. Decision makers create the same decision-making structure and a common expression. *Con*: Promoting the appropriate issues remain a subjective interpretation, and often not consistent.

Of these available frameworks, the PEST Analysis would be the best fit to predict characteristics of a successful energy policy as it provides common indicators for environment analysis, yet is broad enough to accommodate motivations other than competitiveness; limitations of scope are disadvantages of the SWOT Analysis and the Five Forces frameworks. Behavior of environment can be modeled to address subjectivity and consistency issues arising from PEST Analysis.

3. Adoption of PEST framework (Politics, Economics, Social and Technology)

3.1 Cases of Various Adoption of PEST Analysis

PEST Analysis helps to determine the systematic environment indicators of the policy. On a specific issue of energy policy, PEST has been used to analysis U.S Biofuel Policy (Siidiqui, 2013) that identified the assessment of key factors related to successful commercialization of nuclear power and nanotechnology as the benchmark on developing the likelihood of biofuel commercialization in the US.

3.2. PEST Adopters for Successful Energy Policy

PEST Analysis has had rigorous expansion and adoption since its introduction in 1967, where in the mid-2000's SPELIT power Matrix was introduced to focus more discussion on other specializations, including Ethical, Religious, Security and some business-related indicators like Competition, Ecological, Temporal (schedule), etc.

Adopting the PEST framework from Francis J Aguilar (1967), Newton (2013) introduced the most relevant PEST framework for energy policy environment analysis purposes. It captures a comprehensive aspect of government involvement in the analysis which is crucial for an energy policy environment. Table 2. represents PEST adopters for a successful energy policy.

3..3 PEST non-adopters

The non-adopter PEST aspect from the Francis J Aguilar (1967) and Newton (2013) framework includes indicators that are more suitable for the operational aspects of business activities. These indicators

explain the practical working environment and are less relevant in addressing energy policy related issues, including: network coverage, price and quality, import and export, legal aspect, and advertising.

3.4 Further literature review on the adopted PEST indicators and implication to public policy

Further literature review is needed to synthesize all high-quality research evidence on the relationship between PEST indicators and public policy.

3.4.1 Politics

Politics and policy making are greatly depend on power and interests. The need for *political stability* is the most prominent aspect of policy analysis. The analysis tends to reduce contradiction and ambiguity by promoting universal understanding and conventional values that applicable to reach policy objectives in every field for any situation (Moran , Rein, & Goodin, 2006). The role of *bureaucracy* is also important to regulate, collect and handle most of the public information relevant to policy decisions (Mayntz and Scharpf, 1975). However, there are some downsides of resilient *bureaucracy* to democracy that need to be addressed and have been carefully studied. Bureaucrats tend to shift policy objective for political intent (Moran , Rein, & Goodin, 2006). *Corruption* on the other hand, jeopardize political systems and lowers the stringency of the policy (Damania, Fredriksson, & List, 2003). *Government leadership* in the context of policymaking is to influence congressional thought to agree with the government's policy goals (Edwards & Wayne, 2013). The *compliance* or degree of consensus on policy goals is a crucial aspect for successful policy (Meier & Morgan, 1982), because a considerable portion of public rejection can fail the policy implementation.

3.4.2 Economics

Economics are an important aspect of public policy, because economic features influence the type of policies a society makes. The most common measure of economic activity is the *Gross Domestic Product (GDP)* as an aggregate statistic, measuring the total output of a country's economy and representing all goods produced and services rendered by residents and nonresidents within the political boundaries of a

country. GDP is commonly used to determine economic growth and is thereby influential in making public policy choices (Birkland, 2014). *Inflation* contributes to the change of interest rates that affect the magnitude of government spending and play a significant role in affecting monetary policy (Birkland, 2014). *Tax* is required in exchange for public goods provision, such as preserving law and order or national security, and is an instrument of public policy (Lau, 2003). *Globalization* broaden the economy by expand the market boundary, investment and technological exchange which advocate relevant energy policy in the acceleration of economic growth (Shahbaz, Mallick, Mahalik, & Sadorsky, 2016). *Globalization* also promotes key issues for international cooperation to face global scarcity issues from international trading policy (Evans, 2010). The *exchange rate* affects all other price in any open. Currency policy, therefore is a major monetary policy (Frieden, 2016). The *cost of living* is measured by Consumer Price Index (CPI) as the least spending to reach a basic utility for consumer at the current prices. The CPI will have an explicit budget impact thus very important matters to public policy (Gordon, Boskin, Dulberger, Griliches, & Jorgensen, 1998). *Finance and credit* by households, business firms, state and local government, and the federal government affect the market for loanable funds. The demand and supply for loanable funds can fluctuate interest rate and affect monetary policy (Hyman, 2014).

3.4.3 Social

Public policy eventually must be applied in the society, therefore social concerns must be properly addressed. The methods and measures by legislature on tackling social concerns affect policy decisions (Regan, 1995). One important aspect regarding social concern is demography, where lack of assurance in *demographic* information may affect population variability for public budgets and public policy (Waite, 2004). *Historical* perspectives on policy analysis emphasize the need to bring science to solve problem on the society (Fischer, Miller, & Sidney, 2007). *Education* (college and job training) also affect policy by the assumption that more education could put people to work thus addressing social problems effectively (Anyon, 2014). Successful accommodation in *ethnically* diverse societies also contributes to the

successfulness of public policy implementation. Cultural pluralism is part of current societies, where ethnicity will not fade with modernization (Young, 1994). The role of *communication* in the context of social relationship is to foster transparency and comprehension on the implementation of public policy. *Attitudes and belief* are driven from individual motivation and preferences as part of the society and may influence their involvement to reach public policy objective (Jamieson, Kahan, & Scheufele, 2017). Public *health and safety* often increase public concern for resulting an expensive regulation. Thereby, policies should be altered that promoting health and prevent injury will impose a minimum personal burden (Gostin & Wiley, 2016).

3.4.4 Technological

The OECD strongly influenced the emergence of a strategy to promote technology advancement. Consequently, *Research & Development (R&D)* was closely linked to the emergence of new technologies as part of industrial policy. There was a wide acceptance that research-driven industrial development was essential for imminent development and welfare (Wicken, 2007). It is also crucial that policymakers have capacious knowledge of elements that encourage *technological change*, and the role of public policy in such processes is crucial. *Technological change* may facilitate a larger scale and extensive of policy targets. Policymakers should also ensure a framework for *technology incentives* to ensure investment and the deployment of modern technologies are impacting the economy. Policymakers need to assess the effectiveness or efficiency with which incentives reach relevant policy target (Christiansen, 2001). *Intellectual property* promotes the exclusive rights to foster innovation from research and development. The policy will encourage enable the spur to innovation and discovery of new technology (Lemley, Menell, & Merges, 2016). *infrastructure* is crucial for delivering societies with reliable and affordable energy services, and anticipating climate change. Energy availability and environmental challenge require a change in the energy infrastructure paradigm (Goldthau, 2014).

4 IEA Publication Discussion, Review and Analysis

4. 1. Determinants of PEST Adoption

The empirical material from this paper leans toward the publication and tacit knowledge from the IEA Publication in reviewing 44 policies from OECD 28 country members. Each review provides certain characteristic and explanation of why such policy considered to be successful. The characteristics then being categorized based upon indicators contained in PEST framework.

According to IEA publication, successful energy policy characteristic from adoption of PEST framework can be described as follow:

Politics

P1. Government Stability

In 2012, Denmark promoted initiatives pointing toward the long-term goal of full conversion to renewable energy by 2050 with the wind energy agreement policy.

Our analysis results suggest that Government Stability was perceived as indicating higher responsibility in making a long-term commitment to achieving renewable energy full conversion by 2050.

“...To fulfil ambitious targets – such as the Danish energy agreement of 2012 – it is important for investors in the market to have stable and transparent political conditions on a long-term basis” (p.79).

P2. Bureaucracy

The key issues facing 4 countries with respect to Bureaucracy would be the inefficient reviewed system from too many agencies and lack of accountability in the regulatory system. Addressing these key issues can remove uncertainty and accelerate major energy development projects.

“...These measures will make the review process for major projects more predictable and timely (a reduction from an average of four years to a legislated period of no more than two years)” (p.13).

“...Energy Efficiency Coordination Board has been established with the participation of all the relevant organizations to effectively execute energy efficiency efforts across the country, as well as to monitor and coordinate the outcomes” (p.48).

P3. Corruption Level

No successful characteristic found under this indicator.

P4. Government Leadership

In a heterogeneous demographic country where policy is the responsibility of provincial and territorial governments, a strong and effective inter-government collaboration is essential. Canada and Australia have worked toward participation of states and territories to promote a successful implementation of a national energy policy.

“... In a country where building codes are the responsibility of provincial and territorial governments, the development of Code 2011 is an excellent example of what can be accomplished through strong and effective inter-governmental collaboration” (p.30).

P5. Compliance

The ability to create a concise legal framework will promote compliance with the required regulation and procedure, which eventually lead to a successful energy policy.

“... The development of a specific legal framework for the public sector will enable the conclusion of energy performance contracts between ESCOs and public authorities” (p.45).

Economics

E1. GDP and GNP

GDP as a measure of economic growth for a country could also contribute to the successfulness of an energy policy, for example the implementation of Jeju Smart Grid by Korea in 2009.

“..This project raised awareness that the smart grid can contribute to promoting economic growth and gave a clear policy direction” (p.106).

E2. Inflation

No successful characteristic found under this indicator.

E3. Tax and Duties

In 2009, Sweden’s experience showed energy and CO₂ taxation increase price on fossil fuel and it drove the reduction of GHG emissions.

“..High energy taxes on fuels and electricity, as well as high CO₂ taxes on fossil fuels, effectively steer demand through environmental signals, putting an implicit price on fossil carbon while at the same time providing state revenues” (p.21).

E4. Globalization

Liberalization of the energy market plus international producer co-operation secured a reliable energy supply in Japan and some other European countries.

“...Heavy reliance on natural gas can easily lead to price increases during a market liberalization phase if adequate market design and infrastructure measures are not put in place. To keep prices in check, measures should be designed to increase liquidity, efficiency and competition” (p.92).

E5. Exchange Rate

No successful characteristic found under this indicator.

E6. Cost of Living

No successful characteristic found under this indicator.

E7. Finance and Credit

To increase the acceptance of a policy, a financial support scheme was implemented in Luxembourg, Slovack, and Greece.

“... to implement the “nearly zero-energy” buildings standard for new buildings in the European Union after 2020 (2018 for public buildings) by request EPC for permit of a new building, an extension, or a renovation of an existing and the simultaneous adaptation of subsidy schemes” (p.41).

“... Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF) is a new financial investment instrument from The European Bank for reconstruction and Development (EBRD) designed to improve energy efficiency” (p.46).

“... The implementation of a special tariff system on electricity, such as the SHT, is an essential characteristic of liberalized electricity markets. Moreover, the flexible structure selected for the awarding of the SHT to vulnerable customers, this tool also tackles fuel poverty, which is particularly pronounced in Greece in this time of financial crisis” (p.65).

Social

S1. Demographic

No successful characteristic found under this indicator.

S2. Historical Issue

No successful characteristic found under this indicator.

S3. Education

No successful characteristic found under this indicator.

S4. Ethnic/cultural

No successful characteristic found under this indicator.

S5. Communication

Cross-governmental monitoring on Germany's Energy Reform comprehensively informed the public in order to achieve broad public acceptance. Clear information also mobilized customers to choose the most suitable energy plan in Belgium.

"... The government can play a significant role in raising awareness and mobilizing consumers through the provision of targeted assistance and the distribution of clear information to help choose the most suitable supplier. This also encourages competition among suppliers" (p.58).

S6. Attitude and belief

Public participation is the key success indicator for a successful characteristic. Most successful qualities in IEA publication address this issue. 10 policies from 9 countries rely on this indicator as their key to have a successful energy policy. When public have attitude and belief toward a policy, they become volunteer in taking any necessary action on energy sustainability program.

"...The program runs on a voluntary basis, with 19 energy suppliers – spread across electricity, gas, solid fuels and oil importers – currently signed up for voluntary energy savings agreements. Legislation underpinning these agreements allows the minister to impose energy savings targets on energy suppliers if they choose not to sign an energy savings agreement" (p.33).

“...The first Germany’s NEP process shows that keeping the public involved in grid expansion projects in their local area from an early stage is important to obtain public backing and acceptance of power line construction”(p.63).

“...The Drill was a voluntary emergency exercise in which all energy stakeholders were encouraged to participate to save electricity” (p.68).

S7. Health and Safety

Safe disposal of nuclear waste is crucial to the sustainable use of nuclear power. Addressing safety issues concerning nuclear power plants will result in the successful implementation of an energy policy.

“...The sustainability of nuclear energy can only be achieved by establishing responsible radioactive waste and fuel cycle management practices. Bataapáti demonstrates that with appropriate political intention, allocation of responsibilities and effective communication with the public, success can be achieved” (p.67).

Technology

T1. Research and Development

Belgium electricity energy policy overcomes a sudden electricity interruption by comprehensively researching the demand to limit the incident. Italy launched research program emphasis on acceleration on the economics, safety and environment on the national electricity system operation.

“...a comprehensive study to established measures to restore the balance between generation and consumption as soon as possible. In the event of sudden interruptions (such as frequency variations due to storms or other exceptional climatic situations” (p.58).

“...fundamental research aimed at the general benefit of the users of the national electricity system, and industrial R&D, for the benefit of specific entities operating in the electricity sector or related sectors” (p.103).

T2. Technological Change

Adoption of innovative technology to facilitate transformation of ageing energy plants and applying a technology neutral approach to energy resources has initiated wide public acceptance in some European countries. Technologically-neutral approach accommodates price decrease and securing energy supply by having a flexible choice from many competitive energy resources.

“...a technologically-neutral approach to energy resources to facilitate transformation of the ageing Czech energy sector to resolve the problem of massive decommissioning of lignite power plants, stabilize the wholesale electricity market” (p.15).

“...The SDE+ is a technology-neutral instrument: renewable electricity projects, renewable gas projects and renewable heat projects compete with one another for the available budget” (p.80).

T3. Technological Incentives

Italy promoted incentives for using any type of energy efficiency measure through White Certificate. Each WhC represents a savings of 1 ton of oil-equivalent (toe). The scheme is based on energy-savings obligations imposed on electricity and gas distributors with more than 50 000 customers.

“...the multiple benefits from Whc’s are related to the adoption of energy efficiency technologies and behaviors” (p.36).

4.2. Barrier for PEST Adoption

From our review and analysis, there are some indicators in the PEST framework that do not correspond with energy policy characteristics. These indicators either have no significant relation to promotion of a

successful energy policy or have been better explained by another indicator. For example, the demographic indicator in which a heterogeneous demographic plausibly becomes an issue and limits implementation of energy policy can be better explained by a strong government leadership indicator in which government leadership overcomes this situation by embracing inter-government co-operation among states and provinces.

5. Conceptual Framework

5.1 Developing conceptual framework

We investigate evidence for characteristics of successful energy policies within the 2003-2014 period by delving into the IEA publication. By using the PEST framework from the Aguilar (1967) and Newton (2013) literature, relevant indicators form a conceptual framework of successful characteristics for energy policy. Due to the qualitative nature of this study, we consider an indicator as relevant if it is supported by at least one existing successful policy.

We found no evidence that indicators that consider the corruption level, inflation, exchange rate, cost of living, demographics, historical issues, education, ethnic/cultural factors, intellectual property and infrastructure were highly relevant to a successful energy policy. Hence, we propose these indicators be excluded from the conceptual framework. Indicators that were relevant to a successful energy policy are summarized and presented in Figure 2.

5.2 Directing conceptual framework to research question and literature

Our research focuses on how to formulate policies that will be politically acceptable and work in the field. With strategic analysis of policy environment, we exercise Politics, Economics, Social and Technological, or PEST indicators to build conceptual framework for successful energy policy design and implementation.

Evidence from the IEA publication regarding successful characteristics clearly show a relationship between a PEST indicator and a successful energy policy. A further explanation regarding each PEST characteristic that leads to a successful energy policy follows.

Politics play an important role for policy making and the implementation process. In a specific energy policy case, the scarcity of energy resources led to a significant effect not only at the domestic political economy level but also at the global economy and International politics level. Our study on the IEA highlights confirms the literature on the importance of political stability, efficient bureaucracy, government leadership and policy compliance which are the influential aspects for the successful energy policy. However, we could not find any evidence that corruption level leads to the successfulness of energy policy. According to Damania, Fredriksson, & List (2003), corruption will reduce the stringency of a regulation. However, it implies a post policy making process and still workable in the field but less stringent.

Our study reveals that the contributions from the *economic* aspect to the successfulness of energy policy are GDP, tax, globalization and the availability of loanable funds for finance and credit. Literature from Evan (2010) mentioned an economics aspect for a specific case in energy policy will be how to deal with the scarcity of energy resources. This is in line with the findings from the IEA highlights which reveal that the objectives of the energy policy should focus on issues related to the energy security. Increase in GDP can have significant policy implications by addressing the causality between energy balance (Dedeoglu & Kaya, 2013). Also, both *globalization* and the availability of loanable fund to *finance* energy project tackle scarcity issues by promoting key issues for international cooperation to face global energy availability (Evans, 2010) and (Hyman, 2014). A structured *tax* policy encourages existing energy production, energy conservation and alternative energy resource (Leighty & Lin, 2012 and Lazarri, 2008). In contrast, our study reveals that a monetary aspect like inflation and interest rate do not contribute to successfulness of an energy policy. Monetary policy alters the inflation target to manage fluctuation in energy prices by

stabilized energy supply shock for a short time period, thereby it is not intended to cope with the sustainability of energy security (Gavin, Keen, & Kydland, 2013). We also found that cost of living does not contribute to successful energy policy. According to Fankhauser & Tepic (2007), we found that an interruption on energy tariff reform by a few years makes insignificant difference to address on the affordability issue, therefore not be an effective way to mitigate the social impact of energy policy.

Social acceptance drives policy success or failure. Our study reveals that communication, attitudes & belief and health & safety are the most important factors to promote social acceptance. It confirms our literature study by Jamieson, Kahan, & Scheufele (2017) and Gostin & Wiley (2016), that explain the role of *communication* in the context of social relationship is to foster transparency and comprehension on policy implementation. The role of *attitudes & belief* is to affect individual motivation and preferences to participate on policy implementation, and the role of *health and safety* will mitigate health concern prior enactment of an energy policy (Songsore & Buzzelli, 2014). Moreover, we found out that demographic, historical issue, education, and ethnic background do not contribute to the successfulness of energy policy. According to Yang, Zhang, & Zhao, (2016) the effects of *socio-demographics* sometimes vary according to cultural contexts depending upon family income, education, etc. and thus policy measures would be more effective when targeted at specific groups and specific behaviors. In our study, this specific behavior has already been well explained by *attitude* and *belief* indicator. We also learn that a *historical issue* is a consequence of policy learning and might not affect significantly to the energy making (Waite, 2004). Despite increased in *education* levels in the last few decades, the share of workers earning poverty wages about the same as in 1973 and thus very little contribution to social problem nor public policy (Anyon, 2014). We also learn that economic growth helps *ethnic* accommodation (Young, 1994), thereby it does not directly impact the energy policy and will be better explained by economics indicators.

Technology's contribution to public policy is meant to get political and administrative influence (Dunn, 2012). In a specific case of energy, for example, the successfulness of energy policy, especially in climate-

related policy, depends upon green energy *technology* (Reuster, Schwenen, Finger, & Glachant, 2014), therefore the advancement of technology is essential to build political influence. Our study reveals that the role of technology to form successful characteristics of energy policy is by promoting *Research and Development, Technological Change, and Technological Incentives*. Literature from Wicken (2007) and Christiansen (2001) strengthen our findings that there was a wide acceptance that research-driven industrial development was essential for imminent development and welfare, and how *technological change* facilitate a larger scale and more extensive policy targets. *Technology incentives* is also crucial to ensure investment and the deployment of modern technologies to impact the economy. However, our research reveals that infrastructure and intellectual property are not contributing to the successfulness of energy policy. These findings confirm literatures from Lemley, Menell, and Merges (2016) and Goldthau (2014) that *intellectual property* framing offers relatively little clarity for public policy, and the development of physical energy *infrastructure* is followed with socio-economic institutions, where social players and norms may be reluctant to change, and this may delay energy policy implementation in the field.

6. Conclusion

This paper is a study of the IEA's characteristics of successful energy policy defined by indicators contained in the PEST (Politics, Economics, Social and Technological) framework. We contribute to the methodology used by preceding literature by Dermont, Ingold, Kammerman, & Stadelmann-Steffen (2017) and Butler, Demski, Parkhill, Pidgeon, & Spence (2015) regarding framing social and public acceptance on energy policy. We generate a broader conceptual framework from more comprehensive aspects of politics, economics, social and technological to explain the successful characteristics of energy policy. We also enrich literature by Newton (2013) and Aguiler (1967) by providing a further application of PEST framework.

From evidence which also is confirmed by relevant literature, this paper describes determinant indicators that are very dominant in influencing the characteristics of successful energy policy, which are government leadership, globalization, social attitudes and technological neutral. Therefore, the government as a policy sponsor can consider these aspects when formulating and implementing energy policy.

The conceptual framework developed from this qualitative study reveals indicators that impact the success of each energy policy. It may be referred to in subsequent study for more emphasis on empirical measures for each indicator that leads to security of energy in OECD countries.

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Figure 1. Study Process

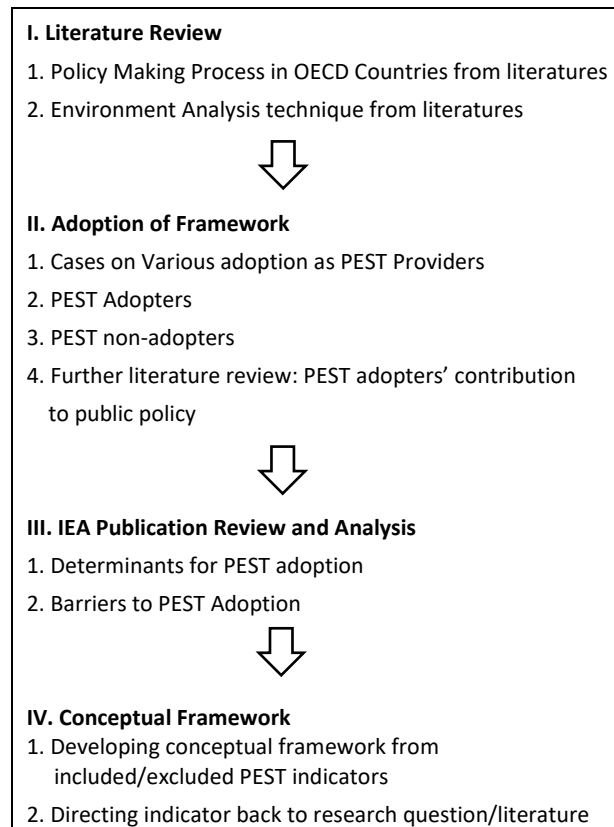


Figure 2. Conceptual Framework of Successful Characteristics for Energy Policy from PEST Adoption

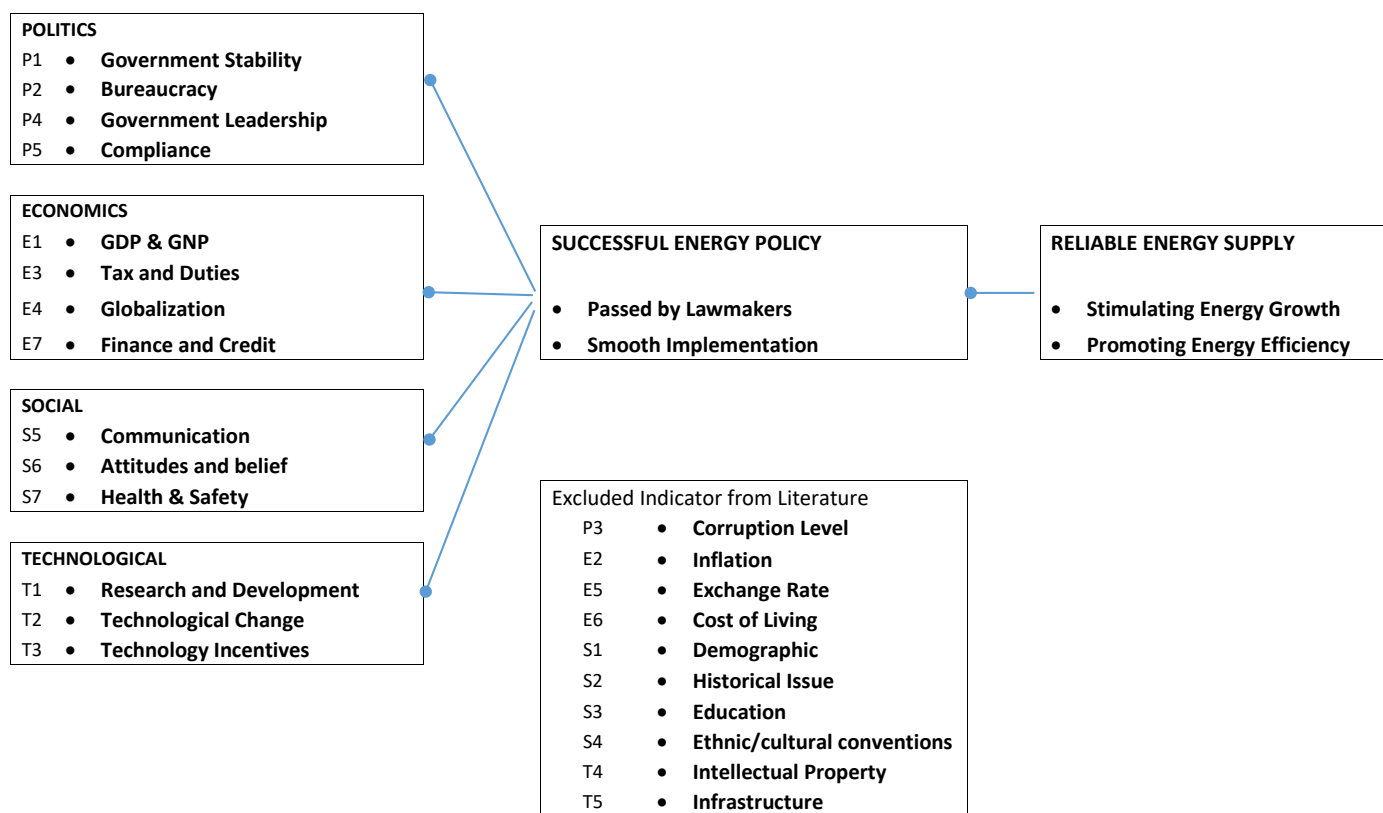


Table 1. "Policy Cycle Stages" Chapman, McLellan and Tezuka (2016). p.3

Author	Howard (2005)	Howlett and Ramesh (2003)	Jann and Wegrich (2007)
Policy Cycle Stages	Agenda setting or problem identification	Agenda setting	Agenda setting: problem recognition and issue selection
	Analysis of the policy issue(s)		
	Formulation of policy responses	Policy formulation	Policy formulation and
	Decision to adopt a specific policy response	Public policy decision making	decision making
	Implementation of the chosen policy	Policy implementation	Implementation
	Evaluation of the policy	Policy evaluation	Evaluation and termination

Table 2. Adoption Framework of PEST Analysis by Newton (2013) and Aguilar (1967)

Indicator	PEST Indicator	Variable Explanation	Frequency
	A. Political		
P1	• Government Stability	• Durability and integrity of current regime.	1
P2	• Bureaucracy	• A system of administration	5
P3	• Corruption Level	• levels of corruption, as determined by expert assessments and opinion surveys.	-
P4	• Government Leadership	• Government influence in Society and Political arena	6
P5	• Compliance	• Adherence to laws, regulations, guidelines and specifications	1
	B. Economic		
E1	• GDP & GNP	• Measurement of economics growth	1
E2	• Inflation	• A general increase in prices and fall in the purchasing value of money	-
E3	• Tax and Duties	• Stimulus or penalties imposed to encourage an economic activity	1
E4	• Globalization	• The process of international integration	4
E5	• Exchange Rate	• The price of a nation's currency in terms of another currency	-
E6	• Cost of Living	• Cost of maintaining a certain standard of living	-
E7	• Finance and Credit	• Monetary benefit offered to consumers, employees and organizations to encourage spending	3
	C. Social		
S1	• Demographic	• A particular sector structure of population	-
S2	• Historical Issue	• Concerned with past events	-
S3	• Education	• Formal process of acquiring general knowledge	-
S4	• Ethnic/cultural conventions	• Population subgroup	-
S5	• Communication	• The imparting or exchanging of information or news	2
S6	• Attitudes and belief	• A settled way of thinking, typically one that is reflected in a person's behavior	9
S7	• Health & Safety	• Procedures intended to prevent accident or injury in public environments	2
	D. Technological	□	
T1	• Research and Development	• Work directed toward the innovation, introduction, and improvement of products and processes	2
T2	• Technological Change	• Overall process of invention, innovation and diffusion of technology or processes	5
T3	• Technology Incentives	• Benefit offered to producer to encourage technology advancement	2
T4	• Intellectual Property	• creations of the mind, such as inventions used in commerce	-
T5	• Infrastructure	• the basic physical and organizational structures and facilities	-