Early Results of Transformation of Pharmaceutical Industry in Turkey: Scope of Localization

Türkiye İlaç Sektörü Dönüşümünün Erken Sonuçları: Yerelleşme Ufku

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ABSTRACT

Background: The pharmaceutical industry is one of the leading industries in the world in terms of economic value and high technology. Turkey's pharmaceutical market reached 40.7 billion TL in 2019. In the Turkish pharmaceutical market, domestic pharmaceuticals had a market share of 43.2% in value and 79.6% on the box scale in 2010. To improve this situation "Structural Transformation Program in Health Industries" was included in 10th Development Plan (2013-2018) which was published in 2013.In this study we aimed to determine the early effects of localization program on the pharmaceutical market in Turkey from the manufacturing point of view.

Method: In this study, annual sales of pharmaceuticals on value (in TL) based compared by dividing into two groups as domestic pharmaceuticals and imported pharmaceuticals in the Turkish market between the years 2010-2019 and 2014-2019. The upward trend of annual domestic and imported pharmaceutical adjusted sales figures was analyzed by time-series regression analysis.

Results: In the period between 2010-2019 the increase trends in the domestic and imported figures were statistically significant. But the significant difference between these two trends has been seen only in the periods between 2014-2019. Domestic products uptrend is steeper than import product trend in this period.

Conclusion: Turkey's production capacity has increased along with the first effects of the localization program. When market data and data of our study are evaluated together, we might say that transition to high value production has not been sufficiently realized. Turkey has to focus on producing innovative and high-tech pharmaceuticals.

Key Words: Turkish pharmaceutical market; localization; domestic pharmaceuticals; transformation of pharmaceutical industry; production capacity

ÖZET

Amaç: İlaç endüstrisi, ekonomik değer ve yüksek teknoloji açısından dünyanın önde gelen endüstrilerinden biridir. Türkiye ilaç pazarı 2019 yılında 40,7 milyar TL'ye ulaşmıştır. Türkiye ilaç pazarında 2010 yılında yerli ilaç değer bazında %43,2, kutu bazında ise %79,6 pazar payına sahipti. Bu durumu iyileştirmek için 2013 yılında yayınlanan 10. Kalkınma Planı (2013-2018) kapsamında "Sağlık Endüstrilerinde Yapısal Dönüşüm Programı" hayata geçirilmiştir.Bu çalışmada, yerelleşme programının Türkiye ilaç pazarı üzerindeki erken etkilerini yerli üretim açısından belirlemeyi amaçladık.

Yöntem: Bu çalışmada, 2010-2019 ve 2014-2019 yılları arasında Türkiye pazarında değer bazında (TL cinsinden) ilaç satışları yerli ilaç ve ithal ilaç olmak üzere iki gruba ayrılarak incelenmiştir. Yıllık yerli ve ithal ilaç düzeltilmiş satış rakamlarının artış eğilimi, zaman serisi regresyon analizi ile analiz edilmiştir.

Bulgular: 2010-2019 döneminde yerli ve ithal ilaç artış eğilimleri istatistiksel olarak anlamlıdır. Ancak bu iki trend arasındaki anlamlı fark sadece 2014-2019 arasındaki dönemde saptandı. Bu dönemde yerli ürünlerdeki artış trendi ithal ürün trendinden daha fazladır.

Sonuç: Yerelleşme programının ilk etkileriyle birlikte Türkiye'de ilaç üretim kapasitesi artmıştır. Piyasa verileri ve çalışmamızın verileri birlikte değerlendirildiğinde, yüksek değerli üretime geçişin yeterince gerçekleşmediği görülmektedir. Bu programın başarılı olabilmesi için Türkiye'nin yenilikçi ve yüksek teknolojili ilaç üretimine odaklanması gerekmektedir.

Anahtar Sözcükler:Türkiye ilaç pazarı; yerelleşme; yerli ilaç; ilaç endüstrisinin dönüşümü; üretim kapasitesi

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INTRODUCTION

The pharmaceutical industry is one of the leading industries in the world in terms of economic value and high technology. The global pharmaceutical market, which was more than $ 800 billion in 2010, reached $ 1.2 trillion in 2018. In 2018, the United States of America accounts for about 40% of the global market with $ 485 billion (1). On the other hand, Turkey's pharmaceutical market reached 40.7 billion TL in 2019 while its size was 13.4 billion TL in 2010 (2).

There are 86 medicinal production facilities and 12 raw material manufacturing plants in Turkey. All production facilities have GMP certificates in global standards. And also, Turkish regulatory authority Turkish Medicines and Medical Devices Agency (TMMDA) is a member of Pharmaceutical Inspection Co-Operation Scheme (PIC/S) with 52 participating authorities since 1st January 2018 (3). In Turkish pharmaceutical market, domestic pharmaceuticals had a market share of 43.2% in value in 2010 and reached 52,1% in 2019. On the box scale, it was 87.6% in 2019 from 79.6% in 2010. In 2010, the average price per box for imported products (including ex-factory discounts and VAT) is 23.00 TL, while for domestic products it is 4.49 TL. These prices were realized as TL 42.25 for imported products and TL 7.75 for domestic products in 2018 (2,4).

In recent years, there have been many developments that affected the pharmaceutical market with the Program of Transformation in Health (2003) and the Social Security Reform (2006) in Turkey. These reforms were including implementation of the reference pricing system in 2004, implementation of the Family Medicine System firstly in pilot provinces in 2005 and all provinces in 2010; establishing Social Security Institute (SSI) in 2006, establishing Reimbursement Commission within SSI in 2007; compulsion of reimbursement application file in 2008. Also, there were several public interventions from 2009 to 2012, including retail sales price cuts, additional reimbursement discounts in 2009 and 2011 and a national budget implementation on pharmaceuticals from 2010 to 2012 (5). The Turkish pharma industry has a long history and has the potential for the future due to production infrastructure and Turkey's geopolitical location. "Structural Transformation Program in Health Industries" was one of the 25 programs in the 10th Development Plan (2013-2018) which was published in 2013. In this program, Turkey's long-term goal was to be a global R & D (Research and Development) and production center in pharmaceuticals. With this program it was planned to increase efficiency in global value chains by increasing domestic production capacity in the medium term, improving R&D and business ecosystem, developing a new molecule in the long term, and produce higher value-added pharmaceuticals. Within the scope of this program, localization studies started a few years ago (6).

In this study, we aimed to determine the early effects of localization program on the pharmaceutical market in Turkey by the manufacturing point of view.

METHODS

This study analyses retail and hospital annual sales data based on value (in TL) of pharmaceuticals in the Turkish market. Data used in this study are obtained from Turkish Pharmaceutical Market reports which were published by the Pharmaceutical Manufacturers Association of Turkey (2, 4, 7). The pharmaceuticals are dived into two groups as domestic pharmaceuticals and imported pharmaceuticals.

A reference pricing system has been in use since 2004 in Turkey. The reference price of pharmaceuticals is the lowest ex-factory price to the warehouses in France, Italy, Spain, Portugal, and Greece as the reference price. If the warehouse sales prices of the countries in which the pharmaceuticals are being domestic and imported are lower than the reference countries' prices than the lowest country price is accepted as the reference price. To determine the Euro/TL exchange rate, the system takes the annual euro average of the previous year into account. The average is multiplied with 0.6 to determine the annual fixed euro rate since 2019. In recent years the average is multiplied with 0.7. The effects of annual fixed euro exchange rate changes were eliminated from the annual sales of domestic and imported pharmaceuticals by the effective date. Fixed euro exchange rate increases are shared in Table 1.

Table 1. Fixed euro exchange rate increase ratios in Turkey

Dates	Increase Ratio
18.05.2015	2,070 %
21.07.2015	3,940 %
22.02.2016	1,825 %
06.01.2017	10,654 %
14.02.2018	15,000 %
14.02.2019	26,370 %

As there has no production of plasma fractionation products in Turkey within the scope of these products' localization studies have evaluated in a separate title. In this context, a fixed euro-priced agreement with a purchase guarantee was concluded for local production and technology transfer of these products. In addition, the current euro exchange rate is taken into consideration when pricing plasma fractionation products instead of annual fixed euro exchange rate. For these two reasons, sales data of plasma fractionation products are not included in the study.

The upward trend of annual domestic and imported pharmaceutical adjusted sales figures was analyzed by time- series regression analysis. The trend coefficients for the domestic and imported pharmaceutical sales were calculated by regression analysis and the differentiation between these domestic and imported pharmaceutical sales trends were determined by including the dummy variable in the regression analysis. This analysis was made separately for the 2010-2019 period and for the period 2014-2019, which is the period after the localization process has started. In calculations, the type 1 error rate alpha was accepted as 0.05. Statistical analyzes were performed by using open-source statistical software area R 3.5.0 (R Core Team, 2018). Tables and charts were created with Microsoft Excel.

RESULTS

While the total amount of sales of domestic pharmaceuticals were 5,8 billion TL and imported pharmaceuticals was 7,6 billion TL in 2010, these sales were 16,5 billion TL and 13,1 billion TL respectively in 2019 (Figure 1). While domestic pharmaceuticals had an approximately market share of 46% in TL base in 2010 and in 2014, this ratio reached 55.8% in 2019 (Figure 2).
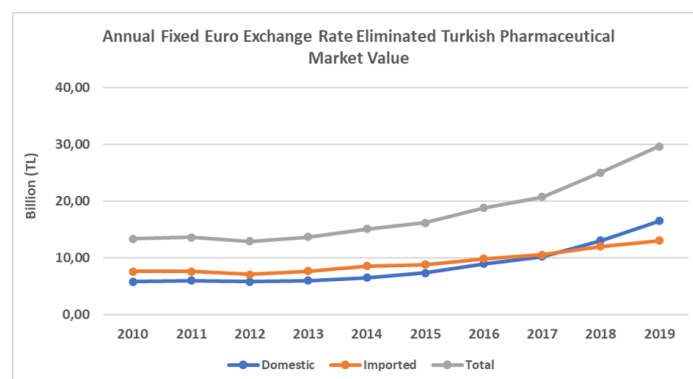

Figure 1: Annual sales amounts (in TL) of domestic pharmaceuticals, imported pharmaceuticals and total of these two subgroups in the years between 2010-2019. The effects of annual fixed euro exchange rate changes were eliminated from the annual sales of domestic and imported pharmaceuticals by effective date. Sales data of plasma fractionation products are not included in this study.

Figure 2: Annually market share of domestic pharmaceuticals and imported pharmaceuticals on value based in the years between 2010-2019. The effects of annual fixed euro exchange rate changes were eliminated from the annual sales of domestic and imported pharmaceuticals by effective date. Sales data of plasma fractionation products are not included in this study.
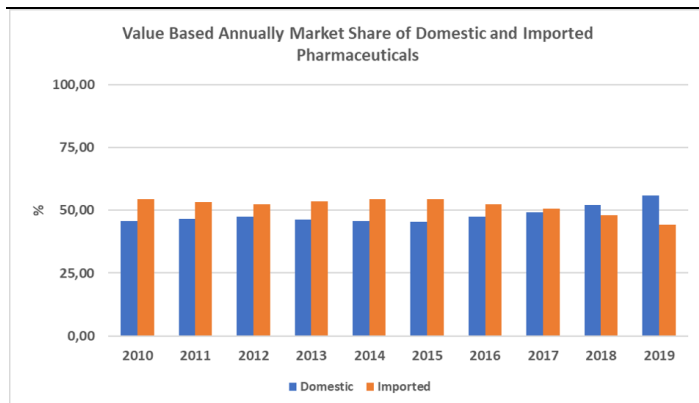
The parameter estimation results for the regression analysis are presented in Table 2. In the period between 2010-2019, the increasing trends in the domestic and imported sales figures were statistically significant (domestic P-value = 0.000547; imported P- value = 6.28e-05). However, there is no significant difference between these two trends (P- value = 0.05151). Period of "after public intervention for localization" that is called localization period the increasing trends in the domestic and imported figures was statistically significant between the years 2014-2019 (domestic P- value = 0.000705; imported P- value = 5.35e-05). There is a significant difference between these two trends after localization. (P value = 0.006716). Also, a significant difference is observed in both the domestic and imported groups when the 2010-2019 period and the 2014-2019 period are compared separately. Domestic products uptrend is steeper than the import product trend in the period under assessment (domestic β=5,199 p value= 0,012752; imported β=3,15 p value=0,00422) (Table 3).

Table 2. Parameter Estimate
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Manufactured Pharmaceuticals:

	Estimate	Std, Error	t value	Pr(>|t|)	
(Intercept)	6,02	1,151	5,228	0,000795	***
comparison	5,199	1,628	3,193	0,012752	*

Imported Pharmaceuticals:

	Estimate	Std, Error	t value	Pr(>|t|)	
(Intercept)	7,72	0,5636	13,698	7,78E-07	***
comparison	3,15	0,797	3,952	0,00422	**

Table 3. Comparison of 2010-2019 period with 2014-2019 period
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

2010-2019				
	Estimate	Std. Error	t value	Pr(>|t|)
Manufactured Pharmaceuticals Trend	1.0769	0.1944	5.540	0.000547 ***
Imported Pharmaceuticals Trend	0.6320	0.0831	7.605	6.28e-05 ***
Difference	0.4449	0.2114	2.104	0.05151
2014-2019				
	Estimate	Std. Error	t value	Pr(>|t|)
Manufactured Pharmaceuticals Trend	1.6982	0.2292	7.408	0.000705 ***
Imported Pharmaceuticals Trend	0.88272	0.06942	12.715	5.35e-05 ***
Difference	0.8155	0.2395	3.405	0.006716 **

CONCLUSIONS

The Pharmaceutical industry has an important capacity for both trained labor force and production technology areas in the specifically conventional technology. In the 2000s Kaplan and Laing stated that developing countries aim to stimulate industrial policy of pharmaceuticals and to access essential medicines by local production. But they also indicated that only a few developing countries as China, India, Brazil, Korea, Poland, etc. have the industrial capacity sufficient for local pharmaceutical production. They also warned that raw materials, technical expertise, and quality standards have not sufficient for production in many countries. Those conditions indicate that foreign exchange savings might be less than expected in these countries (8).

Turkey has a high pharmaceutical production capacity with 86 medicinal production facilities and 12 raw material manufacturing plants (3). TMMDA which was established in 2011, has regulatory, supervisory, and guiding actions towards pharmaceuticals, medical devices, and different areas. TMMDA is one of the members of PIC/S since 2018 and was accepted into The International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) full membership on 27 May 2020. All these memberships are indicators of the quality of regulation and supervision studies in Turkey. Therefore, the above-mentioned reservations might not be seen in Turkish localization program.

Turkey is one of the emerging pharmaceutical markets in the world. Turkey's pharmaceutical market has been increased by nearly 3.04 times from 2010 to 2019 (2). Most public interventions including Health Transformation Program and Social Security Reform implemented to improve health access in Turkey. Thus, access to innovative treatments, orphan drugs, etc. has increased years by years.

It was estimated that medicine spending growth in the Turkish market will continue in the next few years and this market projected to grow at nearly 15% through 2023 (1). Previously it was demonstrated that the market dominance of domestic and imported pharmaceuticals on value basis is close to each other, but the overall distribution is in favor of imported pharmaceuticals between 2008-2012. After the first quarter of 2013, the difference in value between imported and domestic pharmaceuticals has been increasing. (5).

To improve this situation "Structural Transformation Program in Health Industries" was included in the 10th Development Plan (2013-2018) which was published in 2013. With this program, it was planned to increase domestic production capacity in the medium term and produce higher value-added pharmaceuticals in the long term (6). Within the scope of this program, localization studies started a few years ago. According to the Pharmaceutical Manufacturers Association of Turkey's data's domestic pharmaceuticals had a market share of 43.2% in value in 2010 and reached 52,1% in 2019 in Turkey. It should not be forgotten that this program also aimed to support technology and the quality of domestic pharmaceutical production. In this study, we demonstrated that both in the periods between 2010-2019 and 2014-2019 the increasing trends in the domestic and imported figures were statistically significant. This data shows that access to both imported and domestic pharmaceuticals increases year after year in Turkey. Also, with this data, we might say that there is not any shortage to access imported pharmaceuticals significantly in Turkey. But the significant difference between these two trends has been seen only in the periods between 2014-2019 with the possible effect of localization program. Domestic products uptrend is steeper than the import product trends in this localization period similar to market share data.

In contrast to sales on value basis, the sales volume of domestic pharmaceuticals, the basis on box sales, has higher than imported pharmaceuticals remarkably in all years. It was stated as a reason for that situation that domestic pharmaceuticals often been generics in Turkey. Also, imported pharmaceuticals which were mostly original had higher unit prices (5). According to the Pharmaceutical Manufacturers Association of Turkey's data's domestic pharmaceuticals had a market share of 79.6% in volume in 2010 and reached 87,6% in 2019 in Turkey (2, 4). According to this data, the main reason for the trend difference we showed in our study might be the increase in production capacity, not the transition to high-value production. It has been previously stated that there is a need to encourage high-tech pharmaceutical R&D and production. It has been stated that the goal of developing a new molecule in the long term, which can produce a higher value-added pharmaceutical, should be supported (5, 9). As mentioned before, with the 10th Development Plan it was planned to not only increase domestic production capacity also produce higher value-added pharmaceuticals in the long term. In long term localization programs in Turkey should focus on high-value and high-tech production. Both local and global companies have a critical role in the localization of high-tech products. Projects carried out together by global and local companies will play an important role in the production and technology transfer of these products. Assessment of technical capabilities and determination of investment needs, detailed planning, determination of process steps are the critical requirements for the success of a project (10).

Plasma fractionation products has a market share of 6.7% in 2019 and all the products were imported (2). In Turkey, the localization project for these products has evaluated in a separate title. In this context, a fixed euro-priced agreement for a long term with a purchase guarantee was concluded for local production and technology transfer of these products. When the share of these products is considered, the share of domestic medicines will increase even more in the coming years with the success of this localization project. After the completion of this project, its effect should be investigated with a different study. Also, to produce the plasma fractionation products with this project will bring technology and knowledge to the local pharmaceutical industry in Turkey.

In conclusion, we might say that Turkey's production capacity has increased along with the first effects of the localization program. However, the transition to high-value production has not been sufficiently realized. A long-term perspective, setting priorities, research collaboration with universities, and foreign investments are important for localization projects. Therefore, Turkey has potential with adequately trained labor, approved production facilities, and high-quality products, focusing on innovative and high-tech products will be more beneficial for Turkey.

Conflict of interest
No conflict of interest was declared by the authors.

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