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The Effect of Logistics Service Attributes on Customer Satisfaction: Evidence from Southwestern Hub of Ethiopian Pharmaceuticals Supply Agency

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Abstract

The aim of this study was to assess level of customer satisfaction with the pharmaceutical logistics services and investigate the effect of pre transaction, transaction and post transaction attributes on customer satisfaction in the hubs of the Ethiopian Pharmaceutical Supply Agency. 262 randomly selected public pharmacy unit personnel were used to collect the data using a pre-tested questionnaire. Factor analysis and multiple linear regressions models were used to analyze the data. The study found that majority of the respondents (60%) were satisfied with pre-transaction performance the hub. Customers' satisfaction level during transaction and post-transaction pharmaceutical service delivery performance were 37% and 47% respectively. Multiple linear regression analysis was done after factor reduction analysis was computed and the result shows that ordering procedure, personal contact quality, product availability, timeliness, order accuracy, order discrepancy handling, and complaint handling of pharmaceutical logistics service attributes have significant positive effect on customer satisfaction. This has managerial implications in prioritizing logistics service attributes that help to improve the service delivery process of the case Agency and others.

Keywords: *Customer satisfaction; Health facilities; Logistics, Service Attributes, Supply Chain Management*

1. INTRODUCTION

Pharmaceutical supply represents the most critical component for healthcare system function which provides pharmaceuticals necessary for the prevention and controlling of health related problems in a given population. A well-established and sustainable pharmaceutical supply management is the critical way to address the required health system needs (Management Science for Health-MDS-3, 2012; Systems for Improved Access to Pharmaceuticals and Services, 2012; and Towards Access-2030, 2017). In a situation where and when pharmaceutical demand is uncertain, the attentions and actions of researchers from the supply side are highly pronounced to consider service delivery quality as a means to bridge the gap (Lee, 2019). Practitioners also consider providing customers with demanded products with reliable service delivery as a solution for both sides' sense of stability (Christopher, 2011; Management Science for Health-MDS-3, 2012).

Satisfaction is broadly defined as a personôs feelings of pleasure or disappointment resulting from comparing a productôs perceived performance with expectations (Oliver, 2015). Customer satisfaction is one of the most decisive indicators of consumer repurchase intentions and loyalty (Chinomona and Dubihlela, 2014). It is a key factor in assessing the quality of service attributes (Mentzer, Flint & Hult, 2001). Customers are key stakeholders in any organization. Thus, measuring satisfaction is an approach to evaluating customersô experiences and meeting their needs and requirements. It helps to prioritize product attributes that are most important to customer segments as well as a way of ensuring their retention and identifying areas that pursue improvements (Raza, 2013).

Logistics customer service process is often examined by dividing its constituent elements into three phases to reflect the condition of the particular service delivery as Pre-transaction elements that arise before the actual transactions take place (e.g. salesperson quality, method of ordering, system flexibility), Transaction elements which are directly related to the physical transaction (e.g. stock availability, order cycle-time, order information, delivery reliability, and condition of goods), and Post-transaction elements involving elements that occur after the delivery has taken place (e.g. warranties, returns, complaints, and invoicing accuracy) (Rushton, 2010; Christopher,2011 ; Kotylak, Michalowska & Kulyk,2017; Trzesiok,2019).

In pharmaceutical logistics management, customer satisfaction has been identified as a key performance metrics that tracks how products and/or services supplied by an organization meet or surpass a customerôs expectation (Cerna, 2016). Indeed customers can be satisfied when the service delivery processes meet their expectations; otherwise, dissatisfaction can occur (Oliver, 2015). Pharmaceutical providers must ensure the dual product-service expectation of health facilities as suppliers in the downstream channel. A number of literatures have revealed that logistics activities create time and place utility, thereby enhancing product value and end-user satisfaction. Most scholars proved this by describing the seven rights of utility creation by pharmaceuticals logistics services: delivering the right product, at the right quantity, at the right place/condition, at the right time, with the right information, at the right price, and for the right consumer (Rushton, 2010; Danovice, 2014; Management science for Health-MDS-, 2012). Thus, a well-functioning supply chain can meet customer satisfaction by ensuring the six rights (right

quantity, right quality, right time, right price, right place, and right after sale services) for each customer.

Ethiopia Pharmaceutical Supply Agency (EPSA) is a governmental organization that has been mandated to continuously avail the necessary pharmaceuticals to every public health facility (PHFs). Cognizant of these crucial roles, the agency has been striving to ensure an optimal level of product availability and excellent customer service (Ethiopian Pharmaceuticals Supply Agency, 2017). In the EPSA, customer services are offered in combination with a physical product. Attributes of pharmaceuticals logistics services vary from one service organization to another especially organizations that offer service-product to customers (Flint & Hult, 2001). Most of the existing researches in this area focused on the operational performance of the firms (Bekele Boche, 2020; Giovanis; 2013; Giovanis, Tomaras & Zondiros, 2013). To the best knowledge of the researchers, no studies were focused particularly on pharmaceutical logistics service attributes in the study area.

This study has intended to examine whether the pharmaceutical Logistics service attributes (PLSA) determine customer satisfaction and the level of customer satisfaction. The results will have implications for prioritizing pharmaceuticals logistics service attributes that are determinant to improve the service delivery process in the EPSA hubs. The result may help health managers, policymakers, stakeholders, and health professionals to effectively devise and evaluate the pharmaceutical services delivery aimed at improving customer satisfaction in the context of public health facilities in Ethiopia.

2. LITERATURE REVIEW

a. Customer satisfaction

Customer satisfaction has been the theme of considerable research and it has been defined and measured in various ways (Oliver, 2015; Vrat, 2014). It is important for logistics companies while carrying their activities to show that their actions and deeds are satisfying the customer (Ghoumrassi & Tigu, 2017). According to Oliver (2015), satisfaction is the consumerôs fulfillment response while dissatisfaction isnôt. It is a judgment that a product or service feature provided (or is providing) a pleasurable level of consumption-related fulfillment. The implication is that customers purchase goods and services with pre-purchase performance-specific expectations based on their previous experience and used as reference points against which the product/serviceôs performance, once purchased and used, is compared. Kotler (2010) defined satisfaction as: ña personôs feelings of pleasure or disappointment resulting from comparing a product perceived performance with his or her expectationsò. Customers would be satisfied if the service outcome meets expectations; otherwise, dissatisfaction will occur (Cerna, 2016; Kotler, 2010; Looy, 2013).

Customer satisfaction has been a subject of great interest for organizations because customers are key stakeholders in organizations and their satisfaction is a priority for sustainable growth (Wang, 2015). Measuring satisfaction level plays an important role in identifying the customer perception of the product /services offered by a given company and help to take a corrective action to retain the customerôs satisfaction at the highest level (Kavaliauskiene, 2014). If the company understands customersô requirements, it is easier for service providers to satisfy them.

Knowing customersô satisfaction level and their requirements will also help in finding out the best direction in which the company needs to go on (Wang, 2016).

b. Logistics customer service

Based on the definition, the essence of logistics customer service is to meet the needs of customers related to the delivery time, delivery reliability, convenience, and good communication. The literature acknowledges many attempts to define the logistics customer service. For instance, Kempny (2001) defined it as the ability or capacity to satisfy the requirements and expectations of customers, mainly as to the time and place of the ordered supplies, using all available forms of logistics activity, including transportation, warehousing, inventory management, information and packaging. Kramarz (2014) stated it as the ability of the logistics system to respond to customer needs in terms of time, reliability, communication and convenience (Rushton, 2010; Chopra & Meindl, 2016). Logistics customer service has three levels of attributes. They are classified as pre transaction, transaction, and post transaction attributes or elements.

c. Logistics customer service Attributes

Attributes of pharmaceutical logistics is not only moving from the supplier to the buyer, but also pursuit service in a short time, with flexible and high value-added manner and in a way that satisfies the customers. Thus, the attributes of pharmaceutical logistics have become more and more important to the differentiation of companies (Wang, 2016). It was validated by a 15 item physical distribution service quality (PDSQ) scale based on the value added utilities of time, place, and form, and comprised of three physical distribution service attributes of timeliness, availability and condition (Bienstock, 1997). The logistics service attributes concept was further expanded by encompassing PDSQ's outcome dimensions of timeliness, availability, and condition, along with additional dimensions of a process nature such as personnel contact quality, order release quantities, information quality, ordering procedures, and order discrepancy handling (Bienstock, 1997; Flint & Hult, 2001). They emphasized that logistics service attributes should be conceptualized as a process that can be applied across multiple customer segments. A study conducted in manufacturing companies in Greece shows that outcome quality dimension conceptualized across four sub-dimensions of availability, timeliness, order accuracy, and order condition, and process quality dimension that comprised of ordering procedures, personnel contact quality, information quality, and order discrepancy handling influence customer satisfaction significantly.

d. The relationship between logistics service attributes and customer satisfaction

Xie (2011) argued that service quality is the predecessor of customer satisfaction. It can, therefore, be assumed that the quality of service leads to customer satisfaction. The logistics service companies in Lithuania perceived the expectations of consumers and able to meet the needs of consumers since the Customer Satisfaction Index of 80.79% was received from the customers (Kavaliauskiene, 2014). A survey conducted in Poland shows that >89%, >93%, and 76% of the respondents expressed satisfaction with pre-transaction service, during the transaction, and after the transaction services respectively (Kulyk, Michalowaska & Kotylak, 2017). A study on logistics service providers in Poland has shown that logistics costs and shorter delivery times are significant logistics services for customer satisfaction (Trzesiok, 2019).

e. Study Variables

The dependent variable considered in the study was customer satisfaction. In this study, customer refers to a person or public organization that purchases pharmaceuticals from EPSA (i.e., Health facility ï both Health center and Hospital). Explanatory variables investigated in the study were information quality, ordering procedure, personnel contact quality, product availability, order condition, timeliness, order accuracy, order discrepancy handling, and customer complaint handling. Information quality is the adequacy, completeness, and credibility of the information provided by the agency. Ordering procedure refers to the easiness and convenience of order receiving procedure followed by the branches. The agencyôs contact personnel knowledge, experience, and empathy for the customerôs situation were assessed by personnel contact quality (Flint & Hult, 2001). Product availability operationalized to stock availability and facilitiesô ability to obtain desired order quantities from the agency. Order condition refers to the agencyôs ability to provide orders without any damage or loss (conveniently packaged and intact). Timeliness is the agencyôs ability to deliver orders as promised, and timely respond to special requests.

The agencyôs ability to deliver the right items and quantities was designated by order accuracy. We denoted order discrepancy handling as the capability of the agency on addressing any discrepancies in orders after items delivery has taken place (Chopra & Meindl, 2016; Flint & Hult, 2001; and Giovanis et al, 2013). We operationalized the handling of customersô queries (customersô claims, complaints, and questions) in the agency as customer complaint handling.

3. RESEARCH METHODS

Southwestern Ethiopian pharmaceuticals supply agency (EPSA) was surveyed. The southwestern EPSA consists of Jimma, Nekemte, and Gambella hubs. These hubs are responsible for availing affordable pharmaceuticals to public health facilities (HFs) in the Southwestern part of the country. Descriptive and explanatory research designs were employed. A cross-sectional study using a quantitative study approach was conducted.

a. **Target population**

The target population included the catchment public HFs found in the hubs of southwestern EPSA (i.e., Jimma, Nekemte, and Gambella), and health professionals working in these facilities. The study took the list of catchment HFs from the three EPSA hubs found in the southwestern cluster. The cluster comprises 337 public HFs in the Jimma hub, 256 public HFs in the Nekemte hub, and 31 public HFs in the Gambella hub. This provides a sampling frame of 624 public HFs in the study area. Two hundred thirty-eight (238) sample respondents were selected by applying Cochranôs (1977) correction formula for calculating sample size when population size is finite assuming a maximum variability of 50% at a 95% confidence interval (Fuller,2009 ;Kother, 2004). However, the final sample size was 262, with the addition of 10% for potential non-response rate.

b. Sampling method

A multistage sampling technique was implemented to select the respondents of the study. At the first stage, the southwestern EPSA cluster, one of the seven EPSA clusters in Ethiopia, was selected randomly. Second, sorting the list of public HFs from the branches was made using

Microsoft Excel. The final sample size was proportionally apportioned to the three EPSA hubs. Within hubs, systematic probability sampling method was used to draw the required HFs. As a final stage, one health professional working at the selected public HFs and responsible for pharmaceutical logistics management was selected as the respondents of the study.

c. Method of data collection

Self-administered questionnaire of a 5-point Likert scale (1-strongly Disagree to 5-strongly agree) type was used to collect data from respondents. It was adapted from previous works (Bienstock, 1997; Flint & Hult, 2001; Giovanis, 2013; Kambel, 2011) and customized into the local context and objective of the study. Before the actual data was collected, a pilot study was done using 23 respondents which were excluded from the final data collection. Based on the finding, minor adjustments were made on few of the items to enhance the validity and reliability.

Finally, from a total of 262 questionnaires, 247(94.3 %.) questionnaires were correctly responded. The rest of the responses were either unable to access the respondent or showed a pattern of inconsistency in filling the questionnaire.

d. Method of data analysis

The data were analyzed using descriptive and inferential statistics by Statistical Package of Social Science (SPSS) version - 26. A descriptive analysis of frequency and percentage were used to determine the extent of customer satisfaction in the pharmaceutical logistics service provision processes. In order to investigate the causal association between dependent and independent variables, its underlying assumptions (multivariate normality, linearity, and multicollnearity) that substantially affect the ability to represent the relationship were tested (Fidell, 2013; Hair, 2014; & Yockey, 2018). In order to reveal out the relationship, Pearsonôs product-moment correlation (*r*) was conducted (Gaur, 2009; Hair, 2014).

Exploratory factor analysis (EFA) was conducted to identify determinant items and to use the results for subsequent multivariate analysis. A principal component analysis (PCA) with an orthogonal Varimax rotation was used to suppress all factor coefficients less than 0.4 to enable simple factor loading (Fidell, 2013; Hair,2014; Samuels; 2016; & Yockey, 2018). We checked the appropriateness of data to proceed with EFA by examining the correlation matrix and the KMO (Kaiser-Meyer-Olkin). Multiple linear regression models were performed using the summated scale of items with the highest factor loadings to identify the determinant explanatory variables that can predict the outcome variable significantly. A p-value of less than 5% was considered to flag statistical significance.

4. RESULTS AND DISCUSSIONS

a. The level of Customer Satisfaction (Descriptive Analysis)

The logistics customer services are often examined by dividing its constituent elements into three phases to reflect the nature and timing of the particular service delivery as pre-transaction, transaction, and post-transaction elements. Respondents were requested to rate the extent of their satisfaction with the pharmaceutical Logistics services provided by EPSA using a 5-point Likert scale satisfaction questions (1 óvery dissatisfiedô to 5 óvery satisfiedô). The result shows that the majority (60%) of the study participants responded satisfied with the pre-transaction logistics

services; 89(37%) of the respondents were satisfied with the during-transaction logistics services, and 122(47%) of them expressed as satisfied by the post-transaction logistics services (Table 1).

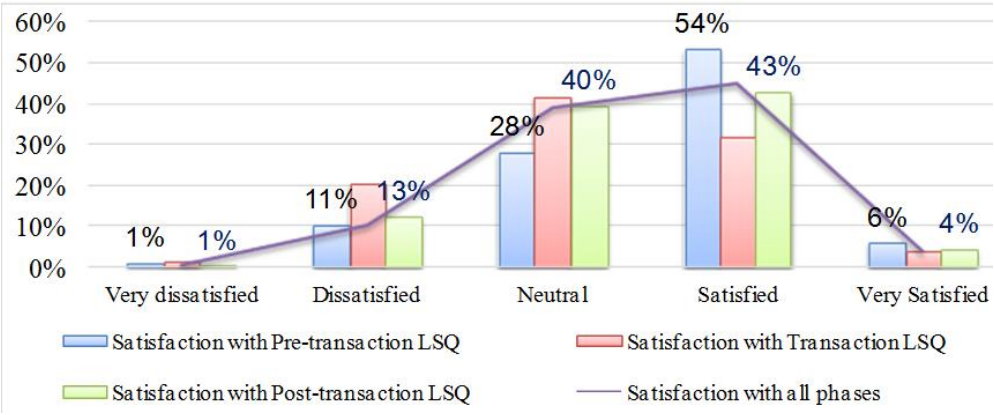
Table 1: ***The Extent of Customer Satisfaction for Pharmaceuticals Logistics Service Delivery at Southwest Ethiopia, 2020 (N = 247 Public HFs).***

Variables	*VD No (%)*	*Dissatisfied No (%)*	*Neutral No (%)*	*Satisfied No (%)*	*VS No (%)*
Satisfaction with Pre-transaction LSQ	3(1%)	36(11%)	70(28%)	133(54%)	15(6%)
Satisfaction with Transaction LSQ	4(2%)	51(21%)	103(42%)	79(32%)	10(3%)
Satisfaction with Post-transaction LSQ	1(0%)	31(13%)	98(40%)	106(43%)	11(4%)
Satisfaction with all phases	2(1%)	26(11%)	97(39%)	112(45%)	10(4%)

Note: VD = Very Dissatisfied, VS = Very Satisfied

Relatively, smaller numbers of customers expressed dissatisfaction with the logistics customer services (39(12%) in the pre-transaction, 55(23%) in the transaction, and 32(13%) in the post-transaction phases). Considerable number of customers: 70(28%) in the pre-transaction, 103(42%) during-transaction, and 98(40%) in the post-transaction responded neutral. It is also worth noting among dissatisfied, the largest number of customers were during-transaction as every 5th customer rated the level of logistics service as dissatisfied, and every 62th as very dissatisfied. The descriptive results in table 1 can be more figures out using the following figure 1.

Figure 1: The Extent of Customer Satisfaction for Pharmaceuticals Logistics Service Processes at Southwest Ethiopia, 2020 (N = 247 Public HFs).



This result coincides with the survey conducted in the medical logistics service companies in Lithuania (Kavaliauskiene, 2014). The variation may be differences in the study setting, specific pharmaceutical logistics services provided, and characteristics of the study population used in the studies.

b. Explanatory (Inferential Analysis)

Inferential analysis was done to examine the relationship between dependent variable (customer satisfaction) and pharmaceutical logistics attributes (Independent variables). Before directly going to the analysis of multivariate cause and effect relationship, the assumptions tests need to be done. In the current study, the underlying assumptions that substantially affect the ability to represent multivariate relationships were tested. The outputs of the analyses showed no violation of the underlying assumptions of multivariate statistical analysis. The tests are Normality, linearity, and multicollinearity

i. Multivariate Normality Test

A multivariate explanatory analysis method requires approximately normally distributed outcome variable for each category of predictive variables**.** A plotted data on the histogram (Figure 2) outlines the scores were approximately normally distributed in the graph.

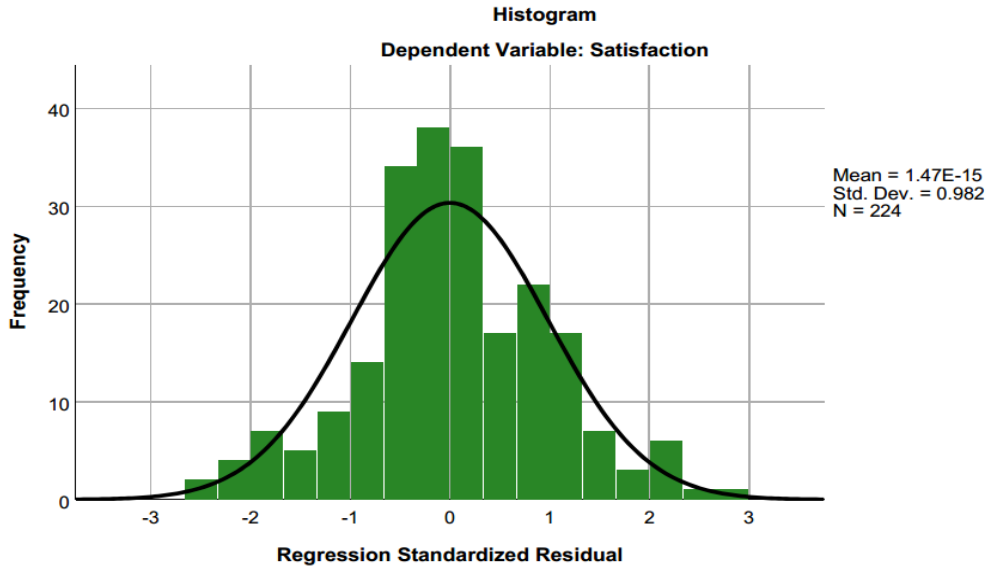


*Figure 2**: Histogram with a superimposed normal curve (N = 247 Public Health facilities).***

ii. Multivariate Linearity Test

Linearity defines the dependent variable as a linear function of the predictors. The linearity among pairs of variables was examined by inspection of a scatterplot of residuals. Inspection of the P-P plot in Figure 3 shows a linear relationship exists among variables in the study.

*Figure 3: **Normal P-P Plot of standardized Residuals (N = 247 Public HFs).***

iii. Multicollinearity Test

It refers to the situation when the predictor variables are highly correlated with each other. This causes inflation in the standard error of regression coefficients resulting in a reduction of their significance. In this study, the problem of multicollinearity was not suspected as the tolerance (T) statistics values for the predictor variables were greater than 0.1 and variance inflation factor (VIF) less than 10 (
Table ***2***).

*Table 2: **Multicollinearity statistics values (N = 247 HFs)***

Constructs	IQ	OP	PCQ	PA	OC	T	OA	ODH	CH
T	0.668	0.870	0.588	0.557	0.776	0.786	0.655	0.714	0.604
VIF	1.495	1.128	1.693	1.734	1.289	1.235	1.464	1.384	1.583

IQ = Information quality, OP = ordering procedure, PCQ = Personal contact Quality, PA = product availability ,OC = order condition, T = Timelines, OA = order accuracy, OD = order discrepancy, and CH = compliant handling

Bivariate Correlations Analysis Result

Correlation is a measure of the size and direction of the association (relationship) between variables. Pearsonôs product-moment correlation coefficient (*r*) gives a mathematical value for measuring the strength of the linear relationship between two variables. It can take values between ï1(perfect negative) to 1(perfect positive) correlation. According to a rule of thumb, [0.1 < *r* < 0.3] indicates weak correlation, [0.4 < *r* < 0.6] reveals moderate correlation, and [0.7 < *r* < 0.9] indicative of strong correlation between variables. Correlation analysis is carried out before Multivariate analysis to rule out strong relationships between the independent variables (Gaur, 2009; & Hair, 2014). The correlation analysis result reveals a positive significant correlation between all pharmaceutical logistics service attributes (PLSA) and customer satisfaction (all have p-values < .05) although the strength varies. Most PLSA have a moderate

correlation (0.463 Ò r Ò 0.617, p<0.001) except ordering procedures (r = 0.309, p<0.001) and order condition (r = 0.275, p<0.001) with customer satisfaction.

The correlations table (Table 3) depicted the highest correlations between product availability and customer satisfaction (r = .617), and the lowest correlation between order condition and customer satisfaction (r = .275). The predictor variables are positively correlated with each other, with values ranging from 0.05 to 0.567. Indeed, all LSQ attributes and customer satisfaction are positively correlated, the better the LSQ attributes the higher customer satisfaction will be.

Table 3: Bivariate Correlations between Variables, 2020 (N = 247 HFs)

Factors	*IQ*	*OP*	*PCQ*	*PA*	*OC*	*T*	*OA*	*ODH*	*CH*
IQ	1								
OP	.274**	1							
PCQ	.433**	.243**	1						
PA	.284**	.136*	.415**	1					
OC	.200**	.225**	.225**	0.05	1				
T	.308**	.208**	.316**	.273**	.257**	1			
OA	.279**	0.094	.207**	.536**	.185**	.162*	1		
ODH	.371**	.217**	.448**	.331**	.237**	.336**	.141*	1	
CH	.388**	.218**	.567**	.423**	.307**	.297**	.275**	.420**	1
Satis	.492**	.309**	.610**	.617**	.275**	.491**	.463**	.569**	.587**

(Note: **p< 0.01, *p< 0.05 (2-tailed))

Results of Exploratory Factor Analysis (EFA)

After several iterations of retaining/removing variables, an EFA was re-run on the remaining 27 items (removing eight items) using a principal component analysis (PCA) with an orthogonal õVarimaxô rotation of Kaiserôs normalization, allowing the KMO statistics, extracting a fixed number of factors (8), and suppressing all factor coefficients less than 0.4 to enable better visualization of the factor structure (Fidell, 2013; Hair, 2014).

The Kaiser-Meyer-Olkin (KMO) ï the measure of sampling adequacy ï quantifies the degree of intercorrelations among the variables and the appropriateness of factor analysis. Samuels (2016) recommends the KMO value of 0.5 as a minimum, and values between 0.7 and 0.8 are acceptable. As exhibited in

Table ***4***, the KMO measure of 0.83 is indicative of the sufficiency of data to proceed with factor analysis. Bartlettôs test - another indication of the strength of the relationship among variables - is a statistical test for the overall significance of correlations within a correlation matrix. A statistically significant Bartlettôs test of sphericity (sig. < .001) indicates that sufficient correlations exist among the variables to continue FA and the existence of nonzero correlations.

*Table 4****: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test (N = 247 Public Health facilities)***

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy.		.828
Bartlett's Test of Sphericity	Approx. Chi-Square	2846.370
	Degree of freedom *(df)*	351
	Sig.	.000

The result of the analysis (Table 5) demonstrates the existence of eight factors that accounted for 68.22% of the total variance in the dataset. The first factor (Order discrepancy handling) consists of four (4) items with factor loadings ranged from 0.689 to 0.788 which accounts for 26.16% of the variance in the datasets, the second 9.7%, and the third 7.84%.

Table 5: ***Rotated Factor loadings, Eigenvalue, and % of variance explained, 2020 (N = 247 Public HFs)***

LSQ Attributes (Factors)	Number of Items	Factor Loadings	Eigenvalue	% of Variance Explained
Order Discrepancy Handling (ODH)	4	[.689 - .788]	7.07	26.16
Personnel Contact Quality (PCQ)	3	[.664 - .815]	2.62	9.70
Ordering procedures (OP)	4	[.652 - .839]	2.12	7.84
Order Accuracy (OA)	3	[.734 - .818]	1.70	6.30
Product Availability (PA)	4	[.651 - .688]	1.49	5.51
Information Quality (IQ)	3	[.640 - .854]	1.43	5.30
Complaint Handling (CH)	3	[.652 - .715]	1.03	3.78
Timeliness (T)	3	[.497 - .875]	1.01	3.62

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Reliability of Factors after EFA

Having identified the determinant items in the attributes, the components have been tested for internal reliability. All PLSA after FA exhibited high Cronbachôs Ŭestablishing the reliability of the instrument (Table 6). The Cronbach's alpha for this study was 0.918, an indication of the acceptability of the scale for further analysis.

Table 6: Measured items and Cronbach Ŭafter Factor Analysis at Southwest Ethiopia, 2020 (N = 247HFs)

Variables	IQ	OP	PCQ	PA	T	OA	ODH	CH	Satis	Overall
No of Items	3	4	3	4	3	3	4	3	5	32
Cronbach Ŭ	.783	.770	.802	.764	.708	.804	.803	.717	.870	.918

Multiple Linear Regressions

Having checked the fit of data for multivariate analyses, multiple linear regression was performed to examine the influence of explanatory variables (information quality, ordering procedure, personnel contact quality, product availability, timeliness, order accuracy, order discrepancy handling, and complaint handling) that explain the outcome variable (satisfaction) significantly.

The Model Summary table below gives the multiple correlation coefficient (R), its square (Coefficient of determination ï R^2), adjusted R^2, and standard error of the estimate as summary measures for assessing the overall fit of the model. From the Model summary (Table 7), the multiple correlation coefficient (R = 0.854) shows there is a positive strong correlation between

the independent variables and customer satisfaction in the regression model. In terms of variability (R^2 = .729), a 72.9% variation in the customersô satisfaction can be explained by the explanatory variables included in the model. Since by definition, R^2 increases even if non-significant independent variables are added, the *adjusted* R^2 is an improved estimation of R^2 in the model. Thus, changes in pharmaceutical logistics service attributes accounted for 72% of the variations in customer satisfaction and the rest (28%) remain unexplained.

Table 7: Model summary of Multiple Linear Regression output, 2020 (N = 247HFs)

Model	R	R-Square	Adjusted R^2	SEE	Durbin-Watson
1	.854[a]	.729	.720	.34027	1.845

a) Dependent Variable: Satisfaction

b) Predictors: (Constant), Compliant Handling, Ordering Procedure, Order Accuracy, Timeliness, Order discrepancy Handling, Information Quality, Personnel Contact Quality, and Product Availability; SEE = Standard error of estimate

Analysis of Variance (**ANOVA**) and **F**- statistics generated by the regression of explanatory variables and customer satisfaction (Table 8) indicates the relationship was highly significant at F (8, 238) = 80.219, p < 0.001. Certainly, the *F*-test for the null hypothesis that none of the explanatory variables are related to customer satisfaction (R is zero) was rejected, and it is concluded that the regression model (with the eight predictors included) significantly predicts customer satisfaction.

Table 8: Significance level for multiple correlation coefficient - ANOVA[a], 2020 (N = 247HFs)

Model	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	74.302	8	9.288	80.219	.000[b]
Residual	27.556	238	0.116		
Total	101.858	246			

a) Dependent Variable: Satisfaction

b) Predictors: (Constant), Compliant Handling, Ordering Procedure, Order Accuracy, Timeliness, Order discrepancy Handling, Information Quality, Personnel Contact Quality, and Product Availability

Testing the Individual PLSA for Significance

The output (Table 9) provides the regression coefficients at 95% confidence intervals (CI) according to the estimated contribution of predictors to the dependent variable. The predictors ordering procedures, personal contact quality, product availability, timeliness, order accuracy, order discrepancy handling, and complaint handling have a significant positive effect at 95% CI with customer satisfaction, meanwhile information quality has an insignificant positive effect with the predicted variable. This implies improving overall PLSA is likely to enhance customer satisfaction.

Table 9: Significance tests of Regression coefficients, 2020 (N = 247 Public HFs)

Explanatory Variables in the model	*Unstandardized Coefficients* B	*Standardized Coefficients* (Beta - ƀ)	*T*	*95% CI for B*	*Sig.*
Order Discrepancy Handling	.212	.225	5.537	[.137 - .287]	.000
Product Availability	.213	.206	4.640	[.123 - .303]	.000
Timeliness	.162	.192	5.075	[.099 - .225]	.000
Order Accuracy	.166	.190	4.699	[.097 - .236]	.000
Personnel Contact Quality	.163	.189	4.218	[.087 - .240]	.000
Complaint Handling	.173	.177	4.055	[.089 - .257]	.000
Ordering Procedure	.078	.075	2.106	[.005 - .150]	.036
Information Quality	.063	.067	1.666	-0.011 to .137	.097
(Constant)	-0.67		-3.752	-1.02 to -.318	.000

The study findings indicated that Order Discrepancy handling was the most important variable to customer satisfaction in the study area. A significant positive effect was obtained for Order Discrepancy handling (ƀ=0.225, p<.001) with customer satisfaction. This finding implies the Order discrepancy handling has the highest significant contribution of 22.5% of all PLSA included in the analysis and it accounts for 26.16% of the variance in the datasets during factor analysis. As a result, the level of customer satisfaction is significantly improved primarily by order discrepancy handling. This result is in line with similar findings from earlier researches, such as in (Flint &Hult, 2001; Giovanis, 2013).Thus, managing a customerôs complaints and queries in a satisfactory manner need to be an integral part of customer service provisions.

The most significant indicator of an efficient pharmaceutical logistics system is stock availability and delivery reliability (Rushton, 2010; Chopra & Meindl, 2016). In this study, product availability (ƀ=0.206, p < .001) and Timeliness (ƀ=0.190, p<.001) have significant positive effects on customer satisfaction at 95% CI. It can also be inferred from the result that customers will be most satisfied when they acquire the right products with the desired quantities and received them at the promised timeframe. As a result, product availability and timeliness are significant determinants of customer satisfaction in the EPSA hubs. This result is supported by (Bienstock, 1997; Flint & Hult, 2001; Giovanis, 2013; Trzesiok, 2019).

The regression coefficient indicates that each additional change of personnel contact quality would result in a 0.163 predicted increase in customer satisfaction scores by keeping other predictors constant. Thus, it is evident that the quality of contact personnel (18.9%) plays a major role in determining customer satisfaction in pharmaceutical logistics service delivery. Indeed in the EPSA hubs, the personnel contact quality becomes one of the most important determinants in delivering pharmaceutical services as most logistics operations involve personnel who often process orders, deliver products, and handle discrepancies. Thus, the right person with appropriate trainings, adequate skills, and experiences should be engaged to provide specific pharmaceutical logistics services to satisfy customers.

Information quality variable, measured as the information communicated by the agency about product/service is adequate, accurate, and credible, has no statistically effect on customer satisfaction that changes in information quality were not associated with changes in customer satisfaction at 95% CI. This result is supported by Flint & Hult,(2001) who found that information quality does not drive customers' satisfaction, but only serve as the order qualifiers. However, research conducted by (Giovanis, 2013) stated that information quality as a sub-dimension to process quality significantly affect customer satisfaction.

5. IMPLICATIONS

The study reveals that notably high proportions of customers are feeling satisfied with the pharmaceutical services they received. The results of this study have some managerial implications for Jimma, Nekemte, and Gambella branches in particular and to the distribution and inventory management office at most at Ethiopia Pharmaceutical logistics management level. The findings revealed the seven (7) variables ordering procedures, personal contact quality, product availability, timeliness, order accuracy, order discrepancy handling, and complaint handling as the most significant pharmaceutical logistics services attributes influencing customer satisfaction in the EPSA hubs. Thus, managers and coordinators at respective levels need to pay equal attention to these pre, during, and post pharmaceutical logistic attributes to enhance customer satisfaction even by far better than its current performance in light of ever-changing customer needs. The result also has academic implication to conduct further study in the area and beyond.

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