Original Article

ASSESSMENT OF THE MARKET VALUE OF THE PHARMACEUTICAL INDUSTRY IN BANGLADESH

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DOI: 10.47750/pnr.2023.14.02.331

Abstract

Bangladesh is a pharmemerging country due to its large population. The pharmaceutical industry is one of the priority industries for revenue earning of the government of Bangladesh, and the industry contributes 1.0% of the gross domestic product of the country. The industry value was TK 265.95 billion in MAT 2Q, 2022. The IMS provides pharma industry value based on estimation, but it may differ from the true industry value. The study presents the pharma industry size in Bangladesh and evaluates the difference between the IMS and the true market value of the industry by an appropriate statistical test. The study collects 12 quarters, QTR 3Q, 2019 to QTR 2Q, 2022, sales data of ACI, one of the leading manufacturers, from both IMS and the company. The study finds, on average, quarterly, there is a 23.8% sales difference between the true sales value and IMS sales value in Bangladesh. The study chooses the Mann-Whitney-Wilcoxon U (MWWU) test to evaluate the difference between the IMS sales value and the true sales value of a company. The difference between the IMS sales value and the true sales value is statistically significant as the P of the MWWU test is 0.0001743 < 0.01. The limitation of this study is drawing a sales gap issue based on the analysis of a company. For a more meaningful conclusion, further study is required involving others manufacturers. However, This study might be helpful for different national and international bodies such as industry practitioners, researchers, and other stakeholders interested in entering the pharma industry of Bangladesh for business, research, or other purposes.

Keywords: Pharmaceutical industry, Pharma industry in Bangladesh, Pharma market size, Accuracy of IMS or IQVIA data, Mann-Whitney-Wilcoxon U test, pharma industry role in GDP

1. INTRODUCTION

Bangladesh is one of the most overpopulated countries in the world. Its population size is 168 million indicating the 8th and 5th largest country in the world and Asia, respectively, by population size (PopulationStat, 2020). Its economy is growing based on service, industry, and agriculture. The industrial sector of Bangladesh is growing faster than its GDP growth rate. In FY 2020-21, the GDP growth rate of Bangladesh was 6.7%, but the growth rate of the industrial sector was 10.3% (Bangladesh Bureau of Statistics, 2022). The pharmaceutical and chemical sector is one of the growth drivers of the country's industrial sector. The pharmaceutical and chemical sector contributes 15% of the total industrial production in Bangladesh (Ahaduzzaman, et al., 2017). The quantum index of major industries based on FY 2004-05 base year shows the pharmaceuticals and medicinal chemical industry

growth rate was 29.24 in FY 2019-20 indicating the second-highest industrial growth sector in Bangladesh (Ministry of Planning, 2020).

After the liberation in 1971 from Pakistan, the pharma market of the country was dominated by different multinational companies. In Bangladesh, 75% of the pharma market was captured by different multinational companies before the 1982 ordinance (Mohiuddin, 2019). Now the scenario is completely different. At present, local manufacturers are dominating the different foreign manufacturers in Bangladesh. There are 858 drug manufacturers in Bangladesh where Allopathic, Ayurvedic, Unani, Herbal, and Homeopathic manufacturers are 271, 205, 271, 32, and 79, respectively (Directorate General of Drug Administration, 2022). Although there are several hundred manufacturers in Bangladesh, the market is controlled by a few companies. In Bangladesh, 70% of the pharma market is controlled by the top 10 companies (Mahrukh, et al., 2015). After meeting the local demand, Bangladesh is now exporting its drugs throughout the world to meet the foreign demand. After fulfilling the local demand, Bangladesh is exporting pharmaceutical products to over 100 countries (Sultana, 2016). Due to overpopulation, economic development, and investment scope, the pharma market in Bangladesh showing remarkable growth (Mohiuddin, 2019). The pharma industry in Bangladesh is growing rapidly and exporting its drugs to more than 90 countries (Mahbubul & Rafikul, 2018).

Although the pharma industry is not a large sector compared to the GDP size of the country, it has a significant contribution to the revenue sector of the government. The pharma industry is the second largest industry for earnings of the government of Bangladesh (Biswas & Ferdousy, 2016). The pharma industry is the third largest revenue contributory industry to the Bangladesh government contributing 1% of the GDP of the country (Arafat, et al., 2015). The pharmaceutical industry in Bangladesh is growing at a two-digit annual growth rate indicating its significant importance in the economy of the country (Azad, et al., 2018). The export of pharmaceutical products was $ 169.02 million in FY2020-21, but it turned to $ 188.78 million in FY 2021-22 which indicates an 11.7% growth in export income (Export Promotion Bureau, 2022).

The IMS is a reputed consultancy house in the pharma industry that provides data and marketing services in different countries. According to the IMS data, in MAT 2Q, 2022, the pharmaceutical market size of Bangladesh in local currency is TK. 265.95 billion. The IMS estimates the market size based on different samples and estimation techniques. The market size estimated by IMS may not the true. The true market size is the actual sales volume by all manufacturers in the pharma industry. It is almost impossible to obtain the actual sales volume of the industry. On the other hand, there is a difference between the actual sales and estimated sales provided by the IMS of a company. Previous studies in Bangladesh do not address this sales gap issue. The objectives of this study are to provide the present pharmaceutical industry size in Bangladesh based on IMS data and understand the significance, either significant or insignificant, of the difference between the actual and the IMS pharma market size by using appropriate test statistics. The study might be helpful for industry practitioners, researchers, and other stakeholders interested in entering the pharmaceutical industry of Bangladesh for business, research, or other purposes.

2. MATERIALS AND METHODS

Advanced Chemical Industries (ACI) pharma is one of the leading manufacturers in the pharma industry of Bangladesh (Sultana, 2016). The authors collect industry sales data from MAT 2Q, 2018 to MAT 2Q, 2022 from the IMS health. IMS Health is an American Multinational Company serving data and information on the health and clinical research industry throughout the world, and it is currently known as IQVIA. Although the present name of IMS health is IQVIA, it is most familiar as IMS in many countries still now, especially in the study area, Bangladesh, so this study uses the name IMS instead of IQVIA. It is a very tough job to obtain the actual sales data of a company. However, to conduct this study, the researchers collect quarterly actual sales data from 2018 to 2022 from ACI pharma. Further, the authors collect the quarterly IMS sales data of ACI pharma from 2018 to 2022 from the IMS. The study has collected the Gross Domestic Product (GDP) data from the website[1] of the

[1] http://www.bbs.gov.bd/site/page/dc2bc6ce-7080-48b3-9a04-73cec782d0df/Gross-Domestic-Product-(GDP

Bangladesh Bureau of Statistics of the Government of the People's Republic of Bangladesh. On the website, there is an uploaded file entitled "Gross Domestic Product (GDP) of Bangladesh, 2020-21 (Final)", and GDP data is collected from this file.

To understand the significant level of difference between the actual and IMS sales data, the parametric t-test, or the non-parametric Mann-Whitney-Wilcoxon U (MWWU) test might be a good option. The test statistics should be chosen based on the data characteristics at hand. The MWWU is a very popular test statistic used as an alternative to a t-test if the data set violates the t-test assumptions (Gupta & Kapoor, 2004). If the data set violates normality assumptions and has less or equal to 20 observations, the MWWU test has more power than t test (Fay & Proschan, 2010). The study chooses the Mann-Whitney-Wilcoxon U (MWWU) test to understand the significance of the difference between the actual sales and the IMS sales in the pharma industry of Bangladesh due to data characteristics. For general calculations, the study uses the Microsoft excel spreadsheet, and for test statistics and assumption checking, the study uses the R studio.

3. RESULTS AND DISCUSSION

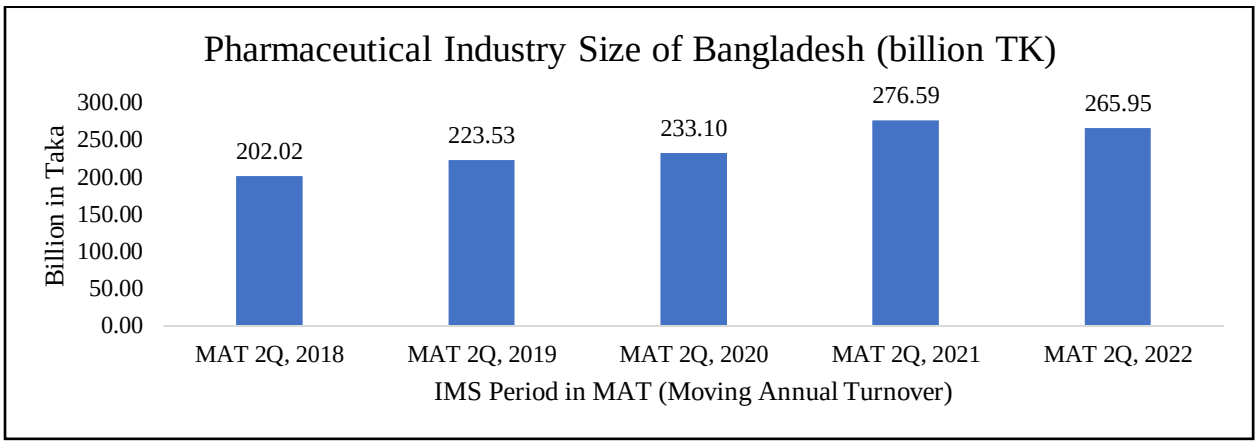
The pharmaceutical industry value of Bangladesh has been presented in table 1. According to table 1, the industry value was TK 202.02 billion in MAT 2Q, 2018; TK 223.53 billion in MAT 2Q, 2019; TK 233.10 billion in MAT 2Q, 2020; TK 276.59 billion in MAT 2Q, 2021; and TK 265.95 billion in MAT 2Q, 2022. Here, TK means taka, the local currency of Bangladesh. At present, the US dollar value is changing very frequently, and on the 15th of December 2022, according to the central bank of Bangladesh, the 1 USD was equal to 103.2 Taka. According to this dollar value, the industry size was $ 1.96 billion in MAT 2Q, 2018; $ 2.17 billion in MAT 2Q, 2019; $ 2.26 billion in MAT 2Q, 2020; $ 2.68 billion in MAT 2Q, 2021; and $ 2.58 billion in MAT 2Q, 2022. The industry growth rate was 10.6% in MAT 2Q, 2019; 4.3% in MAT 2Q, 2020; 18.7% in MAT 2Q, 2021; and -3.8% in MAT 2Q, 2022.

Table 1. Pharmaceutical Industry Value and GDP in Bangladesh

IMS Period	Calendar Period	Industry Size (billion TK)	Industry Growth Rate %	Industry Size (billion $)	GDP of Bangladesh (billion $)	Industry % of GDP
MAT 2Q, 2018	Jul'17 to Jun'18	202.02	-	1.96	230	0.9
MAT 2Q, 2019	Jul'18 to Jun'19	223.53	10.6	2.17	248	0.9
MAT 2Q, 2020	Jul'19 to Jun'20	233.10	4.3	2.26	257	0.9
MAT 2Q, 2021	Jul'20 to Jun'21	276.59	18.7	2.68	275	1.0
MAT 2Q, 2022	Jul'21 to Jun'22	265.95	-3.8	2.58	-	-

The GDP and pharma industry value of Bangladesh were $ 275 billion and $ 2.68 billion, respectively, in MAT 2Q, 2021 which means the industry contribution was 1.0% of the GDP of the country. The industry growth rate was highest in MAT 2Q, 2021, but the rate was negative in MAT 2Q, 2022. The growth rate in MAT 2Q, 2021, and MAT 2Q, 2022 is not normal because there were two unexpected events, COVID-19 and the Russia-Ukraine war, in these two MATs. For a better understanding, further research is required regarding COVID-19 and the Russia-Ukraine war effect on the pharma industry in Bangladesh. For more visualization, the pharma industry value has been presented in figure 1.

Figure 1. Pharma Industry Value in Bangladesh



The industry value has been presented in table 1 based on IMS data, but the question is how true or actual the IMS data is. IMS is a third party that provides sales value based on different estimations. There is a clear gap between the true sales value of a company and the sales value provided by IMS. ACI is one of the leading pharmaceutical manufacturers in Bangladesh. According to IMS, ACI holds a 3% to 4% share of the industry. Table 2 presents the quarterly sales value of ACI according to IMS, and the sales value of ACI, true sales value, according to the management of ACI.

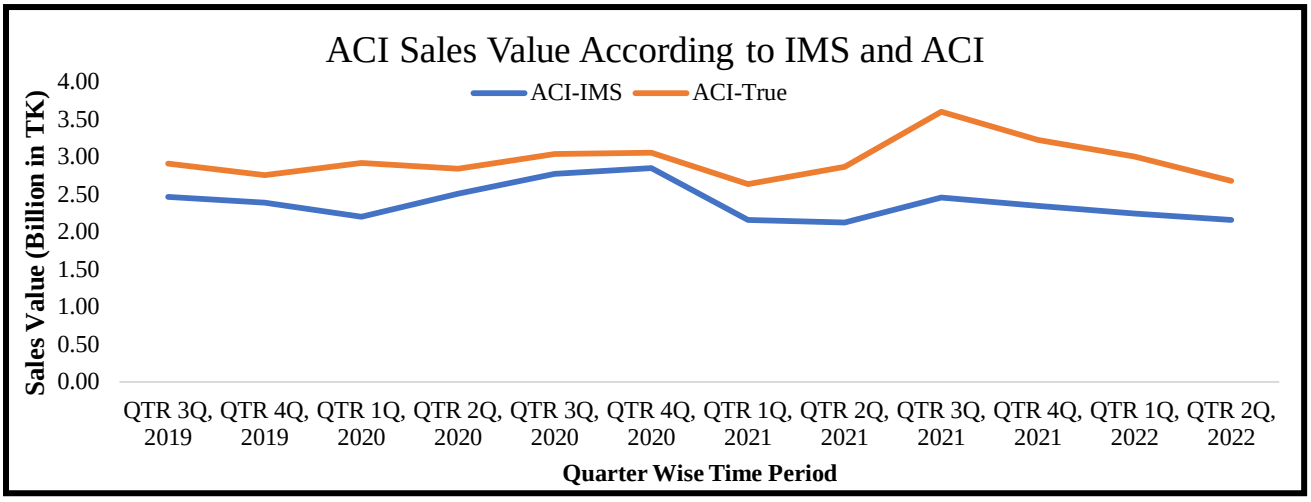
Table 2. Pharma industry value and ACI value in Bangladesh (billion taka)

IMS Period	Industry Value in IMS	ACI Value in IMS	ACI Share% in IMS	True ACI Value	Difference (True-IMS)	Difference% of IMS
QTR 3Q, 2019	60.54	2.47	4.1	2.91	0.44	17.8
QTR 4Q, 2019	58.91	2.39	4.1	2.76	0.37	15.5
QTR 1Q, 2020	55.26	2.20	4.0	2.92	0.72	32.7
QTR 2Q, 2020	58.38	2.51	4.3	2.84	0.33	13.1
QTR 3Q, 2020	72.72	2.78	3.8	3.04	0.26	9.4
QTR 4Q, 2020	76.02	2.85	3.7	3.06	0.21	7.4
QTR 1Q, 2021	65.50	2.16	3.3	2.64	0.48	22.2
QTR 2Q, 2021	62.35	2.13	3.4	2.87	0.74	34.7
QTR 3Q, 2021	67.69	2.46	3.6	3.60	1.14	46.3
QTR 4Q, 2021	66.09	2.35	3.6	3.23	0.88	37.4
QTR 1Q, 2022	65.50	2.25	3.4	3.01	0.76	33.8
QTR 2Q, 2022	66.67	2.16	3.2	2.68	0.52	24.1

In QTR 3Q, 2019, the sales value of ACI was TK 2.47 billion according to IMS, but the true sales value of ACI was TK 2.91 billion according to the management of the company, the difference was TK 0.44 billion that was

17.8% higher than the IMS value. Similarly, in QTR 2Q, 2022, the sales value of ACI was TK 2.16 billion according to IMS, but the true sales value of ACI was TK 2.68 billion according to the management of the company, the difference was TK 0.52 billion that was 24.1% higher than the IMS value. Figure 2 presents the IMS sales value and true sales value of ACI from QTR 3Q, 2019 to QTR 2Q, 2022. Here, the true sales represent the actual sales of ACI according to the management of the company.

Figure 2. IMS sales value and true sales value of ACI



According to figure 2, the true sales are higher than IMS sales in every quarter. The lowest sales difference between the IMS and true sales of ACI was in QTR 4Q, 2020 which was 7.4% higher than the IMS sales. The highest sales difference between the IMS and true sales of ACI was in QTR 3Q, 2021 which was 46.3% higher than the IMS sales. The difference between true sales and IMS sales varies from 7.4% to 46.3% of the IMS sales figure. Table 3 shows the descriptive statistics of the IMS and true sales of ACI.

Table 3. Descriptive statistics of IMS sales and true sales of ACI (billion TK)

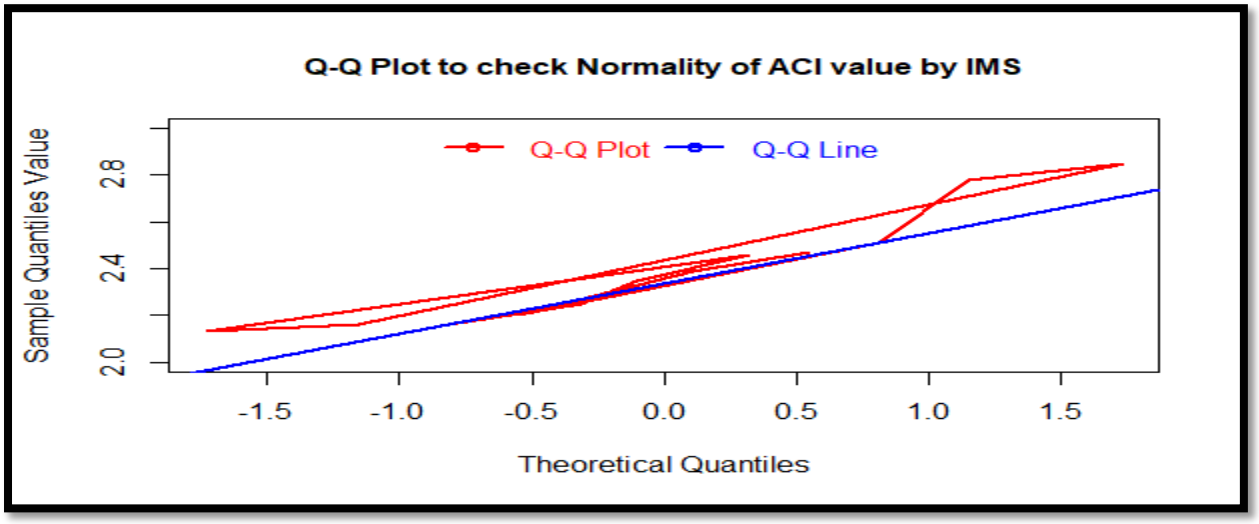
Descriptive Statistics	ACI sales value in IMS	ACI sales value in ACI
Observation Number	12	12
Minimum Value	2.13	2.64
Maximum Value	2.85	3.60
Range	0.72	0.96
Sum	28.71	35.56
Median	2.37	2.92
Mean	2.39	2.96
SE. Mean	0.07	0.08
CI. Mean (0.95)	0.15	0.17
Variance	0.06	0.07

Std. Deviation	0.24	0.26

According to table 3, the Range of IMS sales value is TK 0.72 billion, but the range of true sales value is TK 0.96 billion. The mean sales value of ACI according to IMS is TK 2.39 billion, but the mean sales value of ACI according to company management is TK 2.96 billion in a quarter. From QTR 3Q, 2019 to QTR 2Q, 2022, quarterly, the mean sales difference between the IMS and true sales of ACI was TK 0.57 billion which was 23.8% higher than the IMS sales. The standard deviation of the IMS sales value and true sales value of the company is 0.24 and 0.26, respectively, which indicates the IMS sales value is less scattered than the true value.

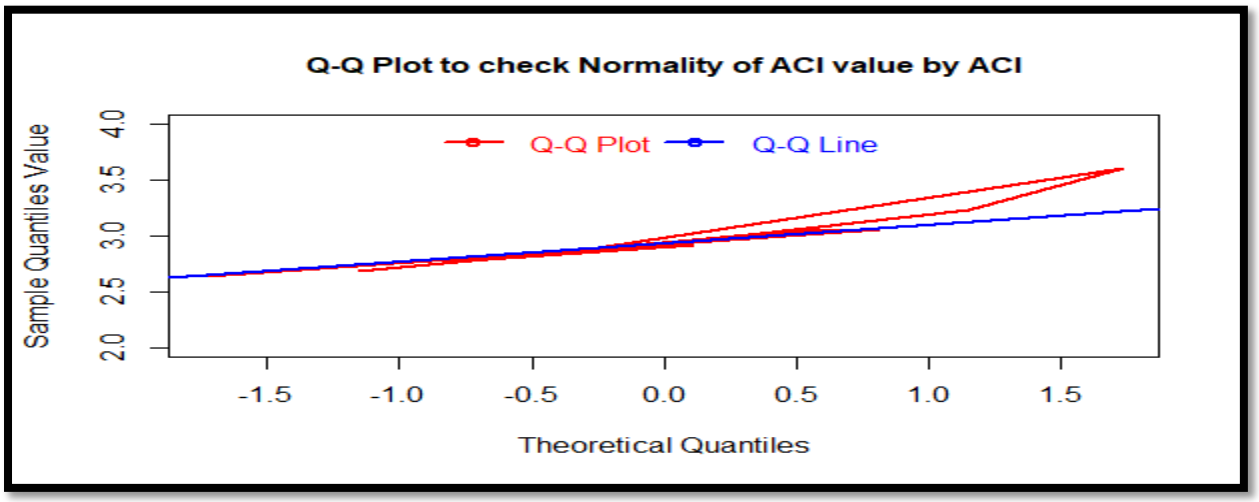
There is an apparent difference between the IMS sales value and true sales value. Is this difference statistically significant or insignificant? To find the answer to this question, it is required to perform an appropriate statistical test based on the data nature. The study has two data sets with 12 observations in each set where one is IMS sales data of ACI, and another is true sales data of ACI. For two samples, the t-test might be a good option. To perform the t-test, the normality assumption should be checked first. Q-Q plot is one of the popular techniques to check the normality assumption of a data set. The study plots the Q-Q plot by using the R studio to check the normality assumption of data sets. Figure 3 represents the Q-Q plot of ACI sales data according to IMS.

Figure 3. Q-Q plot of ACI sales value according to IMS



As there is a lack of fitness between the theoretical quantile and sample quantile in figure 3, the study claims the ACI sales value according to IMS does not follow the normality assumption. Figure 4 represents the Q-Q plot of ACI sales value according to the management of ACI.

Figure 4. Q-Q plot of ACI sales value according to the management of ACI



As there is a lack of fitness between the theoretical quantile and sample quantile in figure 4, the study claims the ACI sales value according to the management of ACI does not follow the normality assumption. The study fails to perform the t-test due to the violation of the normality assumption. So, the study performs the non-parametric MWWU test to check the difference between the ACI sales by IMS and the ACI sales by ACI either significant or insignificant.

The MWWU test of the hypothesis for equality of median at the 1% level of significance is-

H_0: $M_1 = M_2$

vs.

H_1: $M_1 \neq M_2$

Where, M_1 = Median of ACI sales value according to IMS

M_2 = Median of ACI sales value according to ACI

Table: Output of MWWU test

	95% CI		
W value	LL	UL	*P*-value
7	-0.7599457	-0.3800101	0.0001743
Alternative hypothesis: true location shift is not equal to 0			
Sample estimates: difference in location, -0.5599355			

The P value of the MWWU test is 0.0001743 < 0.01 indicates the null hypothesis might be rejected at a 1% level of significance. The study claims there is a statistically significant difference between the ACI sales value according to IMS and the ACI sales value according to ACI. One of the major objectives of this study is to understand the significance of the difference between the actual market and the IMS market value of the pharma industry in Bangladesh. On average, quarterly, there is a 23.8% sales difference between the true sales value and IMS sales value in the pharma industry in Bangladesh, and this difference is statistically significant.

4. CONCLUSION

Although Bangladesh is a pharmemerging country, the last MAT, MAT 2Q, 2022, showed negative growth. This might be for 2 unexpected events, COVID-19 and Russia-Ukraine war. However, further research is required regarding this issue. There is an apparent difference between the IMS sales value and the true sales value in the pharma industry in Bangladesh, and this difference is statistically significant. On average, quarterly, the true pharma industry value in Bangladesh is 23.8% higher than the IMS value. Market assessment or knowing the market value is the most important issue before entering or leaving a market. This study might be helpful for different national and international bodies such as industry practitioners, researchers, and other stakeholders interested in entering the pharma industry of Bangladesh for business, research, or other purposes. However, the major limitation of this study is tried to understand the industry value gap based on analysis of a single firm contributing 3% to 4% of the industry. So, further study is required with the sales data of other firms for a more logical conclusion regarding the difference between the true market and IMS market size in the pharma industry in Bangladesh.

ACKNOWLEDGMENT

There were no funding sources for conducting the study. However, the authors are very thankful to the management of ACI for sharing the actual sales data of the company. The authors are extremely grateful to Muhsin Mia, Director of Marketing Operation of ACI pharma for his cooperation in conducting this study.

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