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Success Factors for IoT and Big Data Analytics in Transpiration System: A Systematic Literature Review

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ABSTRACT

Internet of Things (IoT) envisages overall merging of several "things" while utilizing the internet as the backbone of the communication system to establish a smart interaction between surrounding objects and people. Big data analytics, being the crucial component of IoT, provides valuable platforms through the cloud to manage and analyze data. This paper presents a systematic literature review that is used in identifying the elements of the implementation success factors for the big data analytics and IoT-oriented transportation system. This paper presents the protocol used of the systematic literature review in gathering available and related information for a study being investigated and summarizing empirical evidence for the research.

Keywords: Internet of Things, Big Data, Systematic Literature Review**.**

1. INTRODUCTION

The development of the internet has delivered important technologies within IT evaluation in the transportation sector which is big data analytics and IoT technology. Companies have for so long used data analytics to assist them in directing the strategy of their business in order to maximize earnings. Preferably, data analytics assist in eliminating much of the unnecessary information in trying to understand clients, systematically tracking data patterns to best construct business tactics and operations to minimize uncertainty (Turner, Gantz *et al.* 2014). Not only does analytics decide what may attract new clients, often analytics acknowledges existing patterns in data to assist higher serve current customers, which is typically more cost-effective than organizing a brand new business. Big data analytics will help the transportation sector to get to know exactly what is happening in their businesses so they can act immediately according to the data obtained in real-time to ensure they remain competitive. Big data is nothing else but data which is huge in its information that requires advance technologies to handle as existing traditional technologies cannot manage such enormous datasets, for extracting useful information. This extraction of cost-effectiveness is the evaluation of big data which is known as big data analytics. In addition, the IoT paradigm relies upon on the identity and use of a huge range of heterogeneous bodily and digital objects which might be linked to the world huge net (Canal and Villari 2013). IoT permits the special object to talk with every different, as well as the in-context invocation in their abilities offerings closer to including cost applications. The first IoT packages are primarily based on Radio Frequency Identification (RFID) and wireless sensor network is one of a kind programs fields consisting of healthcare, smart cities, transportations, and so on (Armbrust, Fox., *et al.* 2010, Hussein, W., 2018). The quick development of the engineering such as in the mobile

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communication short-range and enhanced energy proficiency is relied upon to create a pervasive association of things (Armbrust, Fox *et al.* 2010, Canal and Villari 2013). This will definitely result in the generation of tremendous measure of information, which affect to be laid in, treated, and accessed. Figure 1 shows that year-over-year growth of IoT connection and the projected growth for 2025.

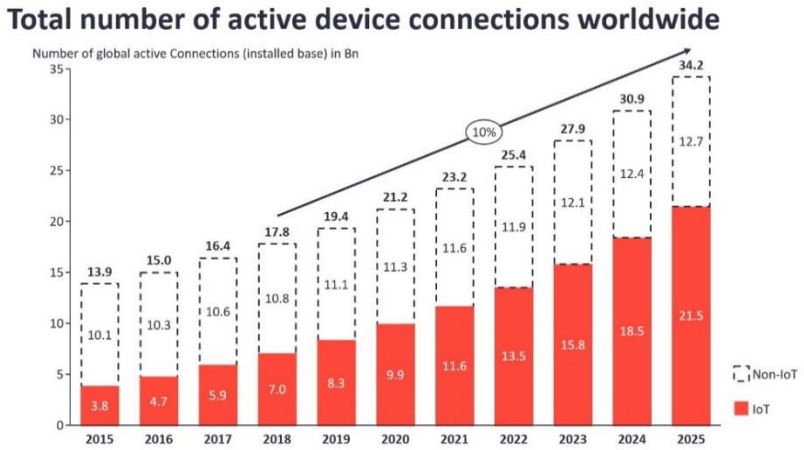

Figure 1. Projected IoT Growth for 2025.

The objective of this research is to identify the variables that are antecedent factors to implementation success of big data analytics and IoT-oriented transportation through a systematic literature review. In doing this, the next section of this paper presents the literature review. The third section presents the method and the fourth section presents the results and discussion. The last section is the conclusion.

2. LITERATURE REVIEW

Adoption of the intelligent transportation system as new technology phase for any of the stakeholders in the transportation sector requires the need for business process reengineering (Ezell, 2010; Barbaresso, Cordahi *et al.*, 2014; Hussein and Al-Hashimi, 2015). IoT requires the adoption of new technology, rethinking, and reengineering of the entire processes of business linked to it. This poses an obvious challenge because of the time and effort that must be invested for optimal benefits (Barbaresso, Cordahi *et al.* 2014; Hussein, Kamarudin *et al.* 2018). In addition, there are instances where a proper change in management is necessary for stakeholders' adaptation to the change and learning of the workings of the new system. Prototyping and testing with integrations of small-technology offer an insight into the functions and benefits of the overall system (Scacchi 2002). IoT projects are typically long-term investments, which must be done with the reengineering of business processes right from the start. The first step would be the identification of the main needs of the business which should adhere to the IoT system, followed by the detail of the to-be business process, and an operational analysis that identifies the main technological requirements. Cross-functional teams are especially useful in considering the full range of business requirements, IT elements, and the regulatory environment (Scacchi, 2002; Barbaresso, Cordahi *et al.*, 2014). Proper change in management is also essential in gaining all stakeholders support, improve transparency issues, and properly adopt the new technological advancement. Finally, a flexible modular approach must be prioritized to allow project-oriented IoT development to evolve into a fully integrated system with cross-platform operability, encompassing all heterogeneous business processes (verticals and horizontals), parties, technologies, and modes of transport to the same network (Dumay 2004, Barbaresso, Cordahi *et al.* 2014).

Studies on implementation success factors or/and implementation models have considered several factors expected for optimal benefits and results in the application and adoption of ICT in the transportation sector (Guerrero-Ibanez, Zeadally *et al.* 2015; Yao, Sheng *et al.* 2015; Ju, Kim *et al.* 2016; Algan 2017; Drăgan, Fortiş *et al.* 2017). These factors can be categorized into five categories namely, business (Ezell, Atkinson *et al.* 2009; Ju, Kim *et al.* 2016; Drăgan, Fortiş *et al.* 2017), infrastructure(Leng and Zhao 2011; Wang and Li 2016), technical expertise(Laboratory 2016), administrative (Jurgen 2013; Yao, Sheng *et al.* 2015) and government policy and regulation (Guerrero-Ibanez, Zeadally *et al.* 2015; Yao, Sheng *et al.* 2015; Ju, Kim *et al.* 2016).

3. METHODS

This research is a qualitative method employing a Systematic Literature Review (SLR). A SLR is a qualitative method similar to document review, is an appropriate method for identifying, evaluating, and interpreting available information about a research topic (Kitchenham, 2004). It is specifically used in gathering available and related information for a study being investigated and summarizing empirical evidence for the research. Furthermore, SLR can be used in identifying important gaps in past related studies as a way of strengthening the focus of the current research and its foundation (Ahmed and SALIM 2013). It is used to detect relevant literature which forms the primary corpus of the study's reference information (Kitchenham 2004; Daams, Wu *et al.* 2014). The three main stages in SLR, according to (Kitchenham (2004)) are (a) planning the review, (b) conducting the review, and (c) reporting the review. Figure 2 depicts the SLR research design.

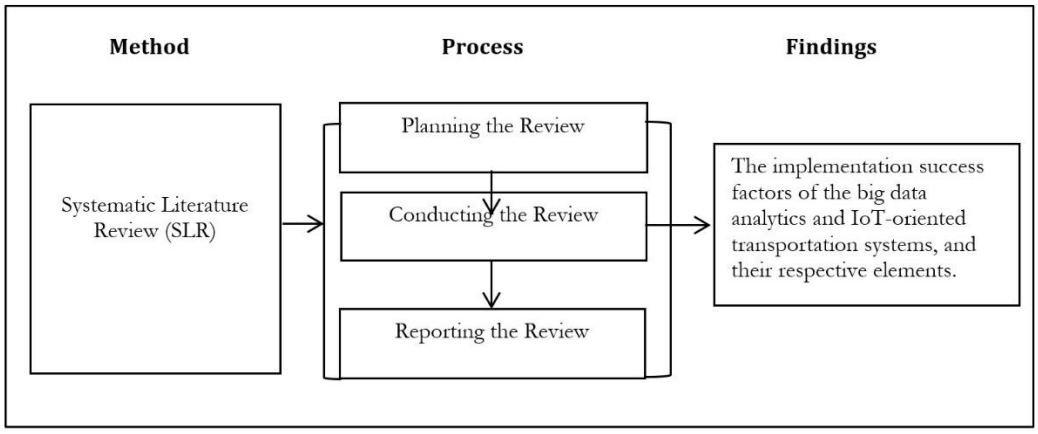

Figure 2. SLR research design.

4. RESULTS AND DISCUSSION

In this section, the systematic review protocol that has been used in this research is presented. A systematic review has been performed by employing the guidelines published by Kitchenham (2004). Figure 3 shows the systematic review protocol.

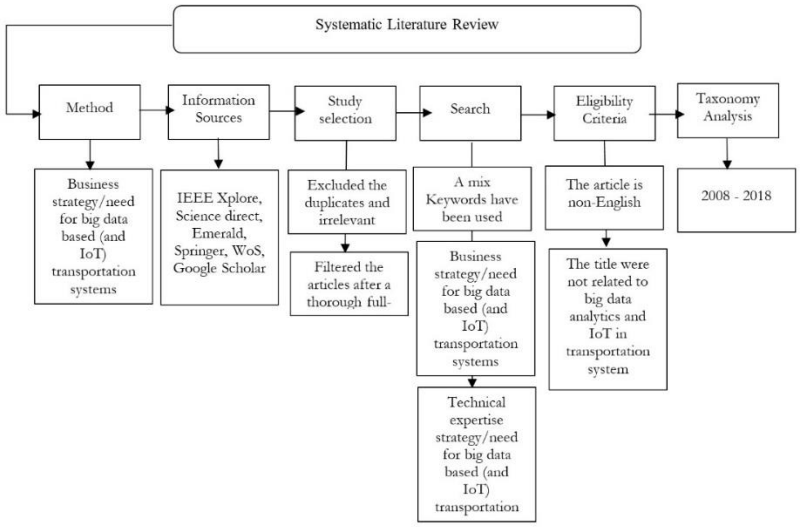

Figure 3. Systematic review protocol.

Every article that met our research criteria as shown in Figure 3 was included. The initial target was set in order to map the space of the research on transportation system into a general and coarse-grained taxonomy of five categories which are business, infrastructure, managerial, technical expertise and government policy. These categories were obtained from a pre-survey of the literature with no constraint (Google Scholar was used to obtain the first taste on the landscape and directions in the literature). After the initial removal of duplicates, articles were excluded in both iterations of screening and filtering if they did not fulfil the eligibility criteria. Examples of exclusion reasons include: (1) the article is non-English and, (2) the focus is on a specific aspect of IoT and big data other than a transportation system. Figure 4 shows the study selection, including the search query and inclusion criteria.

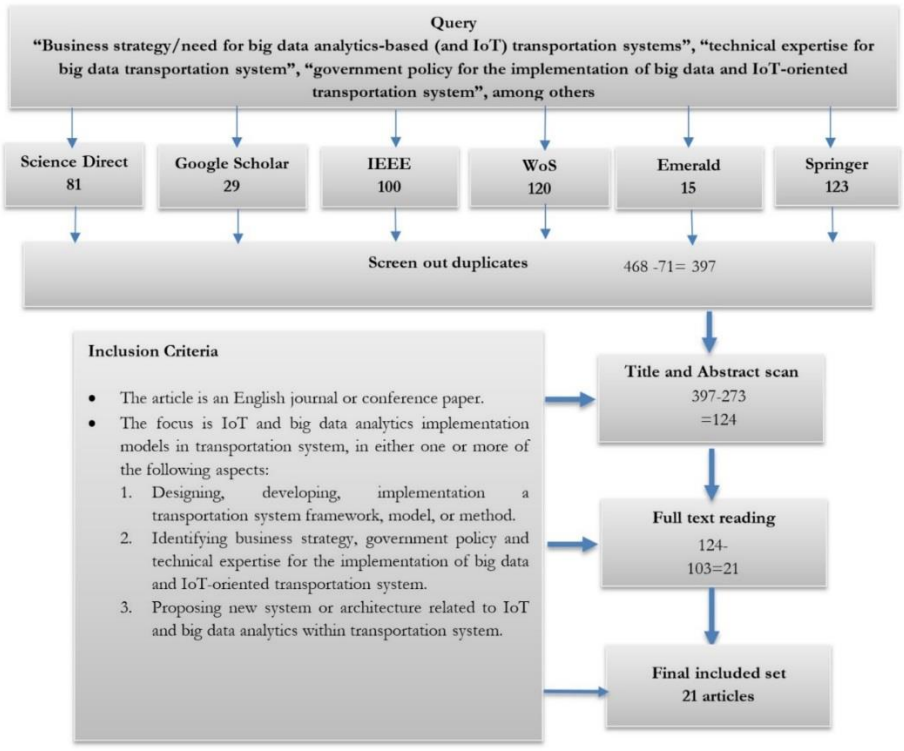

Figure 4. Flowchart of study selection, including the search query and inclusion criteria.

Duplicate and irrelevant studies based on the theme and the search strings are excluded. Table 1 presents the distribution of the literature reviewed.

Table 1 Distribution of the literature reviewed

Electronic Database	Number of Publications Identified in the Search	Number of Publications meeting the Inclusion Criteria	Number of Publications Relevant to the Research Focus
Science Direct	81	36	4
IEEE Xplore	100	25	5
Emerald	15	2	0
WoS	120	21	5
Springer	123	10	3
Google Scholar	29	30	4
Total	468	124	21

The findings of the SLR revealed that there are very few empirical articles related to the core focus of this study, especially in relationship with its research objectives. This accounts for the availability of only 21 out of previously-found 468 articles and 124 articles that matched the inclusion criteria. The twenty-one (21) supported the existence of five different models, or approaches, of understanding implementation successes of big data analytics and IoT-oriented transportation sector. As observed, the preliminary study showed that business, infrastructure, administrative/managerial, technical expertise, and government policy are core factors to be considered in the successful implementation of big data analytics and IoT-oriented transportation system.

5. CONCLUSION

Big data with IoT can bring a great benefit to businesses due to their needs to maintain stable performance and growth. In this paper, a systematic literature review has been conducted in order the identify the implementation success factors of big data analytics and IoT based transportation system , SLR allows the researcher to seek, identify and collate related past literatures on (a) business, (b) infrastructure/technology, (c) technical expertise, (d) administrative/managerial, and (e) government policy and regulation, as components of the implementation framework for big data analytics and IoT-oriented transportation system. This proffer a critical analysis of the literature using clear cut metrics for the selection and exclusion of articles.

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