

**KOLOKIU PENYELIDIKAN 2021
INSTITUT TADBIRAN AWAM NEGARA (INTAN)**

**FACTORS AFFECTING SUCCESSFUL BIG DATA
ANALYTICS IMPLEMENTATION IN PUBLIC SECTOR OF
MALAYSIA**

CECILIA ADRIAN
**KEMENTERIAN KESIHATAN
MALAYSIA**

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Introduction

The advent of information in digital format has created **vast opportunities, advantages and potential value discovery** to the organization.

The Big Data Analytics (BDA) implementation contributes to **the long-term strategic planning to support business growth and value creation**, which can enhance the organizational performance (Wang et al., 2017).

As the application of big data has been successfully implemented across industrial organizations, **public sectors also seek the implementation of big data to effectively improve service delivery** (Gamage, 2016).



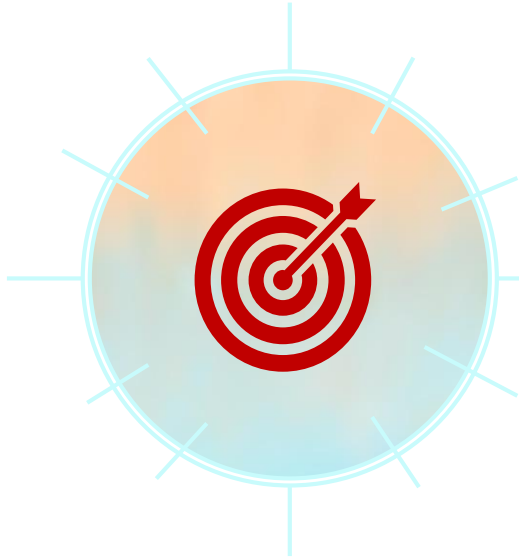
This study defines **BDA implementation as exploring hidden information using specific analytical techniques for the benefit of decision-making**, which influenced by resources and capabilities.

Problem Statement

- **The successful rate by the government organizations has been growing very slow** (Gamage, 2016).
- **The implementation of big data is not merely a technical issue, but linked with people and organizations resources issues** (Huang et al., 2018).
- **BDA implementation success has evolved, and the contributing factors are still under discussion. Prior studies were grouped with specific themes, did not measure the overall relationship between factors affecting the successful of BDA implementation.**
- **Current practical big data models have been largely based on the experience of income-based companies** (Jeble et al., 2018).
- **Hence, a specific BDA implementation model focusing on government organization is essential to establish the solution for this theoretical bridge.**



Research Objective



01

To investigate the factors affecting successful Big Data Analytics (BDA) implementation in the Malaysian Public Sector.

02

To propose and evaluate a new approach of the BDA implementation model for Malaysian Public Sector.

03

To validate the BDA implementation model using a prototype tool.

Research Methodology



06 | **Report Writing**
Final Report

05

Prototype Development

- Model Validation
- Tested Prototype
- Usability Test

04

Analysis

- Descriptive Statistics
- Discriminant Validity
- Hypothesized Model
- Measurement Model
- Structural Model

03

Data Collection

- Pilot Study
- Actual Study
- Questionnaires Survey collected from Actual Study

02

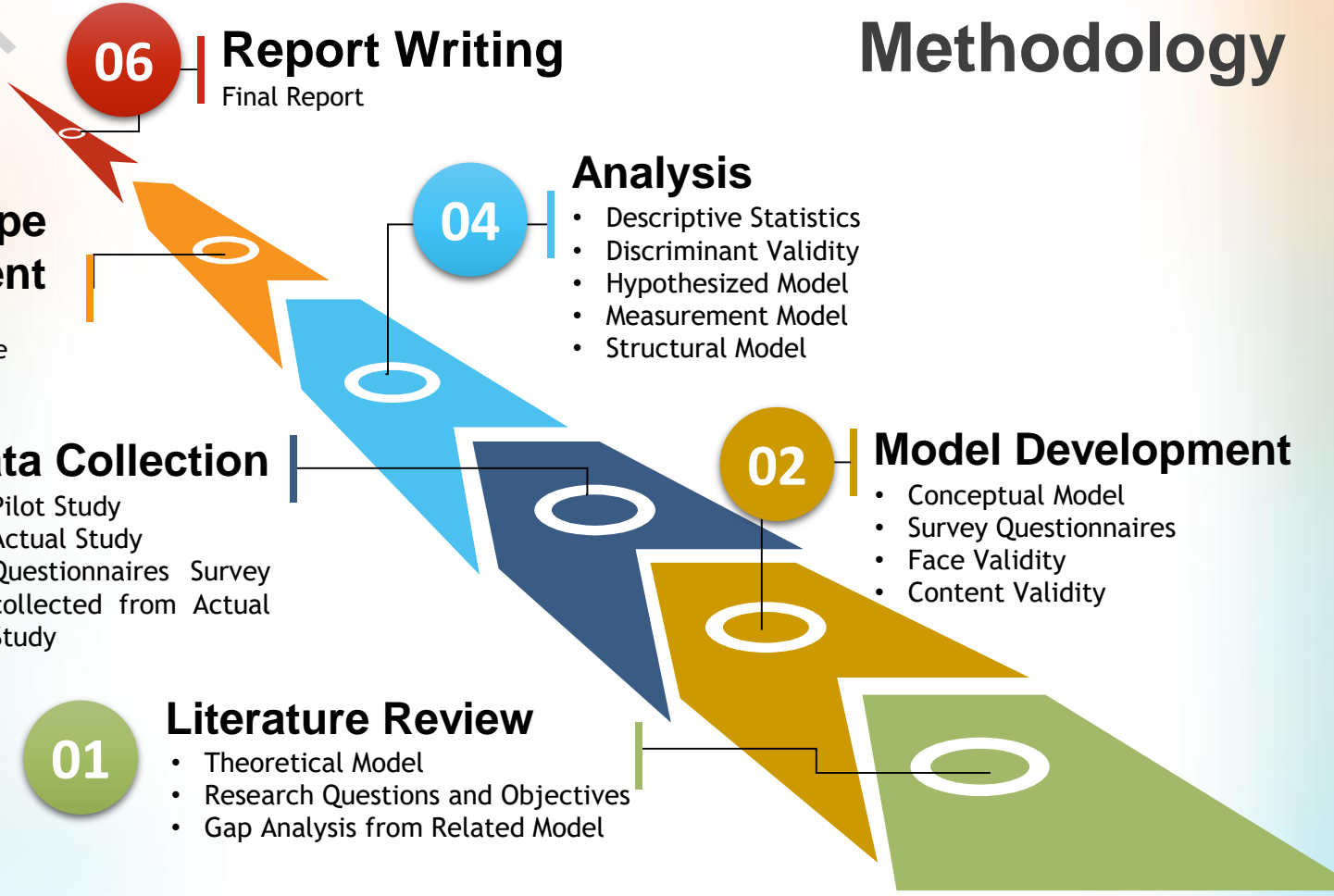
Model Development

- Conceptual Model
- Survey Questionnaires
- Face Validity
- Content Validity

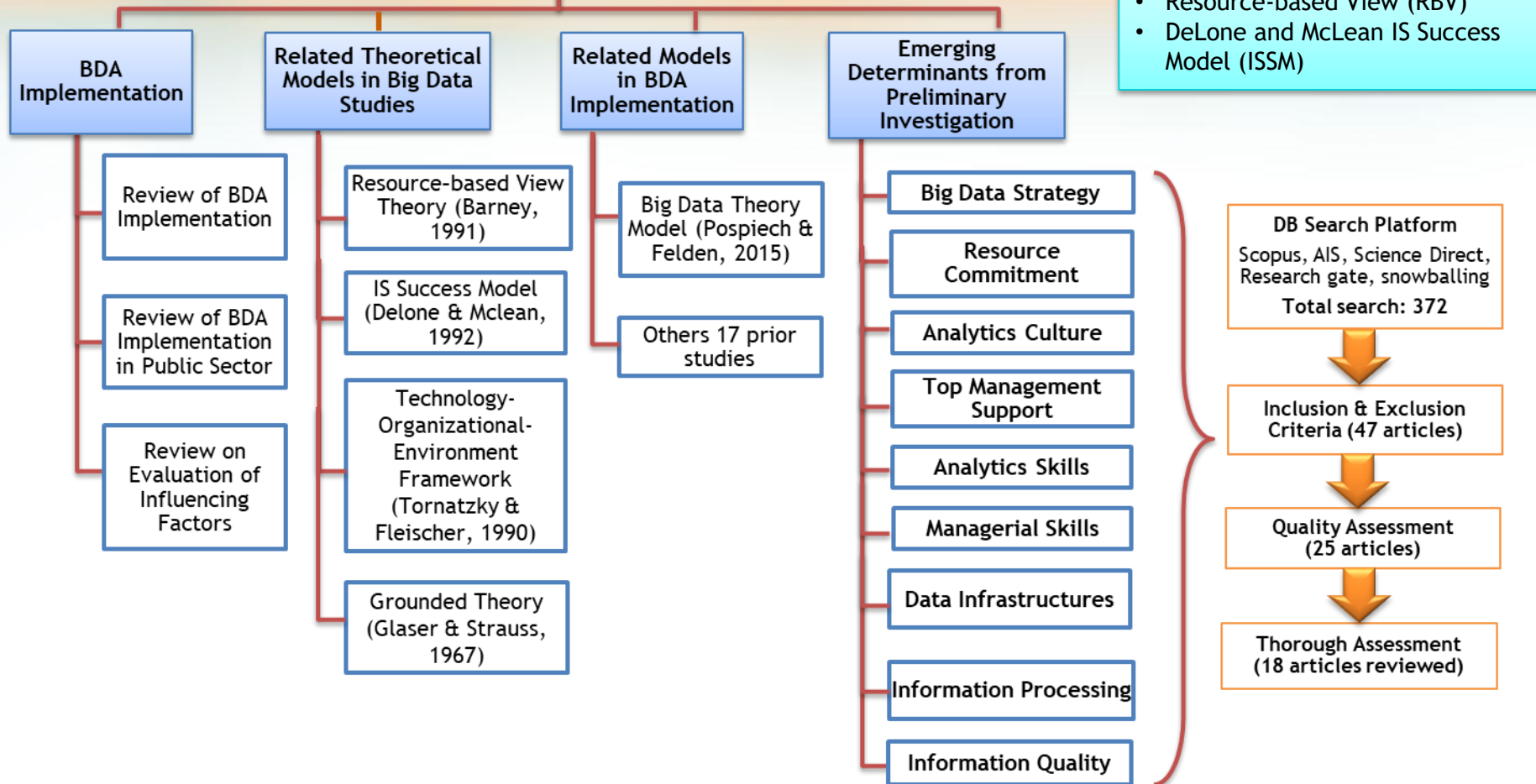
01

Literature Review

- Theoretical Model
- Research Questions and Objectives
- Gap Analysis from Related Model



Literature Review



Constructs – Operational Definition

Construct	Definition	Sources
Big Data Strategy (BS)	The alignment of BDA goals to support the business and IT strategy, and their goals.	Popovič et al., (2016); Raguseo (2018)
Resource Commitment (RC)	The investment of BDA resources includes technology, people and competency development.	Wamba et al. (2017); Gupta & George (2016)
Analytics Culture (AC)	The practice of organization leaders and decision-makers using statistical data and analytics information in decision-making.	Cao & Duan (2014); Janssen et al. (2017)
Top Management Support (TS)	The organization leaders/top management commitment to support the BDA implementation and provide sufficient resources.	Gupta & George (2016)
Analytics Skills (AS)	The ability of analytics personnel to analyse big data effectively with the specific capability, level of knowledge and skills.	Akter et al. (2016); Wamba et al. (2017)
Managerial Skills (MS)	The ability of big data analytics manager that has specific-skills in managing the big data analytics implementation activities.	Koronios et al. (2014); Akter et al. (2016)
Data Infrastructures (DF)	The technology of IT equipment's and application systems used to operationalize the BDA implementation.	Wamba et al. (2015); Akter et al. (2016)
Information Processing (IP)	The capability of IT platforms and analytics applications to process raw data and transform to the valuable information.	Koronios et al. (2014); Kim & Park (2016)
Information Quality (IQ)	The management of data and information quality in processing big data to provide complete, accurate and quality reports.	Kwon et al. (2014); Ji-fan Ren et al. (2016)
Big Data Analytics Implementation (BDI)	The outcomes of BDA implementation based on relevancy, fits well, appropriateness and compatibility with the organizational culture and operational.	Proctor et al. (2011)
Organizational Decision-Making (ODE)	The impact of BDA implementation in decision-making process which include quality, speed, understanding, reduced uncertainty and real-time decision-making.	Wang & Byrd (2017); Ca et al. (2015)

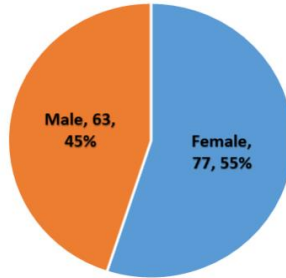
Findings (Empirical Study)

Population

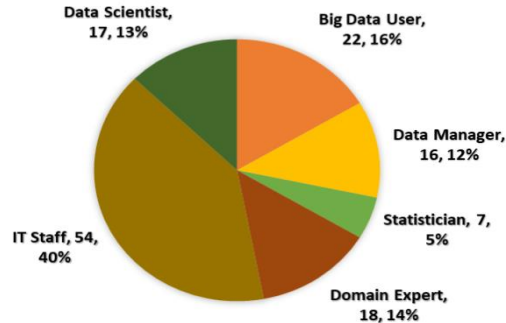
BDA team members included multi-role respondents from various department and units; Active participation in BDA implementation



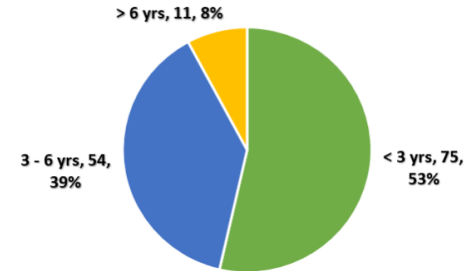
GENDER



BDA ROLES



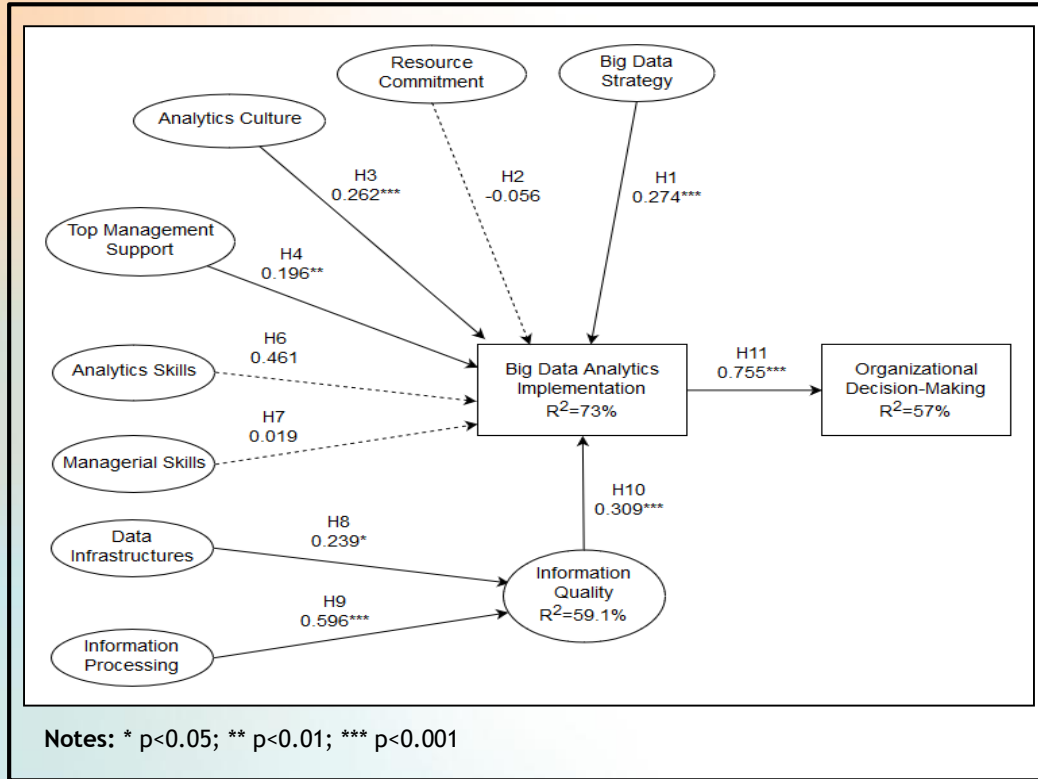
BDA IMPLEMENTATION EXPERIENCED



Survey Administration

Data Collection	Number of Questionnaires
Questionnaire Distributed	195
Questionnaire Collected	152
Questionnaire Analyzed	140

Assessment of Structural Model



- 8 out of 11 hypotheses are significant.

Summary Results of Hypothesis Testing

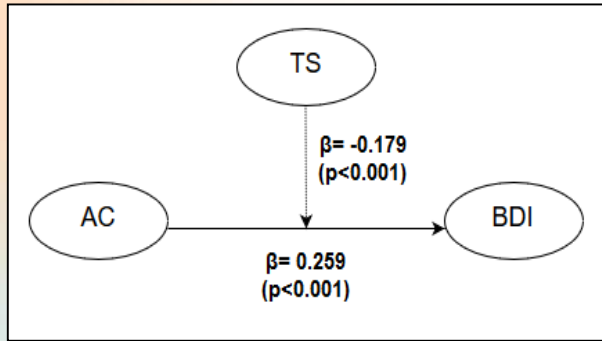
H#	Relationship	p Values	Decision
H3	AC -> BDI	0.000	Supported
H6	AS -> BDI	0.264	Not supported
H11	BDI -> ODE	0.000	Supported
H1	BS -> BDI	0.001	Supported
H8	DF -> IQ	0.023	Supported
H9	IP -> IQ	0.000	Supported
H10	IQ -> BDI	0.000	Supported
H7	MS -> BDI	0.413	Not supported
H2	RC -> BDI	0.251	Not supported
H4	TS -> BDI	0.004	Supported

H6 The analytics skills of big data team in the government agencies are still at the infancy stage.

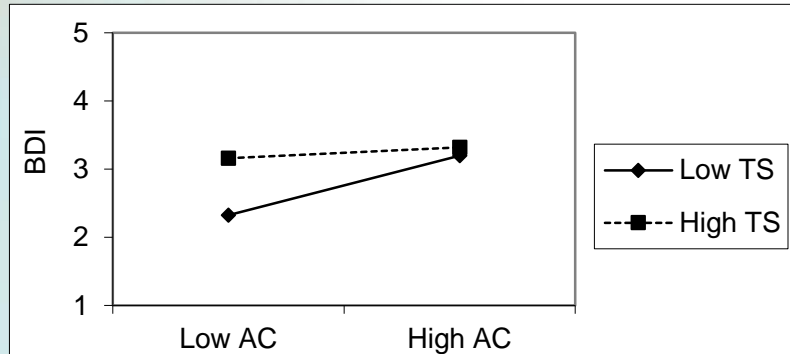
H2 Central agency has provide big data trainings and infrastructures through outsourcing during the BDA pilot project. Thus, no investment for resources from the agency.

H7 Big data managers are not aware with the impact of managerial skills because the manager from the vendor's side are assisting them in the BDA implementation activities.

Moderator Analysis



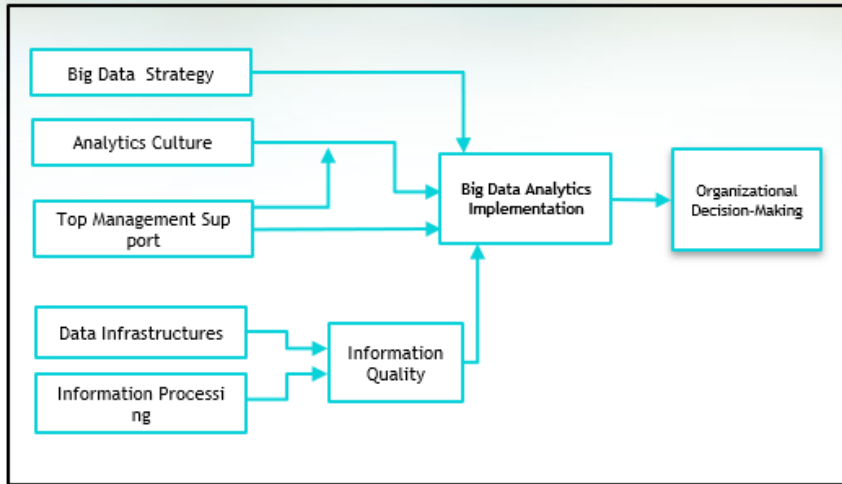
Moderating and Direct Link of AC and BDI



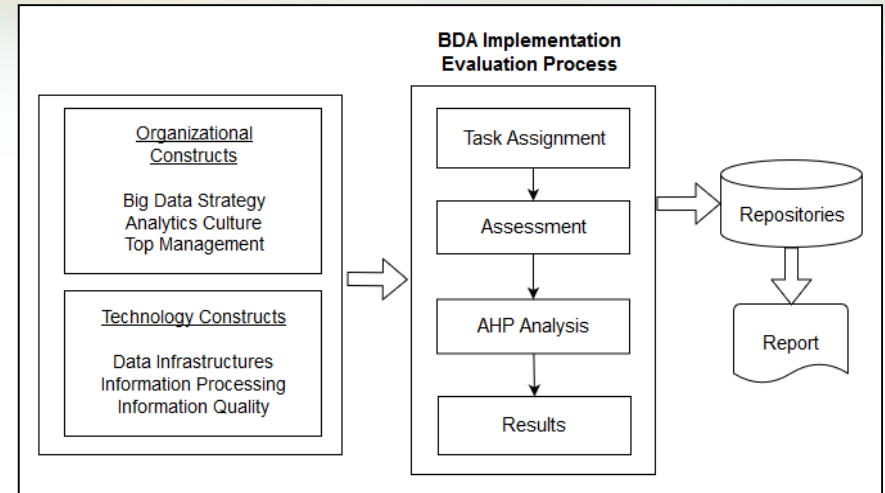
Plotting Graph of AC x TS

- The direct link between AC and BDI was **positive and significant**. However, the interaction link between AC and TS toward big data analytic implementation (AC x TS → BDI) was **negative** ($B = -0.179$) and **significant** ($p < 0.001$).
- The moderation effect of TS on the relationship between AC and BDI is **stronger for low TS as compared to high TS** towards effective BDI.
- The findings suggested that the top management support could play a critical enabling role in aiding to increase the impact of analytics culture and improving the organization's BDA implementation.

Prototype Development and Validation by Experts



Big Data Analytics Implementation (BDI) Model



Implementation Framework for Validation

- To validate the feasibility and applicability of the validated structural model and application of Analytical Hierarchical Process (AHP) method in the evaluation processes.
- 2 big data experts from industries and 1 academic expert from Public university. The outcomes of expert review indicated the usefulness of BDI model in BDA implementation for better decision-making.

Research Limitations

Multi-role Respondents

Data based on multi-role respondents - their own insight and interpretations, which some of them have less experienced in BDA implementation.

Single Source

Data collected from Single Source, which may extend potential biases.



Small Sample

Data drawn from the Central Agencies respondents. Small penetration rate against population.

Importance of Research



Big Data users - able to know the **pre-requisite factors** since the implementation of BDA involves a **high level of risk and investment to the organizations.**



Understanding the **strengths and shortcomings** of BDA affecting factors - will enhance the ability of the organization to **plan and develop the BDA strategy.**



Research Implication

Provide insights and guidelines to management in maximizing the **BDA value** for effective decision-making.



Value



Prioritizing Actions

BDI Model can be used to **prioritizing actions** - reveal the critically need and its worth in investment of time and money.

Enable organization to determine the **lacking of BDA resources** or are in abundance.



Resources

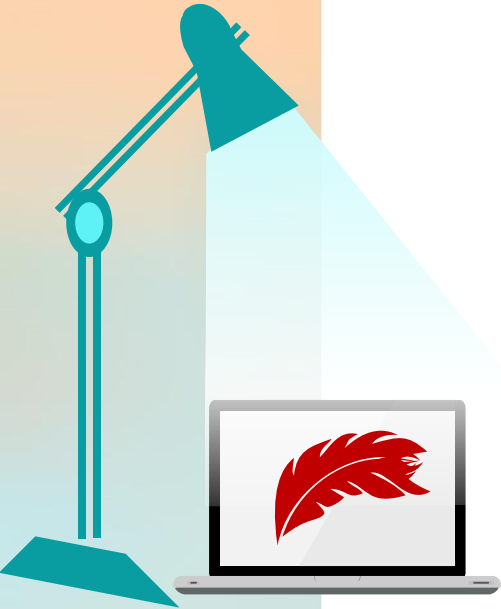


Future Improvement

Determine the **possibility of improvements** on the current practices to make it more effective for decision-making and relevant to the organizational requirements.



Conclusion



01

Proposed a **Big Data Analytics Implementation Model** and examined the factors affecting the success of BDA implementation.

02

The current study provides deeper understanding of the **interaction link of analytics culture and top management support toward BDA implementation.**

03

This study developed the prototype based of the research model constructs and finally **validate the usability of the prototype in practice.**

Thank you



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