Managing Data and Information Quality in Outbound Transportation Systems: A Systematic Approach

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ABSTRACT

Using an interpretive case study approach, this paper describes the data quality problems in two companies: (1) a global wholesale technology distributor, referred to as (GWTD), and (2) a global exporter of hardwoods (GEH). These two interpretive cases examine the outbound transportation system of these two companies. Specifically, the issues examined are GWTD’s freight bill audit and payment process and GEH’s transportation coordination system. A data and information quality (DIQ) assessment of the freight bill audit and payment process, using a framework referred to as PGOT, demonstrates how the framework can identify improvement opportunities within any information intensive environment. Data quality problems within key processes were identified during the assessment, and their implications are described. This paper provides recommendations for DIQ best practices, and illustrates these best practices within this real world context of outbound transportation.

Keywords: Business Intelligence, Data and Information Quality (DIQ), Data Quality, Decision Making, Logistics, Operational Business Intelligence, PGOT Framework, Quality Assessment, Transportation Management

INTRODUCTION

The quality of data and information dramatically impacts decision making (Fisher, Chengalur-Smith, & Ballou, 2003) and vice versa, the decision making context impacts the perception people have of the quality of the information (Neely & Cook, 2011). Furthermore, as data is migrated to secondary sources, the quality of the data may change. In the logistics and transportation arena, professionals must access a diverse set of internal and external sources of data. It is possible that invoices may be recorded in the system correctly, but a decision maker may use erroneous search criteria to extract the data, resulting in inaccurate or misleading information (Borthick, Bowen, Jones, & Tse,
Theoretical, there are three types of decision making: (1) economic person, (2) satisficer, and (3) strategist (Wolpert, 1964). The category “economic person” assumes people desire to maximize their profit. In reality, managers cannot always maximize profit due to time and other constraints but settle for being “satisficers.” Satisficers operate in an environment of bounded rationality where their knowledge is finite about conditions and they settle for something less than optimal. As a result, tradeoffs may be necessary with DIQ. Data may be less than 100 percent accurate in order to receive it in a timely manner. Or perhaps the additional cost to ensure that it is 100 percent complete does not provide substantial marginal benefits to the decision making process. Lastly, strategists operate in an environment where they attempt to mitigate risk and accentuate their benefits in a world of bounded rationality. Once again, tradeoffs may be necessary.

For large companies, like the one discussed in the first case study, the sheer volume of data can be overwhelming when auditing freight bills for payment. The invoices received from carriers should contain information critical to auditing the carrier’s invoice itself but also for use in business intelligence systems for better managing corporate operations and customer service more generally. Unfortunately, the information is frequently inaccurate, incomplete, or not received in a timely manner. As a result, decision makers need to operate within an environment that requires them to balance the quality of data and information they use with the resources needed to achieve such quality. They need to make tradeoffs.

This research uses a model developed by Neely and Cook (2011) to describe the issues associated with business intelligence (BI) and data and information quality (DIQ) within the logistics and outbound transportation functions of a company. Specifically, it aims to encourage discussions between the BI and DIQ communities, providing the foundation for cross-disciplinary research and practice. Furthermore, professionals in fields other than logistics, such as health care and insurance processing, that must operate within a very diverse information intensive environment should care about the concepts covered. Lastly, this paper presents an ongoing research project in data and information quality that is designed to provide a comprehensive framework for judging the quality of the data and information generated by systems (electronic or otherwise). This model is called PGOT, which is short for people, governance, operations and technology.

Taking a holistic, interpretive case-based research approach, the goals of this research are (1) to identify and analyze the relationship between the PGOT framework and BI, (2) to illustrate how the PGOT can be used to identify some typical DIQ problems within the BI system, (3) to propose and demonstrate how the BI community could use the PGOT to improve the quality of such systems and lastly, (4) to provide an evolving roadmap of BI and DIQ integration. The overarching research question addressed is “Does having the PGOT framework allow practitioners to better identify areas of weakness within their DIQ/BI systems?” The two case studies will help us answer this question.

The paper contains the following sections. First, a literature review is provided that examines logistics and transportation management, business intelligence and data quality research. Next, a DIQ decision-making framework called PGOT is described, with particular emphasis on identifying areas needing quality improvement. Then, two interpretative case studies demonstrate the usefulness of the PGOT in real life settings. The two companies used to illustrate specific areas of the PGOT are (1) a global wholesale technology distributor, referred to throughout the paper as GWTD and (2) a global exporter of hardwoods, referred to as GEH. Lastly, the paper concludes with practical recommendations for improving DIQ within BI systems.