STUDY OF DATA ANALYTICS FRAMEWORK ADOPTED BY THINK TANKS

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ABSTRACT
This research paper focuses on the study and analysis of various frameworks adopted by think tanks for data analysis. Think tanks are policy research organizations involved in public policy research. Think tanks work in sync with multiple entities such as government, civil societies, and institutions as well as various governments internal departments. Think tanks work on various subject areas and generate a huge amount of data that need to be processed to gain insights. Think tanks use multiple methods, procedures, tools, and technologies for data analysis.

The data analytics framework provides a platform for think tanks to analyze data for research activities. A data analytics framework is a structured data analysis approach involving several crucial steps or stages. The framework provides a systematic way to manage data and extract meaningful insights from underlying data. There are many frameworks available and used by think tanks based on requirements and what think tanks need to achieve. Framework is a generic term and consists of various components such as tools, technologies, processes, and procedures. Frameworks vary as per use case, and it's crucial to understand their variation for possible framework adoption.
Keywords: Think Tanks, Data Insights, Analytics Platform, Analytics Frameworks

Introduction

Think tanks are organizations that conduct research and provide analysis and recommendations on policy issues. To generate the recommendation based on insights, think tanks conducts and extensive data gathering to support the recommendations. The data generated through various sources such as surveys, research studies, and polls. They may conduct original research using primary sources such as interviews, focus groups, and field observations, or they may analyze secondary sources such as government data, academic research, and news articles. Some think tanks also use advanced data analysis techniques such as machine learning and big data analytics to extract insights from large datasets. Think tanks may also commission outside experts or academic institutions to conduct research on specific topics.

Data analytics can be a useful tool for think tanks to gather, analyze, and interpret large datasets in order to inform their research and policy recommendations.

Think tanks uses a variety of data sources for their analytics, including government data, survey data, and other publicly available datasets. They may also commission their own studies and collect their own data through methods such as surveys and experiments. In some cases, think tanks may also use advanced techniques such as machine learning to analyze large and complex datasets.

Think tanks rely on data-driven research to inform their policy recommendations and advance their mission.

Literrature Review

Falk (2021) explains how BI formulates a public policy and is nonpartisan data driven think tanks work on various topics. The research, analytics and policy recommendations generated by baker institute helps to make informed decisions by policy makers, business leaders. Bakers institute conducts research on wide range of domestic and foreign challenges and issues.

Baker institute creates an fact based, independent research using available and aquired primary data specific for certain scenarios and use cases. Bakers institute uses various tools and technologies to conduct research. For various scenarios they used different data analytrical framework to meet the need.

Bolczak (2003) states how MIC for Data-Driven Policy, generate an objective based, evidence based and non partisan research on various issues faced by nation and provide insights to govenment policy making. Institute work in public domain and serves public interest across various government departments and work in partnership with industry and academia. They work in data science, artificial intelligence, quantum computing,

health informatics, space security, cyber threats, economics and public policy to name a few. Mitre Institute used advance analytical tools, methodologies to generate information or insights from raw data. Foo this they uses various data analytical frameworks.

Korte (2014) explains how the collection, analysis, and consumption of huge amounts of data will have the potential to generate huge social and economic benefits, but to effectively capitalize on these opportunities will require public policies designed to allow data-driven innovation. The Center for Data Innovation is the leading think tank studying the interaction between data, technology, processes, methods and public policy.

The CDI formulates and promotes public policies designed to maximize the benefits of data-driven insights and innovation in the public and private sectors. CDI educates policymakers and the public regarding the opportunities and challenges with data, as well as technology trends such as open source data processing tools, artificial intelligence, and the Machine Learning.

The CDI is a the nonprofit, nonpartisan Information Technology and Innovation Foundation (ITIF), the think tank works on science and technology policy. CDI provides supports include a wide range of services to other organization.

Atkinson (2020) explains how ITIF is an independent nonprofit, nonpartisan research and educational institute that has been recognized repeatedly as the world's leading think tank for science and technology policy. ITIF's work on to formulate, evaluate, and promote policy solutions that accelerate innovation and boost productivity to improve growth, opportunity, and progress. ITIF's provides policymakers with high-quality information, analysis, and actionable insights. ITIF adheres to a high standard in research integrity with an internal code of ethics in analytical rigor, original thinking, policy pragmatism, and research independence.

Tufte (1974) explains a data analytics framework is a set of systematic processes, methods, and tools used to extract insights and knowledge from data. It provides a structured approach to collecting, cleaning, transforming, modeling, and visualizing data, and helps ensure that data analysis is repeatable, consistent, and scalable. Some popular data analytics frameworks include the Cross-Industry Standard Process for Data Mining (CRISP-DM), the SEMMA, and the KDD process.

Gottlieb and Roggendorf (2015) provides organization with reliable, policy analysis and primary original reseach. They generates an based insights and knowledge which helps with actionable impact at various levels. Adopt tools, technologies and domain information to generate insights.

Espey and Cordoba and Schonrock (2023) explains how cepei is global think tank, works on decision-making, availing open data across regions and sectors and expanding the production use cases. They provide solution to suistainable development through data and analysis. They generate knowledge out of raw data which further supports and addreses reginal and global sustainable challenges and issues.

Hwang (2021) propose evidence based policy making which connecting distributed, diverse set of data to generate insights from raw data. Which further helps institutes to make knowledge decisions.

Veenstra and Kotterink (2017) helps in undestanding publicly discussed policy alternatives. Information provision is crucial and open society foundation helps think tanks to improve ability to accesss analytics and communicate further these analysis in better way. Helps in building customized solution to improve end user interaction with underlying data and insights.

Driss (2015) explains how social media data analysis need to work with various governments, academic and private institutes to create proprietary data pipelines for data analysis. Which further helps governments to make and acccess underlying silos of data with ease. Data tech ecosystem framework includes process, procedures, tools and technologies cater for distinct use case, whcih helps to transform raw data into insights.

Objectives

to study the data analytics frameworks adopted by think tanks
to study the need, benefits, type, challenges in adopting the analytics frameworks

Purpose of Analytical Framework

Data analytics can be a useful tool for think tanks to analyze and interpret large amounts of data, identify trends and patterns, and draw conclusions and make recommendations based on their findings. Think tanks may use

data analytics to inform their research on a wide range of issues, such as economic policy, healthcare, education, and international relations.

Think tanks uses various data sources, such as government data, survey data, and other publicly available data, to support their research.

They also use data analytics techniques, such as statistical analysis and machine learning, to analyze and interpret the data.

Data analytics helps think tanks to make more informed and evidence-based recommendations on policy issues. It also help them to communicate their findings more effectively, by visualizing data and presenting it in a way that is easy to understand and interpret.

It is important for think tanks to ensure that they use data analytics responsibly and ethically, by properly assessing the quality and reliability of their data sources, and by being transparent about their methods and findings.

Think tanks use data analytics for the following purposes:

- Collecting and organizing data**:** A framework can help think tanks collect and organize data from a variety of sources, including surveys, research studies, and public records.
- Combine the data from different sources: A framework provides a way to consolidate and combine data sourced from various system, databases and sources.
- Analyzing data: A framework can provide a structure for analyzing data and identifying trends, patterns, and relationships that can inform policy recommendations.
- Communicating findings: A framework can help think tanks communicate their findings in a clear and concise manner, using visualization tools and other techniques to make the data more accessible to policymakers and the public.
- Collaborating with other organizations: A framework can facilitate collaboration with other think tanks, researchers, and policy experts by providing a common structure and set of tools for analyzing and discussing data.
- Staying up to date: A framework can help think tanks stay up to date with the latest methods and tools for data analytics, and ensure that their research is rigorous and reliable.
- Improve the accuracy and reliability of their research: By carefully defining their research question and choosing appropriate data sources, think tanks can ensure that their research is based on high-quality data.
- Save time and resources: A well-designed data analytics framework can streamline the data collection and analysis process, allowing think tanks to be more efficient and cost-effective in their research efforts.
- Communicate findings effectively: A robust data analytics framework can help think tanks present their findings in a clear and concise manner, using visualizations and other tools to illustrate their points and make their research more accessible to a wider audience.
- Ensure the integrity and reliability of the data analysis process: By following a structured framework, think tanks can ensure that their data collection and analysis processes are transparent and replicable, which helps to build trust in their research.
- Facilitate the discovery of new insights: By systematically exploring and analyzing data, think tanks can uncover patterns and trends that may not have been immediately apparent. This can lead to new insights and understanding of the issue being studied.
- Inform decision-making: Think tanks often use data analysis to inform policy recommendations or other types of decision-making. A robust data analytics framework can help ensure that these decisions are based on sound evidence and analysis.
- Enhance the impact of research: By presenting the results of data analysis in a clear and visually appealing manner, think tanks can more effectively communicate their findings to a wide audience. This can help to increase the impact and influence of their research.

Factors affecting on selection of Data Analytic Framework

There are a few key factors need to consider while developing a data analytics framework for a think tank,

- **Define the research question or problem:** Clearly identify the question or problem that you are trying to address with your data analysis. This will help guide your data collection and analysis efforts.
- **Choose the appropriate data sources:** Determine what data sources will be most relevant and reliable for answering your research question. These could include public datasets, surveys, or other primary research.

- **Clean and prepare the data:** Ensure that your data is accurate and in a usable format by cleaning and preparing it for analysis. This may involve correcting errors, filling in missing values, or merging different datasets.
- **Analyze the data:** Use statistical and analytical techniques to explore and understand the relationships within your data. This may involve creating graphs, running regressions, or performing other types of analysis.
- **Communicate the results:** Present your findings in a clear and concise manner, using charts, graphs, and other visualizations to help illustrate your points. Make sure to carefully interpret the results and consider their implications for your research question.

By following above steps, think tanks can develops a robust data analytics framework that will help to effectively use data to make inform research and drive organization's mission forward.

Use Cases of Data Analytic Framework
Data analytics help think tanks in following scenarios,

- Explore trends and patterns from data, such as changes in economic indicators over time or the impacts of policy interventions on specific populations.
- Conduct statistical analyses to test hypotheses and draw conclusions about the relationships between different variables.
- Identify and visualize key insights and findings in a clear and compelling way, using tools such as charts, graphs, and maps.
- Monitor and track changes in data over time, and use this information to update and refine their policy recommendations as needed.
- Make data-driven decisions about program design and evaluation.
- To produce high-quality research that can have a meaningful impact on public policy.

Frameworks
There are various frameworks that think tanks uses to structure their data analytics efforts, process formulation, and methodology formulation,

1) CRISP-DM
2) KDD
3) DMAIC
4) PESTLE
5) SEMMA
6) CYNEFIN

CRISP-DM (Cross-Industry Standard Process for Data Mining)
CRISP-DM is a process model describes the life cycle of data mining. It is a process model for data mining projects that provides a structured approach to planning, designing, executing and evaluating data analysis projects.

CRISP-DM is a widely used framework that consists of six phases:
1. Business Understanding
2. Data Understanding
3. Data Preparation
4. Modeling
5. Evaluation
6. Deployment

CRISP-DM methodology is widely used in the field of data science and helps ensure that all necessary steps are taken in a systematic and organized manner, leading to successful completion of data mining projects.

This framework helps organizations understand the problem they are trying to solve, identify relevant data, clean and prepare the data, build and test models, and deploy the results.

Figure 1. CRISP-DM

Pros of CRISP-DM:

- Structured Approach: CRISP-DM provides a well-structured and organized approach to data mining projects, which helps ensure that all necessary steps are taken and nothing is overlooked.
- Flexibility: The CRISP-DM methodology is flexible and can be adapted to different types of data mining projects, making it suitable for a wide range of industries and applications.
- Industry Standard: CRISP-DM is widely recognized and accepted as a standard methodology in the field of data mining. This means that it is well supported by tools and resources, and it is easier for organizations to find experts who are familiar with the methodology.
- Focuses on Business Objectives: CRISP-DM places a strong emphasis on ensuring that data mining projects align with business objectives and deliver value to the organization.

Cons of CRISP-DM:

- Lengthy Process: CRISP-DM is a comprehensive methodology that covers all aspects of data mining projects. This can make the process lengthy and time-consuming, which may not be suitable for projects with tight timelines.
- Limited Customization: The standardized nature of CRISP-DM may limit the ability to tailor the methodology to specific projects or organizations.
- Reliance on Expertise: CRISP-DM requires a certain level of expertise in data mining and analytics to be effective, which can make it challenging for organizations with limited resources.
- Rigidness: The structured approach of CRISP-DM can be inflexible, making it difficult to pivot or change direction during the course of a project.

KDD (Knowledge Discovery in Databases)

KDD framework helps organizations identify relevant data, clean and prepare the data, apply data mining techniques, interpret and evaluate the results, and use the results to make decisions. KDD is the organized process of recognizing valid, useful, and understandable design from large and complex data sets. It defines the broad process of discovering knowledge in data and emphasizes the high-level applications of definite data mining techniques.

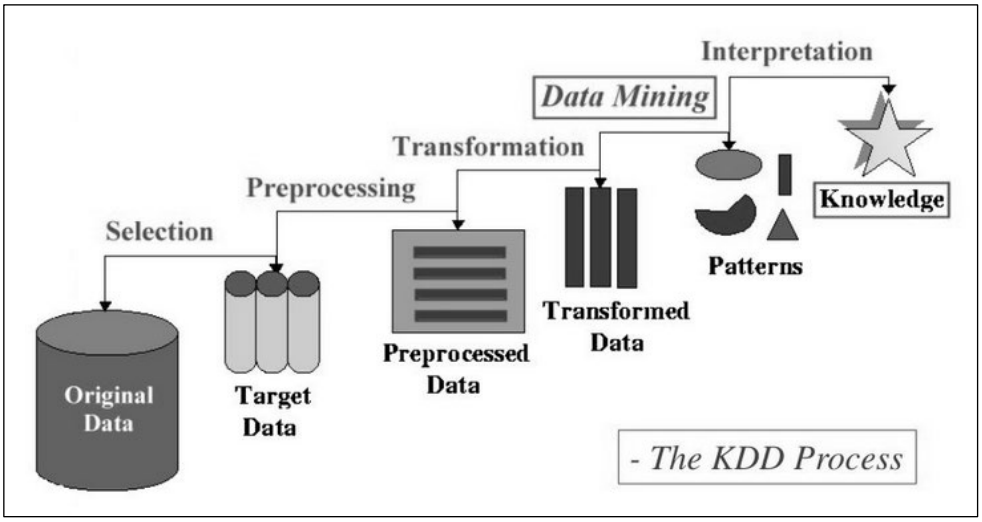

Figure 2. KDD

KDD framework consists of seven steps:

1. Selection
2. Pre-processing
3. Transformation
4. Data mining
5. Interpretation/evaluation
6. Decision making
7. Deployment

Pros of KDD:

- Automated Process: KDD relies on automated algorithms and techniques to extract knowledge from data, making it more efficient and scalable than manual methods.
- Discovery of Hidden Patterns: KDD is able to uncover hidden patterns and relationships within data, which can lead to new insights and discoveries.
- Data Integration: KDD can integrate data from multiple sources, making it possible to uncover insights that would be missed if data were analyzed in isolation.
- Improved Decision Making: By providing access to more complete and accurate information, KDD can support better decision making in organizations
- KDD helps to identify and predict consumer trends. In addition, it also focuses on predicting other types of products consumers might be willing to use. It helps businesses attain a competitive advantage over others in their field.
- KDD is an iterative procedure where knowledge acquired gets transmitted back into the process (to the start of the cycle), enhancing the efficacy of established objectives.
- KDD helps identify anomalies efficiently because the entire process segregates working into different steps. If we find an issue or vagueness at any stage, we can trace back and verify the actions and proceed accordingly.

Cons of KDD:

- This process fails to address many issues that modern realities of data science projects face, such as data ethics, the chosen data architecture, roles of several teams, and their associated members.
- The process is time-consuming because it has to cycle back from the initial phase of the process to refine the established objectives.
- Data security is another aspect of this process. It's a fact that businesses mainly look for ways to understand their customers better than possible. It means they look for more data and securing it is undoubtedly essential. KDD works with data but fails to assure its security.
- If the business objectives are not clear, the process will fail miserably. That's why it is essential to define the problem and the objectives clearly at the start of the project.
- The completion time of a data science project using KDD is sometimes unclear because of some undeniable tasks.
- Data Quality: The quality of the output from KDD is only as good as the quality of the input data, so it is essential to have clean, accurate, and complete data to begin with.

- Requires Technical Expertise: KDD requires a certain level of technical expertise in data analysis and statistics, which can limit its accessibility to some organizations.
- Over fitting: KDD algorithms may over fit the data and produce results that are not generalizable to new data, making it important to validate the results.
- Privacy Concerns: KDD can uncover sensitive and personal information, leading to privacy and security concerns if proper safeguards are not in place.

DMAIC (Define, Measure, Analyze, Improve, Control) DMAIC process is a framework used in Six Sigma, a methodology for improving business processes. It is an approach used in Six Sigma methodology to improve processes and solve problems which is adopted by think tanks for data analytics framework improvement.

The DMAIC process consists of five steps:

1. **Define:** Identify the problem and define the project scope and objectives. Define the problem.
2. **Measure:** Collect data and quantify the current performance of the process. Measure the current state of the process.
3. **Analyze:** Identify the root cause of the problem and determine the relationships between variables. Analyze the root causes of the problem.
4. **Improve:** Develop and implement solutions to improve the process. Improve the process.
5. **Control:** Establish control systems to ensure the solution is sustained and monitor the process to prevent future problems.
6. Control the improved process to ensure that the improvements are sustained.

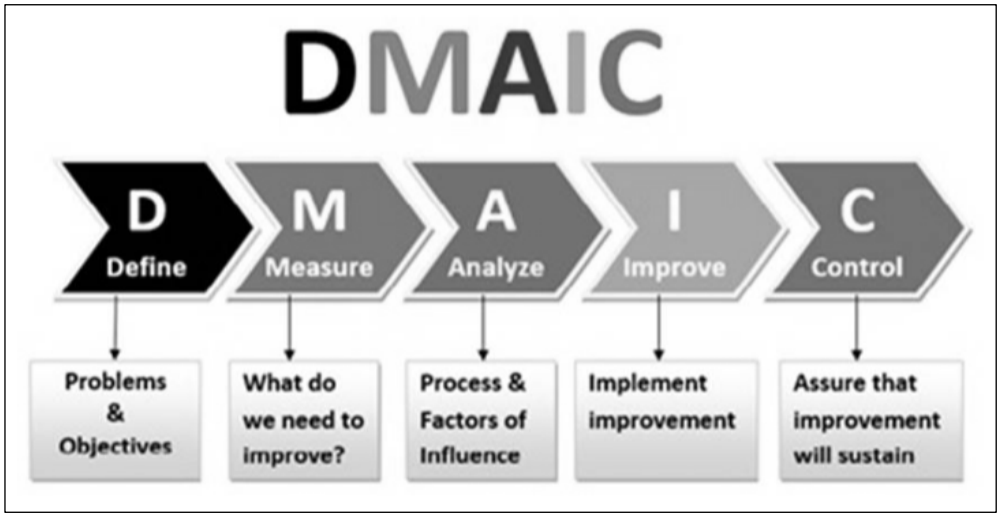

Figure 3. DMAIC

Pros of DMAIC:

- Structured Approach: DMAIC provides a structured and systematic approach to problem solving, which helps ensure that all necessary steps are taken and nothing is overlooked.
- Focuses on Process Improvement: DMAIC is designed to help organizations identify and eliminate sources of variability and improve processes, leading to better outcomes and increased efficiency.
- Data-Driven: DMAIC is a data-driven approach to problem solving, which helps organizations make decisions based on facts and evidence, rather than intuition or assumptions.
- Improved Quality: By eliminating sources of variability and improving processes, DMAIC can lead to improved quality and reduced defects.

Cons of DMAIC:

- Lengthy Process: The DMAIC methodology can be time-consuming, which may not be suitable for organizations with tight timelines or immediate needs for improvement.
- Requires Technical Expertise: DMAIC requires a certain level of technical expertise in data analysis and statistics, which can limit its accessibility to some organizations.

- Reliance on Data: DMAIC relies on data to drive decision making, so it is important to have accurate and complete data to begin with.

- Resistance to Change: Implementing changes based on the results of a DMAIC project can be challenging, as it may require buy-in and support from stakeholders who may resist change.

PESTLE (Political, Economic, Sociological, Technological, Legal, Environmental)
PESTLE analysis is a framework used to analyze the external factors that can impact an organization. It is a framework used in business and marketing to analyze the macro-environmental factors that impact an organization or industry.

This framework helps organizations understand,

1. **Political:** Refers to the impact of government policies and regulations on business operations.
2. **Economic:** Refers to economic indicators such as inflation, interest rates, and economic growth.
3. **Sociocultural:** Refers to demographic and cultural factors that impact consumer behavior.
4. **Technological:** Refers to the impact of technological advancements on the business and industry.
5. **Legal:** Refers to the impact of laws and regulations on the business and industry.
6. **Environmental:** Refers to environmental issues such as climate change and sustainability.

These factors may influence the work of think tanks. Think tanks can choose the framework that best fits their needs and goals, and adapt it as necessary to meet their specific data analytics requirements.

Figure 4. PESTLE

Pros of PESTLE analysis:
- **Comprehensive:** PESTLE analysis takes into account a wide range of factors that can impact an organization, providing a comprehensive overview of the external environment.
- **Facilitates planning:** By identifying potential threats and opportunities, PESTLE analysis can help organizations make informed decisions and plan effectively for the future.
- **Identifies trends:** PESTLE analysis can help organizations identify trends and changes in the external environment, allowing them to adapt and stay ahead of the competition.
- **Improves decision-making:** By considering a range of factors, PESTLE analysis can provide a more informed and well-rounded perspective, which can improve decision-making.

Cons of PESTLE analysis:
- **Time-consuming:** Conducting a thorough PESTLE analysis can be time-consuming and requires a significant investment of resources.

- **Limited scope:** PESTLE analysis focuses solely on macro-environmental factors, ignoring internal factors that can also impact an organization.
- **Data overload:** The wide range of factors considered in PESTLE analysis can lead to an overwhelming amount of data, making it difficult to prioritize information.
- **Lack of detail:** PESTLE analysis provides a broad overview of external factors, but does not delve into specific details or intricacies.

SEMMA (Sample, Explore, Modify, Model, and Assess)

SEMMA data mining methodology used to solve a range of business problems, includes fraud detection, customer retention and turnover improvement, marketing, customer loyalty, bankruptcy forecasting, user market segmentation, risk, affinity, and portfolio analysis.

SEMMA methodology on data mining and machine learning projects to achieve a competitive advantage, improve performance, and deliver more useful services.

The phases of SEMMA are as follows,

1. **Sample:** The process starts with data sampling, e.g., selecting the data set for modeling. The data set should be large enough to contain enough information to retrieve, and small enough to be use efficiently.
2. **Explore:** This phase covers the understanding of the data by discovering anticipated and unanticipated relationships between the variables, and also abnormalities, with the help of data visualization.
3. **Modify:** The Modify phase contains methods to select, create and transform variables in preparation for data modeling.
4. **Model:** In the Model phase the focus is on applying various modeling (data mining) techniques on the prepared variables in order to create models that possibly provide the desired outcome.
5. **Assess:** The evaluation of the modeling results shows the reliability and usefulness of the created models.

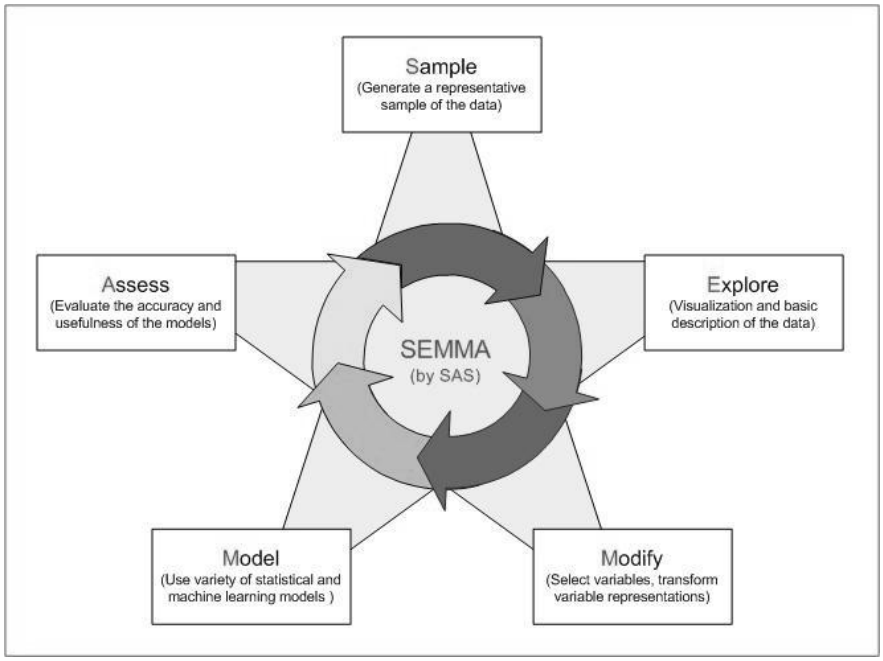

Figure 5. SEMMA

Pros of SEMMA:

1. Comprehensive Approach: SEMMA provides a comprehensive approach to data mining that covers all aspects of the process, from data preparation to model selection.

2. User-Friendly: SAS Enterprise Miner is designed to be user-friendly, making it accessible to a wide range of users, regardless of their technical background.

3. Integration with SAS Software: SEMMA is tightly integrated with SAS software, providing access to a wide range of tools and resources for data analysis and visualization.

4. Scalable: SEMMA can handle large and complex data sets, making it suitable for organizations with large amounts of data.

Cons of SEMMA:

1. Reliance on SAS Software: SEMMA is only available within SAS Enterprise Miner, so organizations need to have access to this software in order to use the methodology.

2. Cost: SAS Enterprise Miner can be expensive, which may limit its accessibility to some organizations.

3. Requires Technical Expertise: SEMMA requires a certain level of technical expertise in data analysis and statistics, which can limit its accessibility to some organizations.

4. Limited Customization: The standardized nature of SEMMA may limit the ability to tailor the methodology to specific projects or organizations.

SWOT analysis

SWAT analysis is used to identify an organization's strengths, weaknesses, opportunities, and threats. Think tanks can use this framework to assess their own internal capabilities and to identify external factors that could impact their work. SWOT Analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of an organization or project.

1. **Strengths:** Refers to the unique and favorable attributes, skills, or resources that give an organization a competitive advantage in the market.
2. **Weaknesses:** Refers to the areas of an organization that require improvement, such as inadequate resources, poor processes, or low morale.
3. **Opportunities:** Refers to external factors that can be leveraged to support growth, such as changes in the market, new technologies, or untapped customer segments.
4. **Threats:** Refers to external factors that could negatively impact the organization, such as increased competition, economic downturns, or regulatory changes.

SWOT Analysis is often used in combination with other planning tools, such as PESTLE Analysis (Political, Economic, Sociocultural, Technological, Legal, and Environmental factors) or Porter's Five Forces (Rivalry, Threat of New Entrants, Threat of Substitute Products or Services, Bargaining Power of Suppliers, and Bargaining Power of Buyers), to gain a comprehensive understanding of the factors impacting an organization.

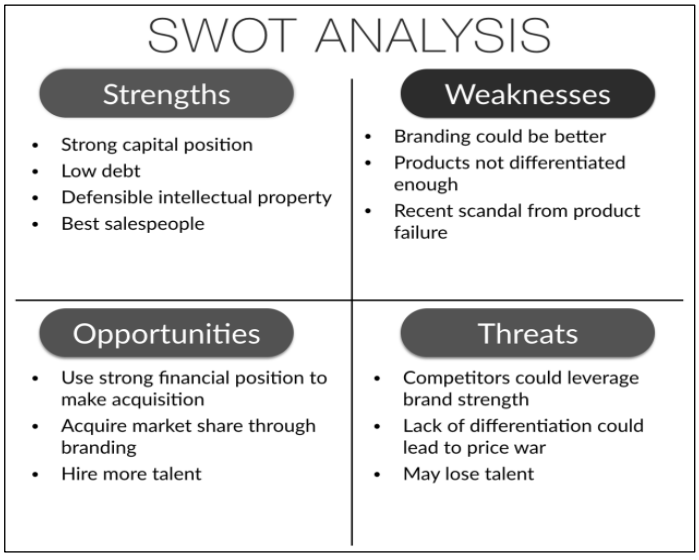

Figure 6. SWOT

Pros of SWOT Analysis:

- Provides a Structured Approach: SWOT Analysis provides a structured and systematic approach to evaluating an organization's strengths, weaknesses, opportunities, and threats, which can help ensure that all relevant factors are considered.
- Facilitates Strategic Planning: By identifying internal and external factors that can impact the organization, SWOT Analysis can help organizations prioritize and allocate resources to achieve their goals.
- Encourages Collaboration: SWOT Analysis often involves input from multiple stakeholders, which can help build consensus and facilitate collaboration within an organization.
- Helps Identify Opportunities for Growth: By identifying opportunities for growth and improvement, SWOT Analysis can help organizations take advantage of new opportunities and position themselves for success.

Cons of SWOT Analysis:

- Limited Focus on Implementation: SWOT Analysis provides a useful framework for identifying strengths, weaknesses, opportunities, and threats, it does not provide a road map for implementing solutions or addressing identified challenges.
- Over reliance on External Factors: SWOT Analysis tends to focus heavily on external factors that may be beyond an organization's control, which can limit its ability to identify and address internal weaknesses and opportunities.
- Risk of Bias: Because SWOT Analysis relies on subjective assessments of strengths, weaknesses, opportunities, and threats, it is subject to the biases and perspectives of the individuals involved in the analysis.
- May Overlook Key Factors: SWOT Analysis is only as comprehensive as the data and information available to the organization, so it may overlook key factors that could impact the organization.

Policy cycle

This framework consists of a series of steps that policy-makers go through when developing and implementing policy. Think tanks can use this framework to understand the policy-making process and to identify opportunities to influence policy decisions at different stages.

The policy cycle framework is a model used to describe the various stages and steps involved in the development and implementation of public policies.
It typically includes the following stages:

1. **Agenda Setting:** This stage involves identifying and prioritizing policy issues that need to be addressed.

2. **Policy Formulation:** In this stage, policy options are developed and evaluated based on their potential impact, feasibility, and costs.

3. **Adoption:** This stage involves making decisions on which policies to implement and securing the necessary approvals and funding.

4. **Implementation:** This stage involves putting the policies into action, including the development of regulations, the allocation of resources, and the establishment of programs and services.

5. **Evaluation:** This stage involves monitoring and assessing the outcomes of the policies to determine their effectiveness and identify areas for improvement.

6. **Revision:** This stage involves making changes to policies based on the results of the evaluation, with the goal of improving their impact and effectiveness.

The policy cycle framework is a useful tool for understanding the complex and interrelated processes involved in policymaking, and for ensuring that policies are developed and implemented in a comprehensive and effective manner.

Pros of the Policy Cycle Framework:

- Provides a Structured Approach: The policy cycle framework provides a structured and systematic approach to policymaking, which can help ensure that all relevant factors are considered and that policies are implemented effectively.

- Facilitates Evidence-Based Policymaking: The evaluation stage of the policy cycle framework encourages the use of data and evidence to assess the impact of policies and make informed decisions about future actions.
- Encourages Continual Improvement: The revision stage of the policy cycle framework provides opportunities for continuous improvement of policies based on the results of evaluations, helping to ensure that policies remain relevant and effective over time.
- Supports Transparency and Accountability: The policy cycle framework provides a clear and understandable process for policymaking, which can help build public trust and increase accountability for policy decisions.

Cons of the Policy Cycle Framework

- Risk of Implementation Delay: The length of time required to complete each stage of the policy cycle can result in delays in the implementation of policies, which can limit their effectiveness.
- Limited Flexibility: The structured and systematic approach of the policy cycle framework can limit the flexibility of policymakers to respond quickly and effectively to emerging issues and challenges.
- Risk of Political Influence: The policymaking process can be influenced by political considerations, which can limit the objective consideration of evidence and the development of effective policies.
- Risk of Lack of Resources: The resources required to complete each stage of the policy cycle, including the development of data and evidence, can be limited, which can impact the quality of policies and their outcomes.

Cynefin framework

The Cynefin framework is a model for understanding and making decisions in complex systems. It was developed by Dave Snowden and is used to help individuals and organizations make sense of complex situations and determine the best course of action.

The Cynefin framework categorizes situations into five domains:

1. **Simple:** This domain is characterized by clear cause-and-effect relationships and a straightforward solution can be identified through best practice or common sense.
2. **Complicated:** This domain requires expert knowledge and analysis to identify the best solution.
3. **Complex:** This domain is characterized by emergent behavior and many interconnected variables, making it difficult to predict outcomes. The best approach in this domain is to sense, probe, and respond.
4. **Chaotic:** This domain is characterized by rapid change and unpredictability, and the only way to proceed is to take action to establish temporary order.
5. **Confuse:** This domain occurs when it is unclear which of the other four domains a situation belongs to, and the first step is to establish the appropriate domain.

The Cynefin framework is useful in providing a clear and flexible approach to decision making in complex situations, and can help organizations identify the most appropriate approach to managing complex challenges and opportunities.

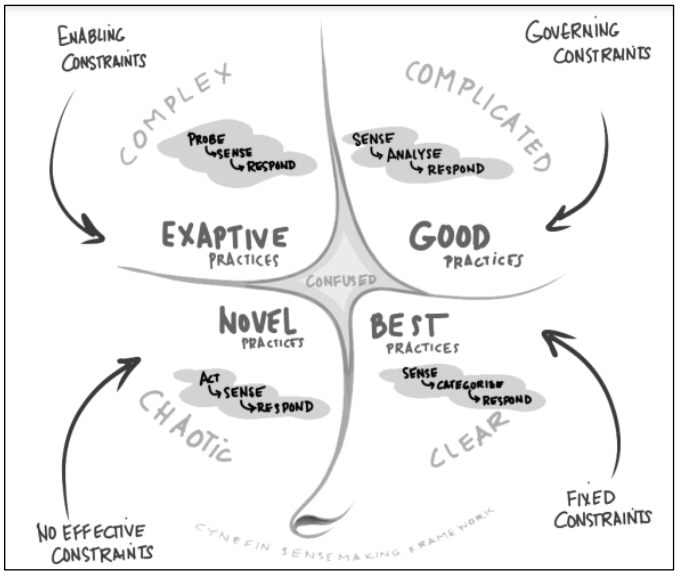

Figure 7. CYNEFIN

Pros of the Cynefin Framework:

- Facilitates Understanding of Complex Systems: The Cynefin framework provides a clear and concise model for understanding complex systems, which can help individuals and organizations make better decisions in these situations.
- Supports Evidence-Based Decisions: The framework emphasizes the importance of gathering data and evidence to support decision making, particularly in complex situations where traditional approaches may not be effective.
- Encourages Appropriate Responses: By categorizing situations into different domains, the Cynefin framework helps individuals and organizations determine the most appropriate response for each situation, whether it be a straightforward solution or a more complex, adaptive approach.
- Improves Decision Making: The Cynefin framework provides a structured and flexible approach to decision making, which can help organizations make better decisions and achieve better outcomes.

Cons of the Cynefin Framework:

1. Limited Practical Application: While the Cynefin framework is useful in theory, it may be difficult to apply in practice, particularly in complex and rapidly changing situations.
2. Risk of Over-Simplification: By categorizing complex situations into five domains, there is a risk of oversimplifying the complexity of real-world problems, which can lead to incorrect or ineffective decisions.
3. Requires Expertise: The Cynefin framework requires a high level of expertise to properly categorize situations and determine the most appropriate response, which may limit its accessibility and applicability to some individuals and organizations.
4. Limited Flexibility: The categorization of situations into five domains may limit the flexibility of individuals and organizations to adapt to new or unexpected challenges, which can reduce their ability to respond effectively.

The evidence-based policy-making framework

This framework emphasizes the importance of using high-quality evidence to inform policy decisions. Think tanks can use this framework to ensure that their research is relevant and reliable, and to identify the types of data and evidence that policy-makers need to make informed decisions. Evidence-based policy-making is a process that involves using evidence and data to inform policy decisions. The framework provides a structured approach to the use of evidence in policy-making, which helps ensure that policies are informed by the best available information and research.

The evidence-based policy-making framework typically consists of the following stages:

- **Problem definition and policy options:** Identifying the problem that needs to be addressed and considering a range of policy options to address it.
- **Evidence gathering:** Collecting data and research to inform decision-making and evaluate the impact of different policy options.
- **Evidence synthesis:** Analyzing and summarizing the evidence to inform policy decision-making.
- **Policy design:** Developing and refining policy options based on the evidence gathered and analyzed.
- **Implementation and monitoring:** Implementing the policy and monitoring its impact to evaluate its effectiveness and inform future decision-making.
- **Evaluation and revision:** Conducting an evaluation of the policy's impact and making changes as necessary to improve its effectiveness.

The evidence-based policy-making framework can help ensure that policies are based on the best available evidence, leading to more effective and efficient policies that are better aligned with the needs and interests of the public. However, it is important to note that this framework is not a panacea and must be used in combination with other policy-making tools and approaches to be truly effective.

Figure 8. The evidence-based policy-making

Pros of the Evidence-Based Policy-Making Framework:

- Improves Policy Effectiveness: By incorporating the best available evidence into policy-making, the evidence-based policy-making framework can help ensure that policies are effective in achieving their intended goals.
- Enhances Transparency and Public Trust: The use of evidence in policy-making helps increase transparency and accountability, which can improve public trust in government and decision-makers.
- Supports Data-Driven Decision-Making: The framework encourages the use of data and research to inform policy-making, which can lead to better informed and more objective decisions.
- Promotes Evidence-Based Practice: The evidence-based policy-making framework helps ensure that policies are informed by the best available evidence, which can help improve the overall quality of policy-making.

Cons of the Evidence-Based Policy-Making Framework:

- Resource-Intensive: The framework requires significant resources, including funding, staff, and expertise, to implement effectively.
- Time-Consuming: The evidence-based policy-making framework is a time-consuming process, which can slow down the policy-making process and make it more difficult to respond to rapidly changing circumstances.
- Limited Relevance of Evidence: The evidence used to inform policy-making may not always be directly relevant or applicable to a specific situation, which can limit its effectiveness.
- Bias in Evidence: Evidence can be influenced by biases or political considerations, which can lead to incorrect or incomplete decision-making.
- Limited Availability of Evidence: There may be limited data or research available to inform policy-making, particularly in areas that are new or rapidly changing, which can limit the effectiveness of the evidence-based policy-making framework.

Challenges

Challenges that think tanks face while implementing a data analytics framework,

- **Analyzing large and complex datasets:** Working with large and complex datasets can be time-consuming and require specialized skills and expertise. Think tanks may need to invest in training or hire additional staff with these skills to effectively analyze their data.
- **Limited resources:** Data analysis can be time- and resource-intensive, and think tanks may not have the necessary staff or funding to devote to these efforts.
- **Data quality and availability:** The quality and availability of data can be a challenge, particularly if the think tank is relying on external data sources that may be incomplete or unreliable.
- **Analyzing and interpreting the data:** Properly analyzing and interpreting data requires specialized skills and knowledge, which not all think tank staff may possess.
- **Communicating the results:** Presenting the results of data analysis in a clear and concise manner that is understandable to a wide audience can be challenging.

- **Ensuring the integrity of the process:** Think tanks may face scrutiny or skepticism about their data analysis methods, and it is important to ensure that the process is transparent and replicable to build trust in their research.
- **Lack of expertise:** Some think tanks may not have in-house expertise in data analysis, which can make it difficult to effectively implement a data analytics framework.
- **Privacy and security concerns:** Think tanks may need to handle sensitive data in their research, and there may be concerns about maintaining the privacy and security of this data. Ensuring that appropriate safeguards are in place can be a challenge when implementing a data analytics framework.
- **Resistance to change:** Some think tanks may be resistant to adopting new data analytics processes, especially if they have relied on traditional research methods in the past. Overcoming this resistance and convincing stakeholders to embrace a data analytics framework can be a challenge.
- **Communication and visualization:** Communicating the results of data analysis to a wide audience can be challenging, especially if the findings are complex or technical. Think tanks may need to invest in resources to help effectively visualize and communicate their results.
- **Time constraints:** Think tanks often work on tight deadlines, which can make it difficult to allocate sufficient time to data collection and analysis.
- **Access to data:** In some cases, think tanks may have difficulty accessing the data they need to answer their research questions. This may be due to privacy concerns, data availability, or other factors.

Conclusion

Data analytics can be a useful tool for think tanks to gather, analyze, and interpret large datasets in order to inform their research and policy recommendations.

Think tanks rely on data analytics to inform their research and policy recommendations. A well-designed data analytics framework allows think tanks to systematically collect, analyze, and communicate data in a way that is transparent, rigorous, and reproducible. This is important because it helps to ensure the credibility and integrity of the research being conducted.

The purpose of this study is to study various frameworks used by think tanks for data analytics. Systematic review to examine the range of technical and non-technical factors, methods involved in selecting framework. The majority of the study focused on the identifying methods and various factors impacts on the selection. It has been observed that various technical and non-technical factors have direct impact on the selection of framework. Based on scenario, requirement and use case, think tanks may opt various frameworks in combination.

Being aware of possibilities, challenges, think tanks takes steps to address them, think tanks can successfully implement a data analytics framework to make informed research and decision-making. In addition to these frameworks, think tanks may also use a variety of tools and techniques for data analysis, such as statistical software, data visualization tools, and survey research methods.

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