Data Quality and Knowledge/Information Management in Service Operations Management: Regional Supermarket Case Study

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ABSTRACT

The concepts of managing data quality assurance by promoting proper safeguards to manage data quality, employee buy-in, and support from top management were illustrated in a case study of Giant Eagle, one of the largest, privately owned and family-operated companies in the U.S. and regional headquartered in Pittsburgh, PA. Specific aspects of data quality assurance, types of access, application examples (especially with its loyalty-card collection and data-mining uses that allow customers to accumulate savings specials and rewards through the fuelperks™ and foodperks™ incentive programs), as well as requirements for entry into knowledge-management systems were discussed through the paper. There are significant benefits, costs, and potential risks for maintaining reliable corporate data, and many organizations do not display the appropriate attitude about ensuring high-quality data, as some management may accept data errors as a cost of doing business. This present study documents the success of high volume, low profit margin grocery-based business that hinges on quality driven in product accuracy, data management, and service levels.

Keywords: Competitive Strategy, Data Warehousing, Information Communication Technology, Knowledge-Based Organizations, Operational Effectiveness, Retail Service Centers

INTRODUCTION

Roles of Good Data-Collection Strategies

Good decision-making techniques coupled with good leadership in knowledge management are always in demand in business and engineering situations (Adams, 1990; Alder, 1995, Bensaou & Earl, 1998, Finch, 1999, Heijdra & Romp, 2009; Ho & Wong, 2009). Certainly, the inherent requirement for good decision-making techniques is good data. Unfortunately, as much of business decision-making is made based on historical data, frequently measured in terms of weeks or years old, the data quality assurance issue is in doubt. For example, even under the best of conditions, hourly data from a production process are usually recorded manually by
a machine operator, then these data concerning parts or products, rejected or accepted, and related process parameters are typically stored for evaluation at the end of the current shift. Tally sheets are created, signed by appropriate tactical managers, usually shift foreman, and eventually sent to a data processing department for data processing into databases. At predetermined intervals, reports are produced and sent to manufacturing management and production administration. Hopefully, after all these required steps, decisions are made about the process and products, and corrective action, if necessary.

However, much of the data collected and processed with such operations, especially in the service sector, were possibly outdated before they are processed; hence, time certainly impacts the quality of data that management eventually receives from the plant and/or retail distribution center. Even data collected in real time but under suspect conditions frequently have negative consequences. Making decisions based on data require that management have confidence in the quality of data collected. Obviously, to obtain this degree of confidence in data, the data must be accurate, timely, and reliable. Management must actively be involved in promoting proper controls for all business transactions if they want to have confidence in their operational decisions. Management needs to control quality, cost, schedule, location of warehouses and plants, inventory levels, pricing, shipment, and a vast host of factors that are almost based entirely on the volume and quality of data and data collection (Baesens, Martens, Mues, & Vanthienen, 2009).

Unfortunately, to complicate this situation, often employees hired to fill data entry roles are minimally skilled, poorly paid, and frequently are associated with high employee turnover rates. The greater the complexity of the data entry task, the greater the probability of making an error. Hence, to eliminate the human element in data collection, some type of automatic identification and data capture (AIDC) system is necessary to ensure the level of accuracy needed to support managerial decision-making systems. For example, the robustness of some of the various bar-code symbologies, the set of rules that define the makeup of each character in the code-tested by the bar code industry are quite remarkable (Harmon, 1996), result in extremely small error rates as compared to human-keyed data. The codes were continuously scanned from a low of about 12 million for bar code, UPC-A, to a high of over 16 million for bar code, Code 16K. The worst-case scenario, assuming a 95% confidence interval, was 1 error in 394,000 for UPC-A to 1 error in 5,400,000 (Fales, 1992). Certainly, when one compares this rate to the commonly held error rate for data entry by humans to be 1 in 300, the advantage of automatic identification systems is quite obvious. Hopefully, with increasing data collection accuracy, there should be an increase in a firm’s productivity level as well.

Applications of other AIDC-related technologies, such as voice recognition and radio frequency identification (RFID) systems include remote databases, e-mail access, retail shelf price audit, retail stock check, and voice over IP-LAN access telephone (Smith and Offodile, 2009). The benefits of voice recognition and RFID include elimination of label costs, increased worker safety and comfort, coupled with minimal training time, since worker literacy and non-English language skills are not problem with voice recognition systems (Polizzi, 1997; Polizzi, 1997). For example, Vocollect, Inc., a Pittsburgh, PA headquartered and privately held company, promotes voice-recognition technology and focuses on logistics and industrial implementations. Billions of dollars of goods are picked by voice each year, with ease of warehouse management and radio frequency systems integration as hallmarks of the system.

**Strategies for Managing Information for Knowledge Management Purposes**

Many of the terms and ideas surrounding knowledge management started to appear in the 1990s due to consulting firm publications and
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