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THE COMPARISON BETWEEN CAPACITY UTILIZATION RATIOS AND FLEXIBILITY LEVELS IN READY-MADE CLOTHING IN TURKEY

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ABSTRACT

Flexibility in manufacture becomes essential with the shift and variation in consumption trends, with the increase in the number of rivals for the same product, with the need to deliver new goods to the markets, with the rapidly changing fashion styles, with the increase in the number of in-year and seasonal products, with the disintegration of standard product markets, and with the obligation to present diverse products to these segments.

Compared with many product groups, the life-span of ready made clothing products is relatively short because of changing fashion trends. As a result of unanticipated and unpredicted demands, the products vary greatly. Consequently, the management of limited sources has become more difficult with the variation and ambiguities in ready made clothing companies. The performance of the system has to a large extent become linked to planning activities so as to rapidly respond to these variations and ambiguities. Flexibility is a concept related to ability of the production system to adapt to the changes in the market rapidly and effectively. The flexibility of a production system can be analyzed from various perspectives.

The purpose of this study is to establish the relationship between capacity utilization and flexibility (of product, process and volume) levels by comparing the capacity utilization of ready made clothing producers and their flexibility levels.

The findings of the study have been collected from 70 ready-made clothing producers in Turkey with over 100 workers. The data collected were processed statistically, and the relationships between the capacity utilization of companies and product flexibility levels, as well as those between volume flexibility levels and process flexibility levels were established.

Keywords : ready made clothing, product flexibility, process flexibility, volume flexibility

1. Introduction

Industrial markets have been increasingly subject to frequent changes regarding product variety and demand volumes (Bayus and Putsis, 1999; Jack and Raturi,2002). For the companies of industrial markets to be able to achieve their ambitions, carry on their business, store and increase their market rates in spite of increasing business competition mainly depend on their accordance to conditions of other sectors (Zerenler 2006). Supporting different solutions for variable needs of customers in a competitive atmosphere is possible only if the companies have enough flexibility.

One of the sectors which inevitably have to have flexible production is ready made clothing sector. Products of ready made clothing companies change rapidly because of the effects of fashion. Therefore, life-span of a ready made clothing product is really short. Variability and ambiguities of the sector make the management of the system more difficult. The performance of the system has largely become dependant on planning activities for these variabilities and ambiguities (Viera, G.E., Herrmann J.W., and Lin E. 2003, Herrmann, J.W., and Pundoor, G. 2002).

There are a great number of studies about flexibility of production enterprises in the literature. In these studies, flexibility was divided into some sub-groups (flexibility of product variety, flexibility of volume, flexibility of machines and work force etc…) and evaluated by different performance indicators. In our study, we aimed to reveal how changes of their performance according to performance indicators of ready made clothing enterprises affect the use of capacity which is another important performance indicator.

Rapidly growing and improving sectors such as ready made clothing production sector, the relation between a company's flexibility performance and other companies' performances are crucial to determine the success of a company.

2. Flexibility

2.1 Flexibility Concept

Flexibility may be defined by different descriptions. Flexibility of a system is defined as being able to adapt environmental factors (Sethi and Sethi,1990; Gupta and Goyal, 1989). Generally, flexibility is described as variability of a state or ability to come over ambiguities (Tekin and Zerenler, 2007). According to Bordoloi et al. (1999) and Barnes- Schuster et al. (2002), flexibility has grown in priority due to pressures to respond to changing market needs and shortening product life cycles. Production flexibility is a term to describe accordance of a production system to the market changes. Furthermore, it is the variety of producible components and the modification of quantity of production and composition if it is necessary (Browne J et al. 1994).

According to these descriptions, flexibility term which is important for a company to support different solutions in a competitive atmosphere is crucial and useful for not only enterprises but also public and workers. Companies having flexibility during the period of production will easily adapt to economical and competitive conditions and improving technology (Akgeyik 1998).

2.2. Classification of the Flexibility

The taxonomy of flexibility types established by Browne et al. (1984) has formed the foundation of most subsequent research into measuring manufacturing flexibility. Sethi

and Sethi (1990) classified flexibility into groups according to the descriptions and purposes. The descriptions of some of these classifications are below;

Machine flexibility refers to the various types of operations that the machine can perform without requiring prohibitive effort in switching from one operation to another"

Process flexibility is the ability to change between the productions of different products with minimal delay.

Product flexibility is the ability to change the mix of products in current production, also known as mix-change flexibility.

Routing flexibility is the ability to vary the path a part may take through the manufacturing system.

Volume flexibility is the ability to operate profitably at different production volumes.
Expansion flexibility is the ability to expand the capacity of the system as needed, easily and modularly.

Operation flexibility is the ability to interchange the sequence of manufacturing operations for a given part.

Production flexibility is the universe of part types that the manufacturing system is able to make. This flexibility type requires the attainment of the previous seven flexibility types (Parker and Wirth 1999).

The flexibility of a production system may be defined in many different aspects. These definitions qualify companies as more flexible or less flexible.

3. Compelling reasons for flexibility in ready made clothing production enterprises

With a small number of models, lots of products were manufactured in the first period of the apparel industry. Nevertheless, nowadays many models are produced in different volumes. Some of the reasons for this situation are; rapidly growing fashion trends, financial competitive atmosphere and varying customer demands. In the apparel industry, a successful manufacturer must make efficient use of limited resources to meet dynamic customer demand as customer preferences change on a seasonal or monthly basis (Tomastik Robert N., Peter B. Luh and Guandong Liu 1996)

For ready made clothing demands, increasing importance of fashion, design and product variety obliges more flexible production systems more than price competence. With the ability of being rapid and flexible, ready made clothing enterprises may compete with ambiguities and inexpensive work force. Ready made clothing enterprises should make decisions for flexible production systems and apply them. These applications are;

- A shift from mass-production manufacturing to small scaled manufacturing
- Providing flexibility in line, quantity, machine park and process of manufacturing
- Having a large scale of products as much as possible
- Increasing the number of products and collections
- Being able to have fast-manufacturing systems for some seasons and special terms of the year
- Integration of information technologies into manufacturing and delivering
- Strategic partnerships and integration of retail traders and producers.

Applying flexibility for small scaled and medium scaled ready made clothing enterprises is easier to apply it for big scaled enterprises. During the process of flexibility in big integrated companies, restitutions are needed. Applications such as having different markets, products and stores and composing cost-price-competition conditions may be suggested for these ready made clothing enterprises.

Another application that ready made clothing enterprises use for different and variable demands of their customers is custom manufacturing. Because companies do not face with problems such as losing customers because of refusing orders or changing price rates, this application is really suitable and essential for the companies. However, the flexibility of the application may cause many serious problems like quality.

Changes in demands of customers raised the question that how variable designs and styles would be composed with minimum cost. In other words, the problem occurred how manufacturing efficiency would be reconciled with flexibility. Since the conformation of the ready made clothing industry is dynamic and prohibitive for worker/producer rights, generally, short-term production changes are provided more easily than other industries. However, these changes should be done as fast and cheap as possible.

According to some researchers, there is a positive relation between flexibility and enterprise performance. These researchers noted that having variable and rapidly changeable products in an ambiguous environment is more effective for a company's performance than having a standard product (Uzkurt 2002).

4. Utilization flexibility and the capacity in ready-to wear enterprises

The production capacity of a business is the amount of production that the business can bring out by rationally using available production factors in a certain time. (Tekin 1996). The concept of capacity, determines the greatness of the scale of business. (Turunç, 1985).

In industrial businesses, the level of capacity and the rate of capacity utilization constitute a measure for business efficiency and productivity. The increase in labour, machine and production capacity of a business will have an important effect on the

productivity of a business. (Tekin, 1994). The capacity shows the state of theoretical production efficiency that is a result of being able to produce combined production variety. The concept of capacity combines the performance of production process with the activities of production.

On one hand, the capacity determining the rapidity of response of production system to the market defines cost pattern, the productivity of its sources, and the level of technology, stock politics and manpower needs; on the other hand, it determines the service level that will be presented to the customer. In addition, it is an essential factor that affects the programming activity, and it imposes a limit on other various decisions related to production/ operation management. For instance, the amount of being able to produce economically in a certain period of time is a restrictive factor in terms of short-term production planning. (Üreten, 2002).

The rate of capacity utilization is one of the most essential performance indicators in the evaluation of business success. That the rate of capacity utilization decrease, which is calculated by the ratio of used capacity and the potential capacity, is a sign that production capacity is not used efficiently.

The changes that businesses make on combined products lead to changes in production capacity as well. For this reason, the increasing variety of products because of flexibility will be directly effective on capacities of businesses.

Production systems can be classified on the basis of volume-variety extent, as well. A system that has high flexibility lets the parts be produced in high variety. Two extreme production styles are: high volume, low variety and low volume, high variety. Between these two extreme states, there is an important medium volume, medium variety production state. (Singh,1996)

There is a close relationship between the businesses' rates of benefitting from their capacities and cost of business profits and risks. As a result of businesses' not working on an appropriate level, the costs increase, profitability decreases and the risk increases. Therefore, the managers of businesses struggle to be able to operate at a higher capacity level.

5. The methodology of research

The aim of this research is to reveal the rates of ready made clothing producers' capacity utilization in Turkey in the comparison to their flexibility level.

In this research, among the most significant criteria, the number of product variety, the sizes of parties, and the performance indicators of the durations of product changes have been utilized to determine the production flexibility performance of ready made clothing businesses running in Turkey. As well as revealing producers' level of flexibility production of ready-to-wear, the rate of capacity utilization, one of the criteria of businesses' general performance, we evaluated the level of production flexibility.

The limitation of the study carried out with survey method is the number of the corporations running in Turkey, the number of whose employees is over 100. The number of the corporations registered is obtained from The Union of Chambers and Commodity Exchanges of Turkey. From these corporations, the data of the research were gathered from 70 of the firms through systematic sampling method. Data collected were classified and thus revealed in bilateral tables.

6. The comparison of rates of ready made clothing businesses' capacity utilization with its level of production flexibility

In this research, carried out in ready made clothing businesses running in Turkey, the rates of businesses' capacity utilization and the distributions of flexibility performance indicators and the findings depending on the relations between them can be summarized as follows:
The distribution of the rates of capacity utilization of ready made clothing business in Turkey is given in Table 1.

Table 1: The distribution of the rates of capacity utilization of ready made clothing businesses

The rate of capacity usage	f	%
More than 95 %	21	30,0
Between 94 % - 85 %	14	20,0
Between 84 % - 75 %	16	22,9
Between 74 % - 65 %	10	14,3
Between 64 % - 55 %	4	5,7
Between 54 % - 45 %	3	4,4
Less than 44 %	2	2,9
TOTAL	70	100,0

n=70

It is determined that 30% of the ready made clothing corporations running in Turkey make use of 95% (and/or over) of their capacities, 23% of them utilize 84-75%, 20% use 94-85%, and 14% get use of 74-65%. The rate of businesses making use of less than 64 % of their capacity is 12 %.

It can be said from Table 1 that a large number of ready made clothing businesses running in Turkey benefit from their capacities to a large extent and their inactive capacities are generally fewer than 25%.

The distribution of production sizes of parties of ready made clothing businesses in Turkey is given in the table 2.

Table 2: The distribution of an average party sizes which the ready made clothing businesses produce.

Sizes of parties	f	%
Less than 50	2	2,9
51–1000	25	35,7
1001–5000	15	21,4
More than 5000	28	40,0
TOTAL	70	100,0

n=70

When the distribution of an average party size which the ready made clothing businesses produce is evaluated, it is seen that 40% of the ready made clothing corporations running in Turkey produce 500(and/or over) of their capacities, 21% of them produce 1001-5000, 35% use 51-1000 and 2% produce less than 50.

According to Table 2, what is significant is that the number of the corporations revealing an average party size that is more than 500 is 40 %. The situation can be regarded as an indication of the fact that most of the corporations produce standard products that have high production pieces.
However, when the distribution in Table 2 is examined, it can be concluded that the corporations work with different party sizes although they are similar in size.

The distribution of the number of product variety which ready made clothing corporations produce at the same time in Turkey is given in Table 3.

Table 3: The distribution of the number of product variety that the ready made clothing corporations produce simultaneously

The number product variety	f	%
A kind	1	1,4
2-3 kinds	30	42,9
3-5 kinds	16	22,9
5-8 kinds	7	10,0
8-10 kinds	6	8,6
More than 10 kinds	10	14,3
TOTAL	70	100,0

n=70

When the distribution of the number of product variety which ready made clothing corporations produce at the same time in Turkey is studied, it is established that 43 % of them produce 2-3 kinds at the same time, that 23 % produce 3-5 kinds, that 14 % produce more than 10 kinds, and that 10 % produce 5-8 kinds of products.

Judging from Table 3, we can conclude that the ready made clothing corporations in Turkey usually produce 2-5 kinds of products at the same time.

The number of products that can be produced in the process of corporations' production is an important indicator in determining the flexibility of the process. According to Suri and Desiraju (1997), and Cagliano and Spuna (1996), the number of products that a corporation can produce without a significant increase in cost is an indicator of the fact that the corporation has a flexible structure.

The fact that the rate of corporations that report producing 2-3 kinds of products is at a high level, 42 %, seems to support the results obtained from Table 2.

Concluding from these findings, it can be said that the ready made clothing corporations in Turkey usually produce 2-3 products in more than 5000 pieces. This situation is a significant indicator of the fact that the majority of the corporations cannot yet ensure product flexibility.

The distribution of the product alternation durations in Turkey is given in Table 4.

Table 4: The distribution of the ready made clothing producers' product alternation durations

The duration of product alternation	f	%
Everyday	9	12,9
Once in 2-5 days	26	37,1
Once in 6-9 days	17	24,3
Once in 10-14 days	7	10,0
More than15 days	11	15,7
TOTAL	70	100,0

n=70

37 % of ready made clothing businesses in Turkey noted that the products they produce alternate once in 2-5 days, 24 % once in 6-9 days, and16 % in more than 15 days, 13% everyday and 10% once in 10-14 days. The duration of product alternation in corporations is a significant indicator of performance in demonstrating production flexibility of corporations. In ready made clothing corporations running in Turkey, the products produced alternate mostly in 2-9 days.

The difference between the distributions of ready made clothing corporations in Turkey according to the rates of capacity utilization is given in Table 5.

Table 5: the distribution of party sizes according to the rates of capacity utilization by corporations

	More than 95%		Between 94%-75%		Less than 74%		TOTAL		x^2	p
	f	%	f	%	f	%	f	%		
Less than 1000	3	11,1	13	48,1	11	40,7	27	100,0	9,044	0,060
1001-5000	6	40,0	7	46,7	2	13,3	15			
More than 5001	12	42,9	10	35,7	6	21,4	28			
TOTAL	21	30,0	30	42,9	19	27,1	70			

It is seen in Table 5 that, of ready made clothing businesses in Turkey which have more than 1000 pieces in party size, 48 % make use of 94-75 % of their capacities, that 41 % make use of less than 74 % of their capacities, and that 11 % make use of more than 95 % of their capacities.

The findings also show that, of ready made clothing businesses in Turkey which have a party size between 1001 and 5000 pieces, 47 % make use of 94-75 % of their capacities, that 40 % make use of more than 95 % of their capacities, and that 13 % make use of less than 74 % of their capacities.

It has also been established that, of ready made clothing businesses in Turkey which have a party size over 5000 pieces, 43 % make use of more than 95 % of their capacities, that 36 % make use of 94-75 % of their capacities, and that 21 % make use of less than 74 % of their capacities.

According to the result of x^2 test conducted, no significant difference has been observed to exist between average party sizes of corporations on the level of 0,05, which could give an idea about the volume flexibility as compared with the rates of capacity utilization of corporations. [$x^2_{(9,044)} = 0,060$; $p<0.05$].

The distribution of the number of product variety according to the extent of capacity utilization in Turkey is given in Table 6.

Table 6: The distribution of the number of product variety according to the extent of capacity utilization.

The number of product variety	More than %95		Between %94-%75		Less than %74		TOTAL		x^2	p
	f	%	f	%	f	%	f	%		
1-3	8	25,8	13	41,9	10	32,3	31	100,0	1,218	0,875
4-8	7	30,4	10	43,5	6	26,1	23			
More than 9	6	37,5	7	43,8	3	18,8	16			
TOTAL	21	30,0	30	42,9	19	27,1	70			

When the distribution of number of product variety according to the extent of ready-made clothing business' capacity utilization is examined, it is seen that 42 % of

businesses that manufactures 1 to 3 different products make use of 95 – 75 % of their capacities, that 32 % of them make use of less than 74 % of their capacity and that 26 % of them make use of more than 95 % of their capacity.

It has also been established that, of the businesses in which 4 to 8 different products are manufactured at the same time, 44 % make use of 94-75 % of their capacities, that 30 % make use of more than 95 % of their capacities, and that 26 % make use of less than 74 % of their capacities.

It has been determined that, of the businesses in which more than 9 different products are manufactured at the same time, 44 % utilize 94-75 % of their capacities, that 38 % utilize more than 95 % of their capacities, and that 19 % utilize less than 74 % of their capacities.

According to the result of the x^2 test, no significant difference is observed between product flexibility levels at the level of 0,05 regarding the capacity utilization rates. [$x^2_{(1,218)} = 0,875$; $p<0.05$].

The distribution of the durations of product alternation according to the capacity utilization rates of ready-made wear businesses in Turkey is given in Table 7.

Table 7: The distribution of the durations of product alternation according to the capacity utilization rates

Duration of product alternation	More than %95		Between %94-%75		Less than %74		TOTAL		x^2	p
	f	%	f	%	f	%	f	%		
Once in 1-5 days	13	38,2	14	41,2	7	20,6	34	100,0	2,837	0,586
Once in 6-9 days	4	23,5	8	47,1	5	29,4	17			
More than 10 days	4	21,1	8	42,1	7	36,8	19			
TOTAL	21	30,0	30	42,9	19	27,1	70			

When the distribution of duration of product alternation is examined according to the capacity utilization rate, the findings were that of those businesses that alternate their products in 1 to 5 days, 41 % made use of 94-75 % of their capacities, that 38 % made use of more than 95 % of their capacities, and that 21 % utilized less than 74 % of their capacities.

It has also been found that of the businesses that alternate their products in 6 to 9 days, 47 % utilized 94-75 % of their capacities, that 29 % used 74 % of their capacities, and that 24 % used more than 95 % of their capacities.

It has also been found that, of the businesses that alternate their products in more than 10 days, 42 % used 94-75 % of their capacities, that 37 % used less than 74 % of their capacities, and that 21 % used more than 95 % of their capacities.

According to the result of the x^2 test, no significant difference is observed between product alternation levels at the level of 0,05 regarding the capacity utilization rates. [$x^2_{(2,837)} = 0{,}586$; $p<0.05$].

7.Results

It is known that, along with the changes in technology, the pattern and organization of manufacture differentiate, that the balance of supply and demand in economy constantly changes because of conjectural fluctuations, and that the key concept to this new period, in which competitive conditions are becoming increasingly sharper, is flexibility.

It is, without doubt, flexibility that is one of the most important means to create an advantage in competition against those businesses situated in countries that stand out with cheap workforce in ready-made wear trade, occupying a significant place among globally traded merchandise.

In this study, conducted on businesses that operate in ready-made wear and that employ more than 100 workers, the findings regarding the number of product variety, party sizes and duration of product alternation, which are the indicators of flexibility performance, were evaluated. According to the results of this evaluation, while the businesses that are under evaluation are similarly sized, they operate with different party sizes. It can be said that the majority of ready-made wear businesses manufacture standard items with a high number of manufacture, as the rate of businesses that operate with party sizes more than 5000 pieces is high.

It has been understood that the majority of ready made wear businesses manufacture 2-5 different items at the same time and that they usually alternate their products in 2-5 days.

The research has identified that most of the ready made wear manufacturers utilize their capacity to a great extent and that their inactive capacity generally remains below 25 %.

The results of the statistical tests reveal that there is no significant relationship between the rate of capacity utilization of ready wear businesses, the number of product variety, and duration of product alternation. From this statistical result, it can be said that there aren't any relationships between the rates of capacity utilization, the product variety, party size and the duration of product alternation, which are of flexibility performances.

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