A CHRONOLOGY OF BIG DATA ADOPTION: REVIEW OF LITERATURE

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Abstract: *In this present era, big data is rapidly gaining the momentum regarded as a necessity tool in accelerating competitive advantage of the economy of a country. Big Data had increasingly revealed on it directimpact on productivity, performance and productivity of companies in this present age on wide usage of IT. Essentially, it is important to realize on the understanding of the determinants onBig Data adoption. This paper aims to provide the review of literature on identifying the determinants on Big Data. Consequently, this study helps to enrich the evolution of the determinants, underpinning theory, research methodology and design utilized problem or challenges and solutions for achieving the benefit gains by using Big Data. Currently, there are few review on literature about Big Data adoption model in Information System (IS) field. This study will review on the top-tier journal or articles on the Big Data determinants to fill-in this gap. A systematic review approach is employed for this study. The investigation will concentrate on theoretical model, research methodologies, research design and contribution and industry-focus areas. Overall findings found that Big Data is an important area of research in the field of Information System (IS) to organization or companies. The major contribution of this study is development of classification, explanation and adaptation of different research methodologies for future research. In conclusion to this study, Future research, exploring and examining determinants in refining the IS theory for Big Data, development of scale and measurement in various industry segment and regions.*

Keywords: *Big Data, Information System, Literature Review, Content Analysis,*

1. INTRODUCTION

In the world of Internet today, it represents a big space where massive amount of information are added every day. In recent years, the development of big data adoption had increased rapidly.Recent IS research about Big Data technology lack focus on the determinants that impact companies despite its benefit to performance and productivity to the companies. IT and IS researchers and practitioners had faced with major challenges since the rate of growth is rapidly surpassing the

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ability to design suitable systems to manage the data efficiently and analyzing it to obtain significant purpose for decision making (Gupta & Chaudari, 2015). The advancement of technology such as digital sensors, communications, mobile networks, storage, processing and cloud computing amounted to huge sets of data capturing precious information to business, science, governments, and society (Bryant *et al.*, 2008; Firestone, 2010).

There is limitation of studies in the area of Big Data; therefore it is a necessity to attain detailed review of literature in the topic of Big Data adoption in identifying the development of Big Data adoption studies and underlining the recommendation on scope for future research. Objectives of this study are as below:

a) Understanding on the definition and concept of Big Data in the field of IS

b) Identifying Big Data benefit and challenges

c) Highlight on Malaysian Big Data landscape

d) Provide an extensive review of literature in the field of Information System (IS) on Big Data research

e) Explanation on the descriptive analysis of the international peer-reviewed literature such as author, year, journal publication, research methodologies, and theoretical framework

Current study is to fill in the gap by providing the characteristics of descriptive analysis on the studies, and to answer the research questions relating to Big Data studies. The compilation of various literatures that is available in the area of Information System.

a) What are the academic researches done in Big Data?

b) What are the research methodologies used for these Big Data studies?

c) Which attributes or determinants of Big Data are focused by the literature published?

Information System (IS) practitioners' and researchers will be able to find useful insights in the area of acceptance and adoption of Big Data enabling the improvement of its benefit to business in the companies. This study will help in identifying the wide range of variables or determinants for the acceptance or adoption of big data which helps on how, why and what of adoption or acceptance of Big Data being the fundamental to future research. This will help researchers or practitioners to gain knowledge on how management in the companies to analyse and examine each of the variables or determinants adopted in literature, thus accelerating the right companies strategy and direction to achieve its objectives. Furthermore, companies can make reference on the suitable approach and policies on which of the importance variables or determinants considered for accelerating the acceptance or adoption of Big Data in their companies.

2. DEFINITION OF BIG DATA

Big Data was agreed by most that the term defined artificial intelligence applications and to the huge quantity of digitization data availability (Joh, 2014). Gartner (2012) stated 'big data are high volume, high velocity, and or high variety information that require new types of processing to allow enhanced decision making, insight findings and process optimization'. Laney (2001) came up with 3V's for big data; however these 3V's is only the initial phase of the definition. Demchenko (2013) stated five key characteristics or 5V's defined Big Data which are Volume, Velocity, Variety, Veracity and Value as described below:

a) **Volume –** In the recent years**,** the size of data has increased from Megabytes (MB) to Exabytes (EB) due to the competitiveness in price for hardware costs such as memory and storage, thus it was defined as the massive data generated and collected as estimated global daily creation of more than 2.5 exabytes of data (McAfee & Brynjolfsson, 2013). Demchenko, Grosso, de Laat and Membrey (2014) stated that volume is vital and unique feature of Big Data, imposing specific requirements to all traditional technologies and tools currently used.

b) **Velocity -** Generation of data had been outpaced by the increase in speed. It was defined as the high speed at which new content is generated. This had accelerated the user's expectation for the desirable of full complete data instantly at near real time. There is a need to analyse the insights of the data and decision made through the analysis of this data need to be taken at equally high rate for example, 500 million tweets generated and sent averagely per day in year 2014 (*www.internetlives-tats.com*, 2014).

c) **Variety–** There is various different sources for creating and capturing of data. The global smart-phones users will surpass 2 billion in 2016 as reported by telegraph in UK (*www.telegraph.co.uk*, 2014), Data are categorized into three different types such as unstructured, semi-structured and structured data. SAS (2014) revealed that most of the data presently is categorized in multiple format of audio, email, video, social media, blogs, database system (traditional-structured), financial transactions and many more with the evolution of information system.

d) **Veracity –** This is the fourth dimension, handling data uncertainty known as veracity (Schroeck.et al., 2012). Additionally, veracity described as the query on reliability of specific data format, never only on the quality of data, but the intrinsic ambiguity in data such as a forecasting of weather. There is huge variation and irregularity in the data received as Big Data becomes enormous and originated from various sources of big data that are ever increasing. Due to this fact, there is possibility cause on the

reliability of the data becomes questionable. The main challenging factor of Big Data is always on the data inconsistency and abnormality.

e) **Value –** Big Data majorsetback is the cost that it brings to major organization based on implementation of big data or any software package or framework implementation. Chen et al. (2014) revealed that value is most important dimension of big data, since enormous concealed worthiness of datasets from huge data from different types or format and rapid generation. Plan of adoption on Big Data is utmost significant and the value needs to be reflected in the value to price perspective to represent its benefit. In-depth understanding of Big Data is of great importance besides its usefulness through the big data initiative which brings in value to the organization needs that will be addressed with objectivity on the benefit Big Data brings to the organization.

2.1. Benefits of Big Data

Philip Chen & Zhang (2014) described big data will enables to examine and understand the consumers better, thus enhancing a better customer experience. Big Data is not only about research but had promised capability (Biesdorf, Court and Willmont, 2013).Nawsher Khan *et al.* (2014) explains that by harnessing Big Data, then businesses can obtained it's benefit which includes informed strategic decision making, enhance operational efficiency, customer service improvement, new markets, customer and products. Manyika *et al.* (2011) reported on the efficient way to utilize Big Data which detriment 180 economies of transformation and encourage dynamic progression. Borneo Post reported that "big data is the real-time and high-frequency nature of the data on the ability to estimate metrics such as consumer confidence, immediately, and it is becoming more extensively used due to its predictive in nature" (Wong, 2015). NASCIO (2012) mentioned that proper use of big data analytics can significantly improve enterprise performance. Freed (2013) postulated that big data enables the development of extremely particular segmentation to produce product and services to congregate customer experience demand. Big data analytics help in information insight for decision making (Berner, Graupner & Maedche, 2014). Chen, Chiang, & Storey (2012) stated that "In the era of big data, the highlights in industry has moved to data analysis and prompt business decision making will be based on huge volumes of information". Deutsche Bank Research findings revealed that from the academia, business and politics perspective, there are many opportunities discovered even public authorities is utilizing data sets to develop new business models, products and services offering (Dapp, 2014). Minelli *et al.* (2012) described the real value of big data is about utilizing it for a meaningful and worthy manner in real-time provided its value to business. Purcell (2013) postulated that "the benefits of big data use to business executives include enhanced data sharing through transparency, augmented

market segmentation, improved performance though analysis, increased decision support through advanced analytics, and greater capability to innovate business models, products and services". Vaidyanathan (2014) described that big data technology can accelerates on potential of new revenue, improve quality of customer service, more effective marketing, provide competitive-edge against other organizations, improved operational efficiency and other benefits to business through market trends, uncover of hidden patterns, unknown correlations, useful business information and customer preferences.

2.2. Challenges of Big Data

Big Data systems are being implemented in multiple industries, including commerce, science, and society (Bryant *et al.* 2008), Big data had many advantages bringing new prospects, however, there are many challenges found in utilization of big data (Ahrens *et al.,* 2011, Chen *et al.*, 2014). Paul Ohm (2013) argued that "Big Data's touted benefits are often less significant than claimed and less necessary than assumed". Obviously, there are challenges in big data even it creates opportunities as it involved massive amount of data generated at high speed rate beyond the capability to use (El Jamiy, Daif, Azouazi & Marzak, 2015). Bantleman (2012) stated that big data does not integrate well into existing IT resources which requires additional new spending for specific resources and integration. Big data had created challenges to companies or organization in business aspect such as data quality, talent, privacy and security, Saha and Srivastava (2014) addresses that the ear of big data poses data quality management issues. Sarsfield (2011) stated that if there is poor quality of data management, it will impact on loss of revenue, fail in government compliance and create ineffective processes. Talent scarcity is the major barrier posed to organizations or companies, although Big Data had great potential, it is necessary to have data scientist with professional skillset to work on this massive amount of data or information to create formulation in value creation from the adoption of Big Data. Davenport (2013) described big data development had introduced need for a fresh role of data scientists. Data scientist had the skill needed to manage big data for obtaining relevant information needed for business in the companies. Other challenges of Big Data adoption is privacy in the context of companies and organization (Piatetsky, 2014; Fertik, 2014). Privacy issues is one of the factor barrier to the adoption of big data that reveal unintended information as gathering unstructured data is inexpensive and encouragement of consumer in technology adoption produce massive availability of information (Crawford & Schult, 2013; Polonetsky & Tene, 2013). Nuan & Di Domenico (2013) states that even though consumer's keen to provide data, there is still the privacy repercussion need to be considered, though there are techniques to reclassify data but it is not fully protected. Tesco in the United Kingdom advertisement presented that they will protect the information of their 16 million loyalty card members (Pope, Halford, Tinati and Weal, 2014). Other major concern

is security for business and individual customers, in this era of information technology advancement, companies are prone to viruses, hackers, phishing, malware, worms, trojans and a lot more security threats to the databases in their companies. (Demchenko *et al.*, 2013). Although Big Data provides business value creation, companies tend to neglect on capability in accessing existing databases rather than uncover the hidden values of Big Data investment to support its decision on operation, thus fail to monetize Big Data investment. Ross, Beath and Quaadgras (2013) stated that by doing so many companies fail in their return on investment for big data system. LaValle *et al.* (2010) stated that "big data need to be integrated with existing systems and business strategy in order to be the most use to business, this places a tremendous burden on business as big data is a very new undertaking". Simon (2010) provides a sobering statistic: three out of five Big Data projects do not meet expectations in terms of cost and performance. Big Data issues are based on one of the dimension, variety whereby the integration of many data sources including dedicated sensors and multi-purpose sensors (Pu & Kitsuregawa, 2013). Similarly, Dong & Srivastava (2013) stated that "the value of data burst when it can be connected and combined with other data in which tackling the big data integration (BDI) issues is critical for recognizing the possibility and promise of Big Data". Deloite (2014) found that cognitive analytics is bridging the gap between Big Data and decision making while advancing their capability to understand and react in the organizations. Jeffrey Tanner Jr., (2014) explains that companies often make misleading assumptions about data that send managers down the wrong decision making path. The challenge always exist on Big Data is on the real-time decision making as argued by Jay R. Galbraith, (2014). Organization maturity-level is a main aspect in adopting big data for business. . Overall level of data maturity will need to be analysed for discovering the readiness of organizations to adopt big data and accelerating adoption rate. El-Darwiche, Koch, Meer & Tohme (2014) stated that it is important for organizations to know according to big data maturity to evaluate and discover if big data is needed.

In summary, companies strategy need to consider adoption of big data to attain the benefit it brings to business, for those who are not prioritizing big data for competitive edge will lose out in the market competition. Therefore, this research study will review on the literature for the Big Data adoption and acceptance in accordance to each determinants applied based on various methodologies to help contribute to future research in refining the model used.

2.3. Malaysia Big Data Landscape

Findings about Big Data scenario in Malaysia (MDeC, 2015)

a) Malaysian ICT services is projected to have 35% projected share in the nation's Digital Economy in 2020.

b) Data explosion is accelerating the growth of consumer and enterprise data such as Google search queries (5,069), 1.22 Million emails sent, 95+iPhone applications downloaded, 4,000+ Tweets within 60 seconds in Malaysia. This will help to enable huge opportunities to help improved in decision-making, behavioral prediction and better targeting on opportunities.

b) Big data is primarily a major determinants for consideration on top line revenue and growth of business rather and efficiency used by customer centric end-user. Consideration need to be taken in both customer-centric and operational when adopting Big Data.

c) Talent and desired skill-sets is required being one of the factors to drive the sustainability of the Big Data technology. Five skills should be required to ensure specialization when handling or managing Big Data such as Big and distributed data, algorithms, machine-learning, backend programming and visualization.

d) In a multi structured datasets, uncovering the pattern in real-time is the priority to help provide meaningful insight in real time. Open data initiatives on government sector will help to drive the adoption of Big Data. MDeC had developed a partnership with Open Data Institute and launch the National open data champion to drive government open data.

e) In Malaysia, MDeC had envisioned Malaysia to be the Big Data Analytics (BDA) hub in ASEAN and to accelerate BDA adoption in Malaysia.MDeC had collaborated with MAMPU (Malaysian Administrative Modernisation and Management Planning Unit) and MiMOS (Research and development government agency) to further drive BDA initiatives in Malaysia. This is further evident by the establishment of BDA Digital Government Lab by MiMOS in 2015

3. RESEARCH METHODOLOGY

The research adopted content analysis approach by analyzing methodologies used in reported literatures related to this literature review studies and from various secondary sources. This study employed the guidelines by Kitchenham and Charters (2007), selection through primary studies, quality assessment of content, synthesis of data and result findings. This research study proposes on the review of methodologies on Big Data adoption in reported literature. Precise systematic review need to be aligned to the agreed plan, same goes to any research conducted. Structured method adopted inexamining the literature relating to anexplicit subject such as any primary research being documented for replication. Formulation of a review or research question, selection of suitable keyword used and identifying scope ofevidence related material, performing a thorough search of the literature review, ensuring the inclusion criteria for search, conducting data synthesizing from analysis, studies, and provide report for the findings of the study (JBIEBNM,

2000). Primary studies will be identified through collection of sources with unit analysis established based on research paper internationally recognized peer-review article or journal in English such as in conceptual or empirical papers, theoretical methodology, case studies, working paper, books, industry reports, news or online news channel, websites. Review of the literature is search through structured keywords of 'big data adoption' and in databases for top-tier journal or articles in top publishers for primary sources such as Inderscience, Emerald, Oxford, Elsevier, Taylor and Francis, Hindawi and online library databases such as IEEE Xplore, ACM and J-Stor. Over thousands of articles found with these keywords, however, data screening was conducted for its relevance and appropriateness of this research study based on titles, abstracts and objectives.The suitability and relevance of studies on Big Data is limited to this paper objective, therefore, the selection of articles or papers is easy. Any articles or papers with relation to 'big data' adoption on theory and methodology will be selected for this study. The duration period of reviewed was from 2001 to 2016. The types of studies that were not included in this studies is on Big Data Analytics techniques based on analytics, Big Data Storage Platform, working papers and papers that is not in 'English'.

4. FINDING OF RESULTS

4.1. Distribution of articles and journals

Recent updates shown that there in increased in paper relating to Big Data being published. The initial article on big data is back to 1970's, however, it was not being a hot topic for research and discussion to recent years. There is increase of interest in Big Data by scholars or academicians due to its hype which had shown benefit to business in the companies. The structure for categorization and data analysis is as illustrated in Table 1.

Table 1
Categorization Structure

| Attributes	Description
Author's name	Name of the author
Title	Title of Article/Journal
Time of Publication	Year of Publication
Unit of Analysis	Individual, Mixed
Research methodology	Survey, Conceptual, Case study, News (Offline and Online), Online access papers, White papers, Reports, Industry reports, Books and Websites

Source: Author

4.2. Synthesizing of Data

Data synthesis is being performed once extracted from primary sources. Any overlapping or duplicated themes will be analysed and produce the summary of

findings. The latest of the paper is being selected for this study. Total of 35 research papers were selected for this study. The sequential distribution of research paper results presented below found that in year 2014, it was gathered that most of the research papers in total of 12 research papers is being published. In recent years there is a moderation trend for the research on big data adoption in regards to time (year of publication) as illustrated in Figure 1.
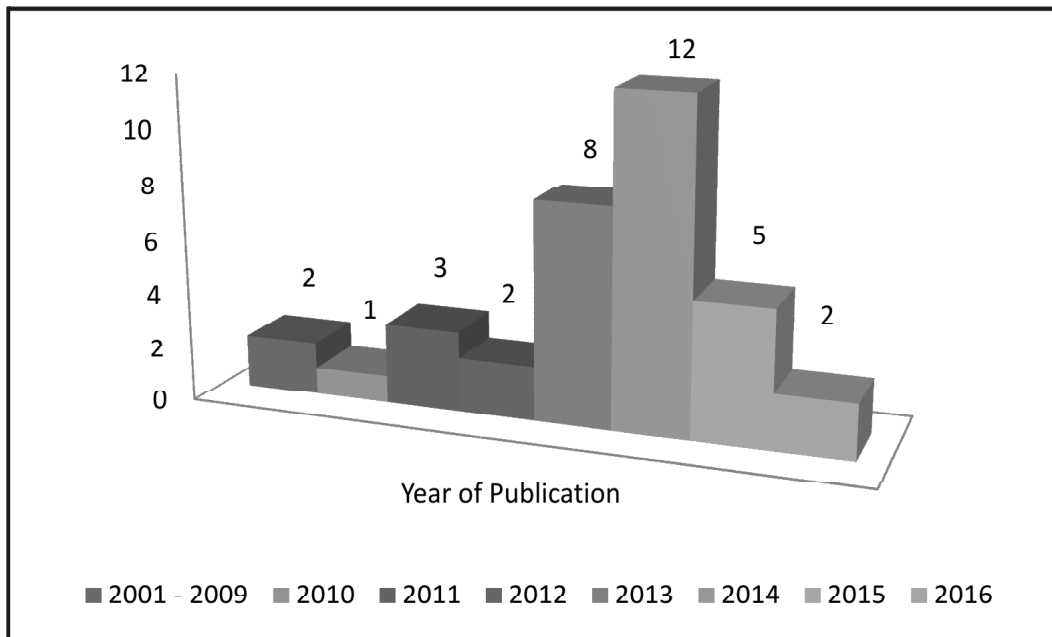
Figure 1: Sequential Distribution of paper

4.3. Research Methodology

Analysis findings on the distribution of research papers on the research strategy and methodology used were illustrated in Figure 2 and Figure 3. Results reported that research papers were inclined toward qualitative studies compared to the quantitative studies. The result finding for the research strategy found (57.1%) is based on approach through empirical studies, followed by (20%) is based on underpinning theory; finally (22.9%) is based on case study for the big data adoption.

In Figure 3, it revealed that there are (71.4%) qualitative research papers, whereas (25.7%) is based on quantitative research papers, mixed method research paper presented only (2.9%) which is the least used in the research methodology used.
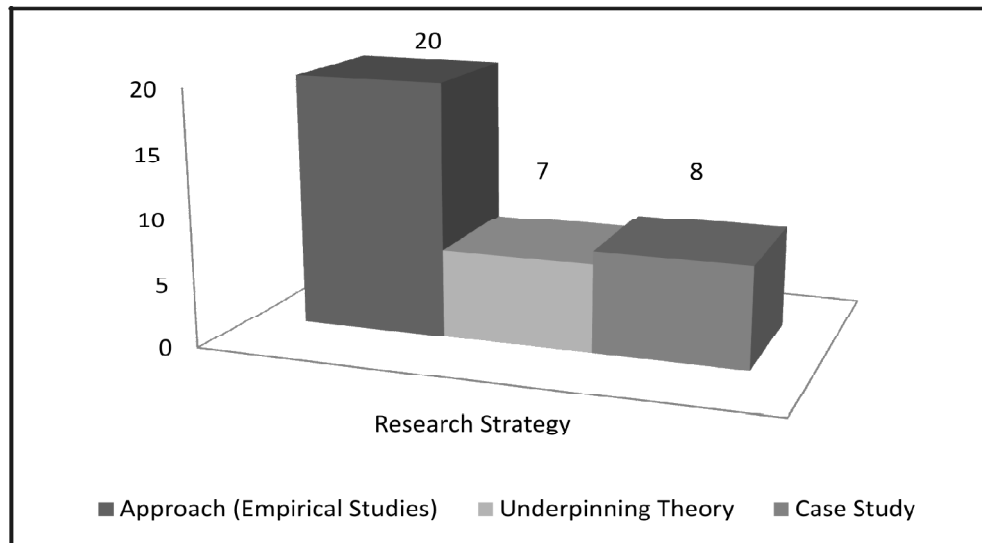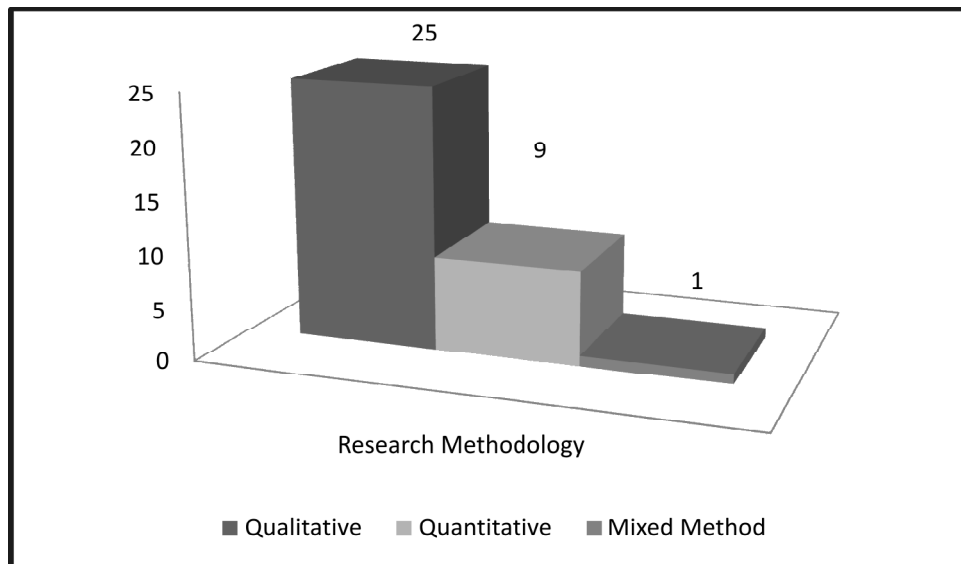
Figure 2: Research Strategy

Figure 3: Research Methodology

Consequently, analysis of the research methodology is being further analysed in detail based on the qualitative type of research. The most utilized type of research is based on the content analysis (66.7%), then followed by case study (29.6%) and the least used type of research is based on grounded theory (3.7%) for this study.

Finally, for quantitative type of research analysis as illustrated in Figure 5 shown that most of the research papers is based on SPSS (62.5%) and the remaining (37.5%)
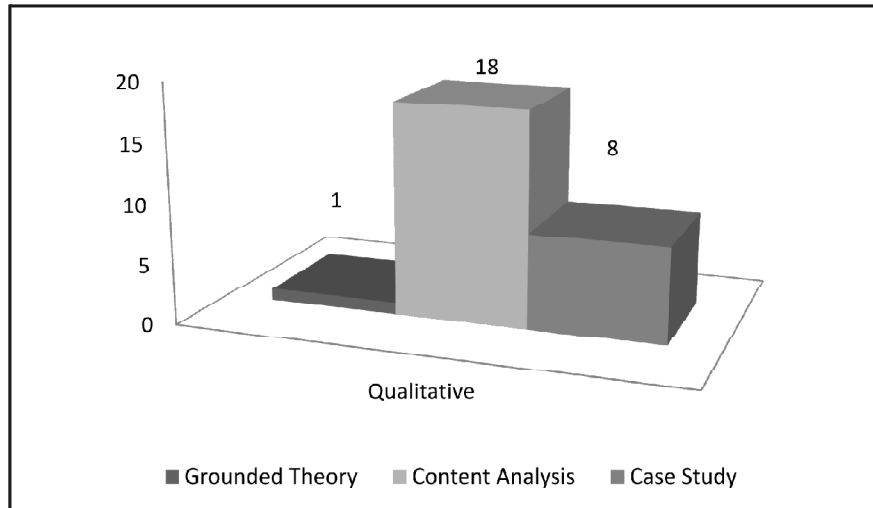
Figure 4: Qualitative study
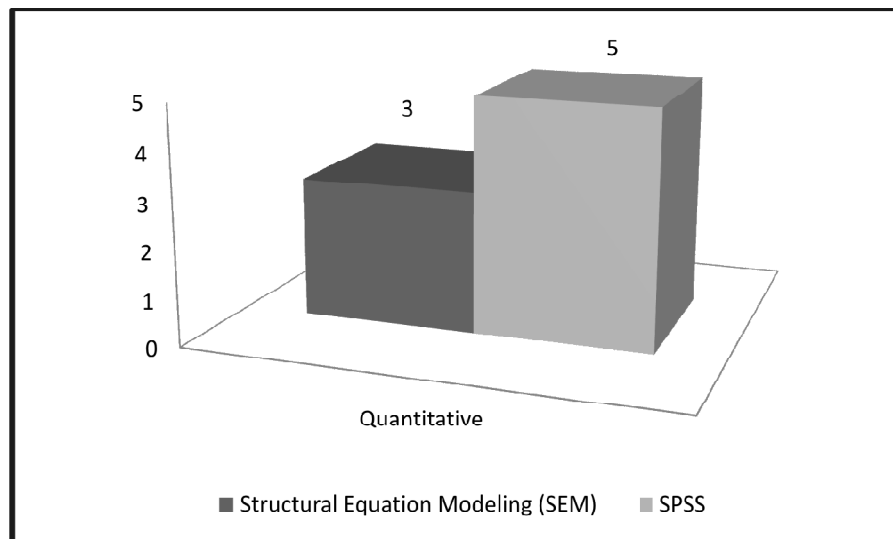
Figure 5: Quantitative study

is using structural equation modeling for conducting the data analysis for the research.

4.4. Underpinning theory

Some of the underpinning theory either one or more theories used for this research paper being the foundation Theory of Information System (IS) studies were described in the Table 2. Most of the researchers on Big Data adoption involved

Table 2
Classification of method, determinants and analysis findings

Author	Year	Title	Method/Theory	Determinants	Findings
J. Bughin	2016	Big data, Big bang?	Approach (Empirical studies) 1. Data Model	Effects of big data on corporate performance	This paper is an extension work on the effects of big data on the corporate performance and approach to the production function.
R. Clarke	2016	Big Data, big risks	Case study	1.Data quality 2.Information quality	These findings described on the moral and legal responsibility issues relating to researchers in computing and professionals in disposition ofenthusiasm, and truth involving activity for promotion.
A. Minonne and S. D. Rold	2015	Big Data Adoption and Key Use Cases in Western Europe: Finance and Discrete Manufacturing Ahead of the Game	Case study	Competitive advantage to business	Findings of this paper will be provided to finance, discrete manufacturing and other sectors to adopt big data in an effective ways to gain competitive advantage
H-M Chen	2015	Demystifying Big Data Adoption: Paradigm shifts and Complexity Tolerance Theory	Case study 1.Paradigm shifts and Complexity Tolerance Theory	1. Relative advantage 2. Paradigm shifts 3. IT fashion 4. Competitive pressure	Study contributed to the firm-level technology adoption and innovation theories in the knowledge of big data adoption practices.
H. Li, J. Wu, L. Liu and Q. Li,	2015	Adoption of Big Data Analytics in Healthcare: The Efficiency and Privacy	Approach (Empirical studies) 1. Two-dimensional product differentiation model	Efficiency-privacy tradeoffs	Findings will help to provide useful insights and optimization of adopting BDA to business managers. Better policies in improving health service quality with in healthcare sector will guide planners.

Author	Year	Title	Method/Theory	Determinants	Findings
R. Dubey and A. Gunasekaran	2015	Education and training for successful career in Big data and Business Analytics	Approach (Empirical studies)	1. Education 2. Training	The study identified skills for BDA and propose theoretical framework for education and training for BDA
W. K. Chong, K.L. Man and S. Rho	2015	Big Data Technology Adoption in Chinese Small and Medium-sized Enterprises	Approach (Empirical studies)	Combination of critical success factors (CSFs)	The proposed framework provide a balance theoretical and practical perspectives to guide business managers and academicians on the competitive advantage, best practices and improvement of business performance when utilizing big data.
D.J. Power	2014	Using Big Data for analytics and decision support	Approach (Empirical studies)	1. Strategy of Big Data 2. Appropriate people utilizing BDA 3. Data sources knowledge	The value of data can be obtained through analysis. Domain and new data sources knowledge is key for the analysis. Specific skillset is needed.
M. Chen, S. Mao, and Y. Liu	2014	Big data: a survey	Approach (Empirical studies)	1. Data acquisition 2. Data generation 3. Data analysis 4. Data storage	This research aim to provide a comprehensive overview and big-picture to readers of Big Data
H-K Ka and J-s Kim	2014	An Empirical Study on the Influencing Factors for Big Data Intended Adoption: Focusing on the Strategic Value Recognition and TOE Framework	Underpinning Theory 1. Strategic Value Recognition and TOE framework (Statistical Analysis/ SEM)	1. Strategic value perception 2. Environment 3. Type of business 4. Corporate sizes	This study helps to propose useful guidelines for the corporations and policy maker to consider when implementing big data.

Author	Year	Title	Method/Theory	Determinants	Findings
I.A.T. Hashem, et al.,	2014	The rise of "big data" on cloud computing	Case study	1.Scalability 2.Data Integrity 3.Data Transformation 4.Data QualityData 5.Heterogeneity 6.Privacy 7.Legal & Regulatory 8.Governance	An outcome of this study is with regards to the results based on the investigation research challenges.
J. R. Galbraith	2014	Organizational Design Challenges Resulting From Big Data	Underpinning Theory 1. STAR model	1.People 2.Process 3.Strategy 4.Structure 5.Awards	Big Data can measure on the impact of organization performance.
L. Lau, F. Yang-Turner and N. Karacapilidis	2014	Requirements for Big Data analytics Supporting Decision Making: A Sense making Perspective	Underpinning Theory 1.Collaborative Sense	1.Collaboration between machine intelligence and human 2.Constant and Detailed knowledge on connections 3.Uphold on external depiction	Value generation and creation from big data through method of collaborative sense
L. Taylor, R. Schroeder and E. Meyer	2014	Emerging practices and perspectives on Big Data analysis in economics: Bigger and better or more of the same?	Approach (Empirical Studies)	1.Data value 2. Skillset 3.Accessibility to data	This studyaddresses potential and challenges of Big Data in economic study. Value of Big Data help to create new ways of thinking for economist in the digital landscape
M. Singh	2014	Big Data in Capital Markets	Approach (Empirical studies)	1. Education 2. Resolutions with future awareness	Analysis of the growing need of Big Data technology in financial domain, especially in Capital Markets. Highlights existing modules of which big data is in use.

Author	Year	Title	Method/Theory	Determinants	Findings
O. Kwon, N.Lee and B.Shin	2014	Data quality management, data usage experience and acquisition intention of big data analytics	Underpinning Theory Resource view and Isomorphism theories	1. Data completeness 2. Data consistency 3. Perceived Benefit (Usage of External Linkage) 4.Perceived Benefit (Usage of Internal Linkage)	This finding of the study helps on handling data that will provide the usefulness and insight when utilizing big data analytics.
R. Hermon and P. A. H. Williams	2014	Big data in healthcare: What is it used for?	Approach (Empirical studies)	1. Administration and delivery 2. Clinical decision support 3.Consumer behavior 4.Support services	Findings provide proliferation on big data usage in the healthcare industry and broaden the knowledge of application relating to big data.
R. L. Grossman and K. P. Siegel	2014	Organizational Models for Big Data and Analytics	Underpinning Theory 1. Organizational Models	1.Process 2.Staff 3.Culture	Generation of maximum value through the interaction of IT, Business and Analytics
R. Mahindru	2014	Big Data: It's Actually Big	Approach (Empirical studies) 1.DIKW model	1.Quantity and Interconnectedness of data 2.Information transparency and usable	This article emphasize on the meaning, techniques & technologies, trends and challenges of Big Data and relates it to DIKW model. Current scenario and future outlook of Big Data in India and worldwide was discussed.
A. Katal, M. Wazid, and R. H. Goudar	2013	Big data: issue challenges, tools and good practices	Approach (Empirical studies)	Best of Practices	This study will conclude on the Best of Practice for Big data.
A. Rajpurohit	2013	Big data for business managers 2014; Bridging the gap of potential and value	Approach (Empirical studies)	Process of Big Data	Creation of IT business value is through integration of big data process (analytics tools) to IT architecture

contd. table 2

Author	Year	Title	Method/Theory	Determinants	Findings
Erik Tjong Kim Sang and Antal van den Bosch	2013	Dealing with big data: The case of Twitter	Case study	Visualization of search result	This findings help to describe the infrastructure for searching Dutch tweets
J. Esteves and J. Curto	2013	A Risk and Benefits Behavioral Model to Assess Intentions to Adopt Big Data	Underpinning Theory 1.Decomposed Theory of Planned Behavior (DPTB)/ SEM	1. Perceived Benefit 2. Perceived Risk 3. Perceived Usefulness 4. Perceived Ease of Use 5.Compatibility 6. Self-Efficacy 7.Facilitating conditions 8. Attitude 9.Media 10. Social Influence 11.Perceived behavioral control 12.Volume 13.Variety 14.Velocity	Result findings from the study is related to risk and benefits behavioral intention perspectives utilizing theory of planned behavior in predicting the intention to adopt Big Data.
P.P. Tallon	2013	Corporate governance of big data: perspectives on value, risk, and cost	Approach (Empirical studies)	1. Value Creation 2. Risk Exposure 3.Cost	Findings on data governance practices preserve theequilibrium between risk exposure and value creation
S. Sagiroglu and D. Sinanc	2013	Big Data: A review	Approach (Empirical studies)	1.Appropriate people 2.Data quality 3.Sponsorship from business4. Privacy 5.Security	Study concludes that those organizations from various industries using big data will be able to gain from its analytical features for problem solving issues.
Y. Demchenko, C.Ngo and P.Membrey	2013	Architecture Framework and Components for Big Data Ecosystem	Case Study	1.Volume 2.Velocity 3.Variety 4.Value 5.Veracity	Produce overall perspectives of Big Data phenomenon and its challenges initiating broad discussionsand innovative technologies.

contd. table 2

Author	Year	Title	Method/Theory	Determinants	Findings
S. Soares	2013	Big Data Governance	Case Study	1. Information Management 2. Information Governance	Findings of big data initiatives help to address on how to manage and govern big data, highlighting the relevant processes.
B. Franks	2012	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics	Case study	1. Conceptual Tool 2. Case Studies	Formulation of analysis and knowledge management programs to understand on technology changes business.
K. E. Young, L. J. Hoon and P. YeRee	2012	A study on the effect of Organization's Environment on Acceptance of Big Data System	Approach (Empirical studies)	1. Perceived Usefulness 2. Perceived Ease of Use 3. Organization Innovativeness 4. Organization Slank 5. IS Infrastructure Maturity 6. Perceived Benefits of big data systems	This study will increase users' awareness on Big data system and help develop a way to make it possible for the introduction of new technologies to be used as basic materials
Manyika, J., Chui., M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. H.	2011	Big Data: The next frontier for innovation, competition and productivity	Approach (Empirical studies)	1. Data strategy 2. Data policy 3. Talent and organization changes 4. Tools and technology	Big Data strategy to develop new innovative models, product and services and utilized under controlled experiment to produce variability in performance.
Boyd, D. and K. Crawford.	2011	Six Provocations for Big Data	Approach (Empirical studies)	1. Knowledge 2. Objectivity and Accuracy 3. Data size 4. Data source 5. Ethical 6. Limited access to Big Data	In this study, six provocations is being introduced in order to spark the issues of Big Data with the six factors listed.

contd. table 2

Author	Year	Title	Method/Theory	Determinants	Findings
R.L. Villars, C.W. Olofson & M. Eastwood	2011	Big data: what it is and why you should care.	Approach (Empirical studies)	1. Real-time decision making 2. Organizational change 3. Data value creation	An outcome of findings is to present guidance to organization on the value of Big Data and organizational changes is needed.
D. Bollier	2010	The promise and peril of big data	Approach (Empirical studies)	1. Personal Privacy 2. Civil Liberties 3. Consumer Freedoms	Ensure future improvement in quality of business decision-making, government administration, scientific. Improvement by analyzing data in a better ways.
S. Petter and E.R. McLean	2009	A meta-analytics assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level	Approach (Empirical studies)	1. Information quality 2. System quality 3. Service quality 4. Usage and User satisfaction 5. Intention to Use 6. Net benefits	This findings help to support the relationship introduced in the model and offer insight on IS success model.
W.H. Delone and E. R. McLean	2003	The DeLone and McLean model of information systems successa ten-year update	Underpinning Theory 1. Theories of communication	1. Information quality 2. System quality 3. Usage and User satisfaction 4. Impact on organizational	Successful model of Information System (IS)

depend on theories from streams of information technology (IT), information system (IS) and consumer behaviour.

5. DISCUSSIONS AND CONCLUSIONS

The classification of research papers relating to determinants and key finding is shown in Table 2. All the papers focused on the determinants involved for the big data adoption either by approach through empirical studies, underpinning theory and case study.Findings from this study help to provide answer to the research questions for this studyrelating to the academic researches done, research strategy and methodology adopted and; finally, the determinants of Big Data adoption through literature review based on systematic review approach. The study on the big data adoption is limited even though it had been an importance of Information System studies. Big Data studies had been the hype in these recent years. Evaluation of the published literature had been conducted critically to examine the knowledge on the big data adoption. In this findings, with the detail investigation on empirical studies, case studies and theoretical framework proposed by researchers which will enable the understanding of big data adoption. Analysis of the data synthesized will help practitioners and academicians to gain the meaningful insights on the detailed description of determinants used by previous researchers. This study helps to broaden the knowledge of the understanding on big data adoption through contribution of the description dimensions such as research methodology used, underpinning theory and findings for the studies to the much desired researchers. This will help to encourage researchers to produce big data adoption studies with high promising and distinctive evidence recommendation for future research

5.1. Future recommendations

Future research recommendation should include synthesizing of more research papers with relation to management view on the decision to big data adoption. This will help to encourage the examination of management perspective on the determinants justification in spite of the benefits on utilizing the big data adoption. The inclusion of research papers with combination of various underpinning theories should be considered from information technology and information system to extend the knowledge of research methodology used for big data adoption as it has a great and valid potential of research which will enhance the development of big data adoption broadly across all industries. Research of scale development used by researchers should be an added advantage which helps refine the result of finding, thus should be part of the requirement for future research. Finally, research approach should include experiments and analytical modeling which will enable the in-depth understanding on the reason for big data adoption, thus contribute to practitioners and academic researchers. In conclusion, the

research of big data adoption will further accelerate the utilization of big data across all the industry in enabling competition advantages pressured by the market competition.

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