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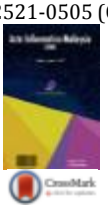

A CONCEPTUAL FRAMEWORK FOR MEASURING THE PERFORMANCE OF BIG DATA ANALYTICS PROCESS

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ABSTRACT

Processes are described as a sequence of steps which result in a specific output based on a given input. The use of term, process, is common and used in different settings including more recently as big data analytics(BDA) process, and Extract, Transform, Load (ETL) process for traditional data warehousing and business intelligence in the past. BDA process starts from data acquisition and selection of the sources, to data preparation, analysis and modeling, to visualization and interpretation phases. Looking at big data analytics in a process perspective has major benefits since improving process drives a better outcome. This study focuses on how the performance of BDA process can be measured. The major contribution will be performance measurement framework of BDA process. The concept of process performance is broadly covered in the literature, mainly in the areas of business process and software process. Thus, process performance measures are available. Time, quality, cost, and flexibility are four of them. Do they apply to BDA process? This is a major question to be dealt with in this research. The overall structure of this research is shown in Figure 1.

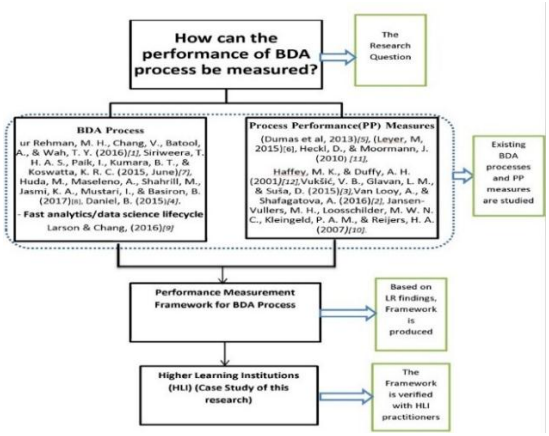

Figure 1: The Research Structure

There are four process performance measures identified in the literature as constructs explained in the following:

Time, as the dictionary defines (oxforddictionaries.com), is "the indefinite continued progress of existence and events in the past, present, and future regarded as a whole". Time is indispensable for big data analytics. It relates to big data analytics in terms of the time the data should be processed, and the speed and the accuracy needed. The delivery of output at minimum amount of time, while accuracy is observed, is what is valued by the customers. Therefore, time is pivotal performance measure for BDA process.

Quality has two aspects which definitely delimits its definition: internal quality and external quality. Internal quality refers to process participants' point of view. Process participants are staff that work on the process. It means how they view the process which they are daily involved in its development and its operation. External quality, on the other hand, relates to clients' satisfaction, or in other words, how customers are satisfied with output of the process. In summary, the expertise of the technical staff in the process is echoed by the satisfaction of process owners and end-users.

The third process performance measure is **cost.** Cost reduction is a major purpose of cost. However, the qualified hands to be hired and the advanced technology to be purchased should also be taken into count. Therefore, cost is unavoidable but the reword is benefits that could be gained. Rational cost/benefit analysis should be performed where devoting company's resources are justified for strategic benefits. Thinking in this way, one important measure that comes out is **cost-effectiveness.** How cost-effective the process is, denotes its performance? The cost applies throughout BDA process. Examples include the cost of technology and manpower needed for data acquisition and the cost of software and hardware tools for data analysis and visualization.

Flexibility, as process performance measure, refers to the flexibility required when building the process (build-time flexibility) and when executing it (run-time flexibility). Flexibility of process structure and flexibility of output volume) are two examples of flexibility. Flexibility should be observed throughout BDA process, as the volume of big data cannot be predicted.

The four performance measures discussed above are adopted to construct the conceptual framework of BDA process performance measurement (Refer to **Figure 2**).

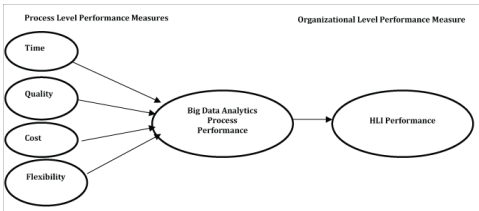

Figure 2: Conceptual framework of BDA Process performance measurement

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