

Chapter 68

Barcodes vs. RFID and Its Continued Success in Manufacturing and Services

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ABSTRACT

The purpose of this chapter is to study barcodes and their implementation. Barcodes have been around since 1949 and have made strides in supply chains across the world. Barcodes are cost effective and one of the most efficient means of tracking to date. Specifically, two companies were chosen to be reviewed, Wal-Mart and Stone, Rudolph & Henry, PLC, by their use of barcodes in their perspective industries, for use by governments, manufacturing, and service industries for identification and error reduction.

INTRODUCTION

Versatile Nature of the Ubiquitous Barcode

A barcode is a machine-readable code in the form of numbers and a pattern of parallel lines of varying widths, printed on a product (Sirico, 2010). Barcodes are essentially a type of symbolic language that uses printed horizontal strips of vertical bars used for identifying specifications. An accompanying scanning device reads the barcode by moving a beam across the symbol (McCathie, 2004). Barcodes can come in one-dimension (1D), 2-dimension (2D), or three-dimension (3D). Barcode systems are used in routine business from the manufacturing and ordering process to the parking lot after purchased. Joseph Woodland and Bernard Silver invented the barcode in 1949. Silver overheard a conversation of a supermarket executive from a food chain called Food Fair. The general rationale was to have an automatic system for capturing product information (Seideman, 2015).

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Barcode technologies have had a relatively long history with almost every type of business that keeps track of goods and services. Point-of-sale (POS) is probably the most common use for the barcode (Chen & Dubinsky, 2003). Customers typically view barcodes on almost every item that is available for purchase within a retail environment. The cashier uses the barcode to scan the items into the computer system and retrieve the amount the customer will owe for that particular item. Barcodes in manufacturing help in inventory control, quality control, and help measure productivity throughout the manufacturing process. Barcodes are used for packaging, tracking time and attendance of employees, and measurement of proficiency (Jain, Benyoucef, & Deshmukh, 2008; Kamhawi, 2008; Kay, 2007; Kearney, 2005; Kennedy & Widener, 2008; Koong & Lin, 2007). Evaluating the efficiency of barcode systems routinely reduce costs while improving quality, on-time performance, and reducing errors.

BACKGROUND

The future need for barcodes will probably be increasing due to its universal acceptance and easy-to-use with low costs of producing barcodes (e.g., it is usually included in the cost of printing labels or packaging materials on products) (Cowles, Kiecker, & Little, 2002; Davis, 1989; Devaraj, Fan, & Kohli, 2002). As the population grows, so does the need to make workplaces and their environments more efficient and safer. Barcodes are employed in supply chain management (SCM) applications in the healthcare industry. The use of barcodes in healthcare facilities allows hospitals to save space and reduce overstock by ordering the supplies needed daily (Harrop, Das, & Holland, 2016). In the retail setting, barcodes are becoming a part of smartphones with apps. The consumer can shop and scan items through the convenience of their phone. This easily enables the retailer to track consumers' spending. A majority of manufacturing companies are turning to the barcode system as well. The use of barcodes in manufacturing facilities assists in making the manufacturing process faster and more efficient. However, with barcodes, as with all IT-intensive technologies, have important advantages and disadvantages to consider, as illustrated in Table 1.

Barcodes are extremely easy-to-use and generally require little to no training for users. The time saved by scanning a barcode is substantial to the amount of time that would be spent manually entering product information for one or one's entire inventory. Two-dimensional (2D) barcodes reduce error and read accurately when scanned. Linear or one-dimensional barcodes are limited in their accuracy since the scanner and barcode must be properly aligned for the information to be captured. Barcodes are generally the most cost efficient method of technology for coding information, but associated equipment such as POS or inventory tracking software and scanners, etc., can quickly increase the initial costs, including replacement costs. Security on barcodes is not good, as most information coded in barcodes readily found.

Table 1. Selected advantages and disadvantages of barcoding as a part of identification technologies

Advantages	Disadvantages
Inventory Control (through tracking and essentially error-free readings)	Costs (associated equipment and replacement costs)
Accuracy (2D, 3D Barcodes), Error reduction	Accuracy (especially with linear barcode)
Time savings	Limitations by line of sight scanning
Easy-to-use	Security issues, as they are easily read

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