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Improving Logistics for Online Pharmaceutical Companies: A Research Through Consumer Perception in Bangladesh

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Abstract

Pharmaceutical companies are becoming online nowadays. In Bangladesh, with the advancement of digitalization, online pharmacies are growing day by day. They are providing similar services as the retail ones. But the supply chain of an online company is different than offline. Especially the logistics side has still yet to be improved. Being a developing country, Bangladesh already faces challenges in logistical issues. Again, as the concept for online pharmaceutical companies is relatively new, it faces a lot of service impediments. For logistics improvement, three different factors will be considered including delayed delivery, location of the warehouse, and transportation mode. A survey has been conducted followed by a set of questionnaire. The sample size includes undergraduate students from different universities. From collecting primary data of the potential customers, the analysis has been conducted by different statistical measures. First, the demographic information is extracted where both male and female students have participated. Then, Factor Analysis and Linear Regression have been used through SPSS software. By analyzing the data, it is observed that the three factors have interrelation among themselves. To solve the problem, a decentralized distribution channel can be introduced increasing the number of warehouses. Price can be slightly altered which will minimize cost abundance. The study is limitedly researched on the perception of undergraduates. There still remains further scope for study acknowledging people from various level.

1. Background

As digitization has become evident nowadays, online businesses are booming up. Almost all of the business tend to have an online version of themselves. Following the trend and facilities, pharmacies are also becoming a part of the e-commerce industry. These online pharmacies operate through different social media, not having a physical location mostly and conduct business like any other online stores. But, as it is related to health care, drugs are not sold without prescription

unless the company sells illegal medicines. However, unlike any other delivery system, online pharmacies need to become more meticulous in its supply chain. One of the most challenging aspect in online pharmacy's supply chain is delivery problems which includes lead time, quick response, warehouse location, packaging system, etc. Lead time in delivery depends on the location of warehouse; the place where inventory is stocked and distributed. If the warehouse is

situated far away from customer's location, it is very obvious that the delivery may delay. Although it can be a relative concept if perfect mode of transportation is used. In Bangladesh, due to different third world problems including excessive traffic on roads, unsafe roads, political condition etc., a customer might receive his/her product later than expected. It hampers customer's loyalty and leads to bad impression of the service company. Most importantly delayed delivery of medicine can lead to serious health issues of consumer.

2. Objectives of the Study:

This research is conducted to study the broad perspectives on how to improve the overall logistics system in an online pharmaceutical company. The following objectives are yet to be researched by appropriate analyzation:

i. To study reduction of delayed delivery in online pharmaceutical companies
ii. To determine the perfect location from where medicines would be delivered.
iii. To figure out the perfect transportation mode for delivering medicines.

3. Literature Review

Online pharmacies are considered as an ideal niche for the e-health venture which brings a justified value to its customers. These pharmacies are developed to provide highly efficient services to their potential customers that includes lower cost along with reliable health service (Ishtiaque 2013) However, research indicates that to reduce cost and gain customer satisfaction, distribution networks are the ultimate profitability key in the supply chain of any business (Izadi 2014). Study shows that online businesses tend to fail largely for various service deficiencies and delayed delivery is one of them (Holloway et al., 2003) Pharmacies which operate through internet are no different. For short lead time in delivery, lean system works to produce inventory prior to demand. It distinguishes itself with the mass production only depending on the forecast horizon. To illustrate, if mass production takes months or years, the lean system will take only two weeks or less (Goldsby et al., 2006). Therefore, customers should have the greatest priority while materializing such accurate forecast. Again, agile supply chain denotes the composite of flexibility and responsiveness. It has the following market qualifiers – quality, cost, and lead time. Whereas, lean system considers service level instead of cost (Mason-Jones et al., 2000a). However, when leanness and agility is combined together using a decoupling point, the supply

chain strategy is known as leagility. It is best suited in need for downstream volatile demand, providing level scheduling upstream from the market place (Van Hoek et al., 2001). If demand is predictable, varieties are few and product has a long life cycle, lean strategy is considered to be affordable. But, products with short life cycle and high variety in a volatile environment requires agility (Agarwal et al., 2006).

Suitable channel, scheduling and location policies all play a vital role in delivery performance. For this, organizational operating schedules should be linked with delivery channels (Gelders et al. (1994) In supply chain, to reduce lead time, survey shows that on-time delivery, delivery-to-request date, delivery-to-commit date, and order fill lead-time determines whether a perfect delivery has taken place or not and consequently measures customer service level. (Stewart, 1995). Stewart's study also reveals a trend in the reduction of lead-time as an operational strategy for improving delivery performance. (Gunasekaran, 2001)

Again, warehouse location manages to respond quickly as per the demand of the customers. Although demand is uncertain, the overall risk and uncertainty in the supply chain reduces, prices can be lowered and thus customer service can be improved. These aspects refer to the importance of selecting a warehouse in a strategic location which will be an interest of all. (Dey, 2013) Packaging also plays a vital role in the pharmaceutical industry. Poor packaging may lead to drugs expiry, which makes the medicine unsafe to consume. In medical pharmacy logistics, track-and-trace system is used while packaging medicine (Kelepouris, T., Theodorou et al., 2006) There are five packaging levels for medicine throughout the product value chain (Romero, A., & Lefebvre, E. (2015). In each level, medicines are meticulously packaged so that no damaged can be done.

4. Hypotheses:

To identify the aforementioned objectives, three hypotheses are assumed. The primary hypothesis will emphasize on delayed delivery system while the remaining two will be secondary hypotheses revolving around location of inventories and transportation mode.

H1: Delayed delivery is highly discouraged in online pharmaceutical business.

H2: Location of inventories must be adjacent to hospital areas where people can find any medicine they are searching for.

H3: Transportation mode should be chosen according to location and cost efficiency.

5. Research Methods

The purpose of this study was to identify the factors relating to online logistics system regarding customer delivery in Bangladesh. This study has been conducted using both primary and secondary data. Primary data were collected from university(undergraduate) students studying in Dhaka, Bangladesh. Secondary data were collected from magazines and journals.

5.1 Demographic Information of the Respondents

For conducting this research, the targeted population is people who buy medicine frequently. Considering university students and their family members as our sample, the whole sample size is 91. The research is followed by taking sufficient data from the sample through questionnaire sheets. Each of the questionnaire set contains 20 distinct independent variables statements and one dependent variable to measure logistics improvement.

Table 01: Gender distribution of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	35	38.5	38.5	38.5
	Female	56	61.5	61.5	100.0
	Total	91	100.0	100.0	

The respondents include 38.5% Male and 61.5% Female of the total participants of 91.

Table 02: Medical Checkup

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once a year	26	28.6	31.0	31.0
	Twice a year	23	25.3	27.4	58.3
	None	35	38.5	41.7	100.0
	Total	84	92.3	100.0	
Missing	System	7	7.7		
Total		91	100.0		

It is observed that most of the respondents do not get frequent medical checkup (38.5%) unless it is emergency or needed (Table 03)

Table 03: Other Medical Checkup

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		84	92.3	92.3	92.3
	Once a month	1	1.1	1.1	93.4
	Once in 3/4 months	1	1.1	1.1	94.5
	Only when sick	1	1.1	1.1	95.6
	Weekly	1	1.1	1.1	96.7
	When its emergency	1	1.1	1.1	97.8
	When needed	1	1.1	1.1	98.9
	When Required	1	1.1	1.1	100.0
	Total	91	100.0	100.0	

Table 04: Family Members

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	4	4.4	4.4	4.4
	3.00	7	7.7	7.7	12.1
	4.00	38	41.8	41.8	53.8
	5.00	30	33.0	33.0	86.8
	6.00	11	12.1	12.1	98.9
	10.00	1	1.1	1.1	100.0
	Total	91	100.0	100.0	

Greater the family size, the more medicine is needed in the family if every member remains in constant medical checkup.

5.2 Questionnaire Design

The research has been conducted through collecting primary data from consumer response. A set of questionnaire were measured on a five point ranging Linkert Scale where 1 = Strongly Disagree to 5= Strongly Agree. The Cronbach's Alpha was identified as 0.627 of 20 items in the questionnaire set which are at the acceptable level.

5.3 Sample size, Data Collection & Analysis

A sample was taken from currently studying undergraduate students. The number of respondents included both male and female of total 91 respondents. Here, primary data were collected to

analyze the pattern of people expecting logistics from online pharmaceutical companies. The interviewers filled a google sheet form through online. All of the respondents had access to internet. To analyze related factors, Factor Analysis and Linear Regression Analysis were used after Descriptive Statistics had been performed. All of these analysis was conducted by SPSS (Statistical Package for Social Sciences). Linear Regression was used to identify the interrelations between the dependent and independent variables and the significant factors.

6. Results and Discussions

This section of the research studies the factor analysis and linear regression analysis.

6.1 Results of Factor Analysis

Variables indicating factors regarding logistics in a pharmaceutical company are indicating very high communalities which denotes that delayed delivery, location, and transportation are related to each other. (Table 5)

Table 05: Communalities of the Variables

Variables	Extraction
Online pharmacy is strongly encouraged (ILOP1)	.652
I prefer purchasing medicine from online than retail stores (ILOP2)	.625
For bulk amount of medicine, purchasing from online is the best option (ILOP3)	.596
I need to take medicine regularly (ILOP4)	.749
My family buys medicine frequently (ILOP5)	.628
The lead time of medicine delivery should be within 2-3 hours (ILOP6)	.789
I don't mind if medicine delivery is delayed for a few days if not emergency (ILOP7)	.773
I would order from online immediately if anyone needs medicine in the emergency unit (ILOP8)	.582
It would be best if the medicine is delivered near to my location (ILOP9)	.684
It would be best if the medicine is delivered near to the doctor's chamber I visited (ILOP10)	.645
The transportation mode in medicine delivery doesn't bother me much (ILOP11)	.690
Online pharmacies cost more than local pharmacies. (ILOP12)	.608

I prefer fast delivery even if it is expensive (ILOP13)	.620
Delivery lead time is not as important to me as price and quality of drugs. (ILOP14)	.752
If I'm nearby the warehouse of an online pharmacy, I will pick up medicine instead of having it delivered. Because, it won't charge me any delivery cost and I have experience buying medicine from them. (ILOP15)	.676
I don't have problem if a particular medicine is stocked out. I am willing to receive it later when available(ILOP16)	.667
Online pharmacies should also have a physical location. (ILOP17)	.660
Packaging is important for me purchasing medicine from online. (ILOP18)	.683
I may order more than once a day if needed/emergency(ILOP19)	.541
I have no problem if the order cannot be cancelled. (ILOP20)	.651

Table 06: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.774	13.871	13.871	2.774	13.871	13.871	2.538
2	2.265	11.323	25.194	2.265	11.323	25.194	2.157
3	1.635	8.173	33.367	1.635	8.173	33.367	2.088
4	1.581	7.907	41.274				
5	1.448	7.239	48.513				
6	1.303	6.514	55.027				
7	1.255	6.275	61.301				
8	1.013	5.067	66.369				
9	.946	4.728	71.097				
10	.862	4.311	75.408				
11	.841	4.203	79.611				
12	.746	3.729	83.340				
13	.644	3.220	86.561				
14	.544	2.719	89.280				
15	.475	2.377	91.657				
16	.425	2.126	93.783				
17	.397	1.984	95.767				
18	.353	1.763	97.530				
19	.297	1.487	99.017				
20	.197	.983	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

6.2 Results of Linear Regression Analysis

By regression analysis it is observed that the correlation is 0.635 and the adjusted R square is .232 which is in the acceptable limit. (Table 07)

Table 07: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.635[a]	.403	.232	.60145

a. Predictors: (Constant), ILOP20, ILOP12, ILOP8, ILOP7, ILOP5, ILOP17, ILOP2, ILOP19, ILOP15, ILOP11, ILOP13, ILOP10, ILOP3, ILOP14, ILOP9, ILOP1, ILOP18, ILOP4, ILOP6, ILOP16

b. Dependent Variable: ILOP21

Anova shows that all the factors are significantly related to logistics of a pharmaceutical company.

Table 08: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.096	20	.855	2.363	.004[b]
	Residual	25.322	70	.362		
	Total	42.418	90			

a. Dependent Variable: ILOP21

b. Predictors: (Constant), ILOP20, ILOP12, ILOP8, ILOP7, ILOP5, ILOP17, ILOP2, ILOP19, ILOP15, ILOP11, ILOP13, ILOP10, ILOP3, ILOP14, ILOP9, ILOP1, ILOP18, ILOP4, ILOP6, ILOP16

7. Conclusion and Recommendation

The results of the analysis denote the interrelation among the variables which is very high. The variables relate to each other in a way that the whole logistic system will work efficiently if the three factors – delivery lead time, location of warehouse, and transportation mode all work together. To solve the issue, number of warehouses can be increased using a decentralized distribution channel. Although costs may increase, yet can be minimized using effective transportation mode. Due to rigid delivery system, the price of medicine or delivery charge can be increased slightly. This will minimize the overall logistics challenge faced by the company.

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