

## **BARCODE BENEFITS IN GARMENT INDUSTRY THROUGH A CASE STUDY**

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**Abstract-** In the digital age, data is playing an important role for managing production in the garment industry. There are different innovative technologies and automation in data gathering and preparing intelligent reports for managers and one of them is barcode technology for tracking production and inventory data. The paper aims to present how barcode technology allows companies to optimize their actual production systems and increase efficiency. The study is conducted in a garment company in Albania producing shirts for Italian customers. The company has implemented the barcode system for 7 years, which has given it many benefits including: time reduction, accuracy, delivery in real time, satisfied customers, increase in customer numbers etc. In this paper we have analyzed and estimated the main benefits coming from barcode technology implementation in this company comparing it with the manual method it used before.

**Keywords:** Barcode, Delivery in Real Time, Time Reduction, Accuracy, Satisfied Clients.

### **1. INTRODUCTION**

In recent years everything is moving toward automation. Many processes are now being automated, reducing the need for manpower. This is because these automated systems can complete the same process in less time, with a higher degree of accuracy. Considering that time is the most important factor in production, and it directly influences productivity, the main reason for using these methods and systems is to reduce the time for manufacturing a product to increase productivity. Productivity is an essential element and should be considered as a culture in every company. Companies can enhance competitiveness and profitability through improving productivity [1]. Since time is an important element in production, companies aim to implement a system that can lead to the reduction of time [2].

Such systems can also lead to quality improvement, and the reduction of defects, which are directly related to customer satisfaction [3]. One of these systems being in use in the recent years is barcode. Barcodes have become an important component of SCM in many companies nearly 50 years ago [4]. Barcode systems are now considered an essential tool for a company if it wants to be

successful [5]. Barcoding will bring to the new millennium what the internet has done for us in the last decade. Barcodes have been around for many years, are versatile and are used in different industries such as grocery, textiles and in many fields such as retail, production, and transportation of products.

The barcode labels have changed over the years. In its beginnings, the barcode consisted of closed circular lines and then it was transformed into vertical lines that still exist today [6]. Since their invention barcodes have become an important tool for companies to make their inventory control and sales operations more efficient and truck products during the supply chain. Barcode is an important element for the company to save time and money because the information it contains can be read immediately, avoiding the need to enter data manually [7]. Barcodes are used as a means of quick identification. A great part of the industries uses barcodes to track the product during different phases of production, to track product sales to the retailer, the time, and the quantity. Especially, barcodes provide better accuracy, traceability, and sorting abilities compared to the manually data entry. Also, barcodes are known for their safety and liability on data transferring [8].

A barcode system is also much used in the warehouse of companies. It brings to the minimization of human errors and provides precision in data transferring and this process is completed in real time [9]. Barcodes are considered as the most used systems which can save cost and provide a high level of accuracy. At the final phase of the production, in packaging the main use of barcodes is to identify the package content. Barcoding also enables operators to work faster, without errors. This automated system can convert physical actions into digital actions in real time, increasing efficiency and helping the management sector to make decisions on planning and work organizing [10].

In Albania, there are 5 garment companies which have implemented barcode technology in the packaging phase, Considering the benefits of barcode, they are preparing to implement it during production processes, to reduce the cost and to increase accuracy and productivity. The study is conducted in one of these companies mentioned above, Dalba Shpk in Tirana, established in 2001.

The company operates as a falcon production company and has a total number of 100 employees. Dalba shpk produce man shirts and has three different sewing lines. It has implemented barcode in one of the sewing lines for 7 years and now it is trying to implement it even in other production lines.

After the product is finished, packed, and the labels are put and before it is delivered to the client, the product passes through a final control point using barcode method. During this phase of production, the operator working in this sector scans all the order quantity packed and ready for export, to check all the details of the finished product. The special feature of barcode system is that at the same time as the final check during the scan for missing items, the Italian customer can check his order in real time. This is why barcode system is considered as a system that enables real time data transfer.

**2. MATERIALS AND METHOD**

The study is based on the comparison between the manual method and the barcode method, for a period of 14 days (10-25 July 2023), related to the quantity of order for each day at the sewing line. We have compared the time needed to put all the data and prepare the product for packaging with the manual method with the time barcode method needs for the same processes. It was also compared data accuracy for the period of the study between manual method and barcode method. Before the implementation of barcode system, the company operated manually by putting all the data written by hand. With the manual method the label was filled in by hand and the information it contains is not as detailed as with the barcode label. Figure 1 shows the barcode label the company is using.



Figure 1. Barcode label

A barcode label consists of bars composition that have a set of numbers underneath it. It is a representation of data that can be translated by a certain type of machine [9]. In the barcode label (Figure 1) the company uses, we can find detailed information specifically:

- 2339 is Number of Schedule
- 445,861 is Order Number
- 01946 is Product Number
- O is Client Representative
- 2 is Order quantity
- \*1460500\* is Product Barcode

Barcode can be read by a specific optical scanner called or scanned from an image by special software [2]. In the company Dalba Shpk the barcode system is used at the end of the production line before the product is delivered to the client. At the beginning, the operator resets the scanner to delete all the previous data of the previous orders and then simply swipes the barcode across the labels.

The standard device scans each label of packaging boxes of the entire order, and the computer automatically generates a sheet with all the necessary information about the order.

After the barcode label used in the company is scanned by a scanner, the computer connected to it automatically generates all the information related to the order. Compared to the manual method, barcode can lead to quick and efficient data entry, time saving and cost reduction [11]. Barcode has a great impact on productivity improvement because it gives the possibility of real time data capture and tracking [12]. Before the company implemented the barcode system, this process was completed manually, and it took a lot of time. The manual method had a negative influence on production and delivery in time of the product. Also, it doesn't have a high level of accuracy.

**3. RESULTS**

The implementation of barcode in the end control during packaging before the product goes to the client has brought many benefits and advantages to the company. After measuring the time needed to put all the data and prepare for packaging and comparing the manual method with the barcode method, resulted that the barcode method, takes less time, which means saves time in the company, in terms of productivity, time saving is the most important component of increasing and improving productivity. Also, barcode system is simply to use and do not take much time to complete it. In Table 1 it is shown the comparison of time in minutes needed during packaging and end control, between the manual method and barcode method for the same quantity of order, for 14 days of the study.

Table 1. Difference in time between manual and barcode method in the company Dalba Shpk (10-25 July 2023)

Days of the study	Quantity of order in pieces	Time in minutes with Manual method	Time in minutes with Barcode method
1	200	180	30
2	200	180	30
3	150	150	22
4	300	240	40
5	250	200	35
6	300	240	40
7	250	200	35
8	200	180	30
9	150	150	22
10	300	240	40
11	150	150	22
12	250	200	35
13	250	200	35
14	250	200	35

Regardless of the quantity of order the barcode method is realized in less time compared to the manual method. This is obvious in every day of study. Figure 2 shows a considerable time difference in minutes between the manual and barcode method. It is obvious that the barcode method is very fast, saves time and it helps the company to be more effective and productive even at this stage of production. Using the barcode system, time was spent efficiently, and the company has improved productivity.

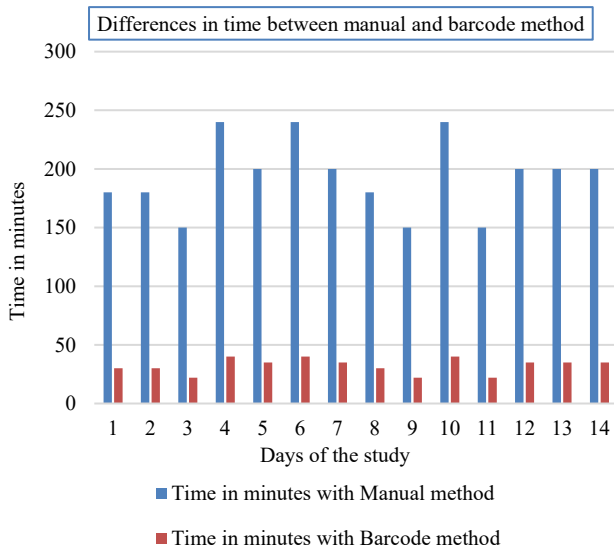


Figure 2. Differences in time between manual and barcode method in the company Dalba Shpk, during 10-25 July 2023

So, the implementation of the barcode system at this stage of production has helped the company to improve productivity, because the operator works faster and saves time. Apart from the reduction of the time, by using the barcode method, the company has also benefited from another important advantage, which is accuracy. In Table 2, it is shown data accuracy in percentage with manual and barcode method during 14 days of the study.

Table 2. Data accuracy with manual and barcode method in the company Dalba, Shpk (10-25 July 2023)

Days of the study	Quantity of order in pieces	Accuracy with manual method (%)	Accuracy with barcode method (%)
1	200	96	100
2	200	95	100
3	150	96	100
4	300	93	100
5	250	94	100
6	300	95	100
7	250	93	100
8	200	92	100
9	150	96	100
10	300	94	100
11	150	95	100
12	250	93	100
13	250	92	100
14	250	95	100

Referring to Table 2, we can notice that with the barcode method there are no human errors in the company, which were very significant with the manual method. In Figure 3 it is shown a comparison of data accuracy between manual and barcode method. We can notice that there are no errors in this final stage of production due to the implementation of the barcode system. Now, with the use of the barcode method in the company, the accuracy in delivering is 100% in every day of the study, compared to the manual method where the accuracy fluctuates 92-96%. The accuracy the barcode method has offered to the company has brought satisfied clients and has given the company the possibility to increase the number of clients.

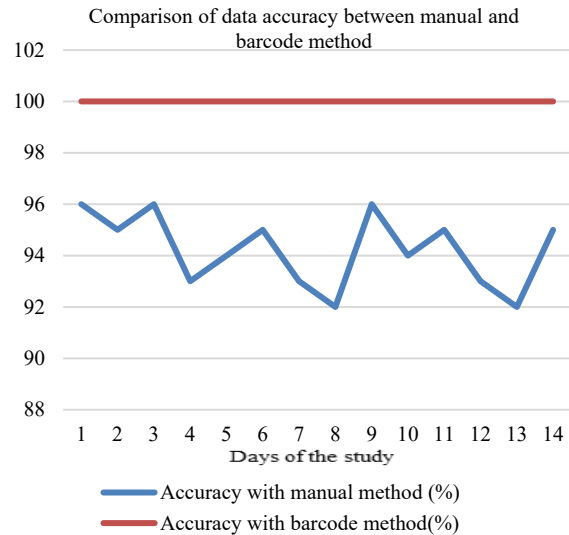


Figure 3. Data accuracy with manual and barcode method in the company Dalba Shpk, during 10-25 July 2023

By the implementation of the barcode method, the company has increased the number of clients by on average 30%, which is a very significant indicator of the reliability and security the company has created to the client. Every time the operator working in this task scans a barcode, it immediately updates the quantity of products ordered by the client in the client's system. Means, the Italian client of the company has the possibility to control by itself the quantity of the product ordered, which means data and delivery in real time. The barcode system the company uses is very easy to use, self - explanatory, by reducing the need for memorization and deep knowledge and it has led to a reduced training need for this task in the company. Barcode has offered added value to the company as the investment made by the company is not large compared to the benefits it offers.

#### 4. CONCLUSIONS

Implementing the barcode system in the company has many advantages. It has eliminated the possibility of human error, which was very high with manual method. The barcode method is reliable and takes less time than the manual method. With the increase of accuracy, has increased the number of clients, is reduced the time, is reduced the human error and the order is controlled and delivered in real time. At the same time the barcode method has increased the productivity of the company, especially of the production line where it was implemented. Using the barcode system, the company has had a lot of benefits, including time savings, cost reduction, improvement of customer service (satisfied customer and increase the number of customer). Considering all the benefits the barcode system has brought to the company, it is highly recommended to implement it in the other two production lines of the company to be more productive and efficient. We will also recommend the barcode system to other garment companies if they want to reduce costs, improve productivity and be more competitive in the market.

**REFERENCES**

[1] M. Farhadi Mahalli, A. Farhadi Mahalli, "Increase Productivity in Low Voltage Networks with Harmonic Reduction in Nonlinear Loads", International Journal on Technical and Physical Problems of Engineering (IJTPE), Issue 4, Vol. 2, No. 3, pp. 70-78, September 2010.

[2] M. Cheema, et al., "Product Identification and Traceability in Apparel Industry", Scribd SlideShare, pp. 2-15, Alberta, Canada, April 2016.

[3] A. Al Jaber, S. Naimi, "TQM In a Mandatory Construction Company: An Experimental Case Study and Methodology", International Journal on Technical and Physical Problems of Engineering (IJTPE), Issue 54, Vol. 15, No. 1, pp. 288-295, March 2023.

[4] L. Mc Cathie, et al., "The Advantages and Disadvantages of Barcodes and RFID in Supply Chain Management", University of Wollongong, Faculty of Engineering and Information Sciences, Honors Theses 9, pp. 8-10, Wollongong, Sydney, Australia, January 2004.

[5] D. Liberto, et al., "Barcode: What It Means, Benefits, History", Investopedia, pp. 1-2, Edmonton, Alberta, USA, September 2021.

[6] H. Baum, et al., "Product Identification Codes. Bar, QR and RFID Codes-Oh My!!", Public University of Cincinnati, pp. 2-6, Ohio, USA, 2020.

[7] I. Mc Cue, et al., "Barcodes Defined - How they work, Benefits and Uses", Oracle Netsuite, pp. 1-110, Baltimore, Maryland, USA, 4 September 2022,

[8] COGNEX, "Introduction to Industrial Barcode Reading - Understand the Inner Workings of 1D and 2D Codes, Printing and Marking Methods, and Types of Barcode Readers", Corporate Headquarters Cognex, pp. 3-5, USA, March 2020.

[9] N. Amanda Istiqomah, P. Fara Sansabilla, D. Himawan, M. Rifni, et al., "The Implementation of Barcode on Warehouse Management System for Warehouse Efficiency", Journal of Physics: Conference Series 1573 038, pp. 1-2, Trisakti, Indonesia, July 2020.

[10] Zebra Solution, et al., "How Barcodes and RFID Deliver Value to Manufacturing and Distribution", Zebra, pp. 1-2, Illinois, USA, April 2016.

[11] M. Buzinkay, et al., "A Barcode Scanning System-Benefits and Disadvantages", Identec Solutions, p. 1, Austria, March 2023.

[12] B. Barry, et al., "Pros and Cons of Barcode Technology", F. Curtis Barry and Company Virginia, pp. 1-2, USA, 2023.

**BIOGRAPHIES**



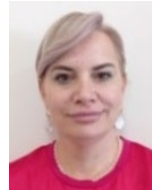
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