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Performance Measurement Methods of Ready-To-Wear Production Lines

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Abstract

Organizations today compete in a complex environment in ready-to-wear sector. For this reason, determining the goals and the methods to achieve these goals becomes a priority for factories because of sustainability. Organizations set goals for their future and plan to achieve these goals. Good planning in the garment production process is defined as the process of achieving the customer's expectations with minimum input and time. After planning, resources and inputs are organized and activities in accordance with the plans are started. It is checked whether the plans are realized and whether the desired developments are achieved, and necessary adjustments are made according to the results obtained. Performance is the sum of these results. In this study, information about the criteria used to measure the performance of production lines that still manufacturing according to the fast fashion trend and the performance measurement that can be determined by using these criteria are given.

Keywords: Performance, ready to wear, production, clothing, sustainability

1.Introduction

Competitive environments are environments where high productivity and performance are expected. The ready-made clothing industry also has such an environment. Ready-to-wear businesses aiming to achieve the desired efficiency and performance with low cost need to take meticulous approaches on their own production processes (Şener & Kılınç, 2013).

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It is very important to measure the performance in order to determine the position of the enterprises in the fields they operate, to determine the possible differences between them and other enterprises by making comparisons, and to improve the activities within and outside the enterprise in terms of quality (Harmankaya et al., 2018).

Efficiency, which is one of the performance criteria and is widely used, is a coefficient obtained by proportioning the products and services (output) produced at the end of a certain period of a production or service process with the production resources (input) used to realize this production. The bigger the result, the higher the efficiency. (Akal, 2005).

In the literature, the factors affecting productivity are divided into two as internal and external factors. Internal factors are the factors that affect the inputs and outputs of the enterprise. Internal factors are also divided into two as rigid factors (which cannot be changed easily) and flexible factors (which can be easily changed). External factors include government policies and institutional mechanisms, political, economic and social conditions, business environment, financing, energy, water, transportation, communication and raw material provision. External factors are those that cannot be controlled by the business. (Başkaya and Avcı, 2011)

When the efficiency comparisons of different production systems used in ready-made clothing production are examined, it is observed that the following data are used. In Akçagün's study, the data of a company during the mass production system and the data after the transition to the lean production system were compared according to the ratio analysis method and the data in Table 1 related to the comparison were used (Akçagün, 2006).

Table 1. Data of both systems during the transition from mass production to lean production system comparison (Akçagün, 2006)

	BEFORE	AFTER
Efficiency (%)	73	84
Idle time (hour)	16	6
Internal stock quantity (piece)	800	100
Machine stops (minute)	8320	3250
Number of operator (person)	53	48
First time correct rate (%)	75	85

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In Belgutay's study on the textile sector, the data during mass production in the enterprise where the application was made and the data predicted after switching to the lean production system were compared according to the ratio analysis method. The data used in the comparison are given in Table 2 (Belgutay, 2007).

Table 2. Comparison of the data of mass production and lean production systems (Belgutay, 2007)

	Mass Production	Lean Production
First time correct rate (%)	91,5	99,6
Setup time (minute)	49,43	12,5
Lead time from start to shipment (hour)	261	171
The area where the production line is located (m^2)	1550	650
Efficiency (%)	87,8	90,5
Number of operator (person)	195	80
Worker circulation (%)	41,1	25,8
Recommendation amount (number/month)	8	96
Tornover rate for stock	26,9	14,1

2.Materials and Methods

Some of the manufacturers have made large investments and adapted to the modular production system. They produce models in small quantities. A group of manufacturers did not disrupt their mass production systems and tried to survive by producing these limited edition models. Activities outside of these two groups, there is another group showing that they are mass-produced systems and trying to produce models that were in small quantities. The biggest problem experienced in this group, which is the majority, is that model changes are experienced very often. Since the production line setup times are long, their productivity is low. (İlleez, 2014).

Material

For this study, the companies that make production within the borders of İzmir province were examined. Among these companies, businesses that apply 3 different production methods described before have been identified. In each group, 6 companies were interviewed and a total

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of 18 companies took part in the study. Then, the production data that can be used for performance comparison in those companies were examined. While determining the companies where the application will be carried out, since the companies that allow the application are mostly companies that produce with knitted fabric, the sample set of the thesis study sequence consisted of companies operating in the field of knitted clothing in Izmir (İlleez, 2014).

The Aim of the Study

This study is a preliminary study of the relative performance analysis of the production systems divided into groups. With this study, it has been determined which data can be used when performing a performance analysis of 18 different companies.

Methods

In order for the efficiency measurement to be meaningful, it is very important for the decision-making units to be similar to each other in terms of both shape and scale size, that is, to be homogeneous in the analysis and interpretation of the results. Otherwise, the effectiveness of the elements whose working conditions and principles are different from each other will be compared.

In order for the decision units to be homogeneous, the most important determinant for the analysis is that they produce the same type of outputs using the same type of inputs. After the literature review to determine the criteria, 18 businesses were interviewed separately. The criteria for data sharing have been determined (İlleez, 2014). The factors affecting productivity are given in figure 1.

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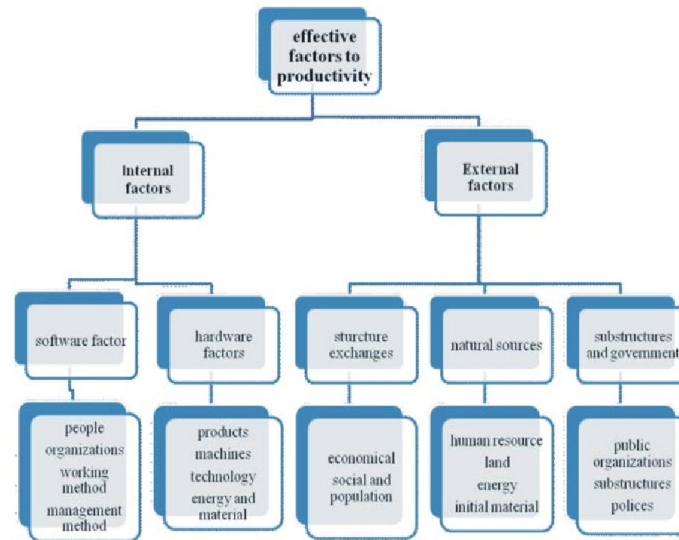Textile and Fashion (ICESMATF 2023)
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Figure 1. Factors affecting efficiency (Başkaya ve Avcı, 2011)

3.Results

In this study, production data that can be used to compare the productivity of companies operating in the ready-made clothing sector and applying different production methods have been determined. Although the data to be needed varies according to the comparison method to be used, the data that the companies consider suitable for sharing and that they record continuously have been determined (İlleez, 2014). These are briefly:

- Product
- Machine (Equipment)   Internal Factors (hardware factors)
- Energy
- Human Source   External Factors (natural sourses)
- Land

Accordingly, as an input variable;

- total working time (labor),

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- number of sewing machines used,

- the area used for production in the planting unit and

- electrical energy used for production in the sewing unit

as output variable;

- the number of production is used.

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