International Journal of
Supply Chain Management
(IJSCM)

The Influence of Goods Receipt and Sorting and Loading and Delivery to Client Practices on Inventory Management Performance in Humanitarian Organizations; A Case Study of Afghan Red Crescent Society Medical Supply Chain

Christopher Kiilu

IPRJB

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.1, Issue 1 No.1, pp 62-74, 2016

www.iprjb.org

The Influence of Goods Receipt and Sorting and Loading and Delivery to Client Practices on Inventory Management Performance in Humanitarian Organizations; A Case Study of Afghan Red Crescent Society Medical Supply Chain

[1]Christopher Kiilu

***Email: christopherkiilu@yahoo.co.uk**

ABSTRACT

Purpose: The main purpose of this study was to establish the influence of good receipt and sorting, loading and delivery to client practices on inventory management performance in Afghan Red Crescent Society Medical Supply Chain.

Methodology: This study adopted descriptive survey design. The target population of the study was 45 end user clinics and 916 experts and procurement professionals existing in the email database of the researcher at the time of study. The sample size of the study was 96 respondents who were divided into strata's of 41 end user clinics and 55 procurement experts. This study used both primary and secondary data collected using questionnaires and secondary data collection guide**.** Secondary data wascollected for all variables from 10 end user clinics. Data analysis was done using SPSS generating both descriptive and inferential statistics like Pearson's bivariate correlation and regression analysis. Descriptive statistics included; frequencies, mean and standard deviation. Data analysis output was presented using tables and cartographies like pie charts and line graphs.

Results: Research findings showed that skewness statistics was 1.224 which indicates that the variable was skewed to the right which implies that the goods receipt and sorting process lead time had massive outliers. Regression results also indicated that the relationship between goods receipt and sorting lead time and overall lead time was positive and significant. Further, the skewness statistics for loading and delivery was 2.581 which indicate that the variable was skewed to the right which implies that the loading and delivery to client lead time had outliers. Regression results revealed that loading and delivery to client practices was statistically significant in explaining overall lead time.

Unique contribution to theory, practice and policy: It is recommended to the management of ARCS to embrace strategies that can lead to reduction of lead time such as vendor managed inventory which enables the customer's partnership channel to be more efficient due to better planning coordination, reduced needs for inventories with increased sales by focusing on selling what end-customer wants.

Keywords*: Good receipt and sorting practices, loading and delivery, inventory management*

1.0 INTRODUCTION

In today‘s intensively competitive global market, effective supply chain management (SCM) plays a critical role in improving organizational performance and competitive advantage (Schneller and Smeltzer, 2006). The competitive environment requires organizations to provide high quality products and services, deliver rapid service response, and develop dynamic capabilities that are congruent with the rapidly changing business environment (Teece, 2007). As organizations are seeking to achieve competitiveness, new challenges in supply chains are emerging. These include increasing demands to reduce costs, increase quality, improve customer service and ensure continuity of supply (Pearson et al., 1996). Therefore supply chain environment is characterized by, increased customer responsiveness, information integration etc.

To cope, companies‘have been compelled to restructure and re-engineer relentlessly, innovate, rebrand and realign. This realization requires firms to evaluate how the resources and capabilities of suppliers and customers can be utilized to create exceptional value (Schneller and Smeltzer, 2006).

Nordas*et al.* (2006) indicate that Lead time is the amount of time between the placement of an order and the receipts of the goods ordered. It depends on the nature of the product e.g. whether it is made to order or if it is a from the shelf product. Lead time also depends on planning and supply chain management, logistics services and of course distance to customers and suppliers. Long lead time does not need to be a problem if delivery is predictable and demand is stable. However, if there is uncertainty about future demand, long lead time is costly even when the customer knows exactly when the merchandise will arrive. If future demand has been underestimated, running out of stock has costs in terms of foregone sales and the possibility of losing customers. If future demand has been overestimated, excess supply must be sold at a discount. Furthermore, the longer the lead time and the more varieties of the product in question are on the market, the larger stocks are needed. It is also important to notice that competitiveness on lead time is not a static concept. When some firms are able to shorten lead time, others must follow in order to avoid punishment in terms of discounted prices or at worst exclusion from the bidding process. The latter can happen when a critical mass of suppliers is able to deliver just-intime and the customer finds it safe to reduce inbound inventories to a couple of days or in some cases even a couple of hours.

Humanitarian organization receives products and services from suppliers, and then stores and distributes to each care unit based on the hospital‘s operation processes. Therefore, SCM includes business activities e.g. purchasing, distribution, management of suppliers) and operations that integrate a continuous, seamless flow of materials and services for aid delivery (Rivard and Royer et al., 2002; Shih et al., 2009). According to Singh et al. (2006), humanitarian supply chains processes have three types of flows: physical product flow, information flow, and financial flow. The physical product flow manages customized products and services. Information and financial flows are related to SC design decisions for effective product flow and improved organizational performance (Singh et al., 2006; Kowalski, 2009).

Inventory management includes two basic functions: one is how to classify inventory items and maintain accurate inventory records (Heizer and Render, 2004); the other is how to decide the amount and time to order items (Stevenson and Hojati, 2004). The main goal of inventory

management is balance –too much adds unnecessary costs, while too little causes delays or disrupts schedules (Stevenson and Hojati, 2004).Thus, inventory management research has long been central to academic literatures. Scholars in different areas try to advance the theory and practice in inventory management.

1.1 Problem Statement

The replenishment decision and the delivery of emergency supplies are very important in postdisaster relief operations. With the increasing of frequency and impact of disasters in recent 20 years, the humanitarian organizations are under an increased pressure of improving their logistics performance, and such trends triggered an interest in humanitarian logistics research (Kovacs and Spen, 2011). After the magnitude 7.0 earthquake stuck Haiti at January 2010, Whybark et al. (2010) made a literature review about the relatively issues and suggested that the Disaster Relief Supply Chains (DRSC) should be treated as a subset of humanitarian supply chains. And there are important differences between the DRSC and the Commercial Supply Chain (CSC), such as the extremely uncertain and dynamic in their operating environment.

The replenishment decision and the delivery of emergency supplies are very important in postdisaster relief operations. With the increasing of frequency and impact of disasters in recent 20 years, the humanitarian organizations are under an increased pressure of improving their logistics performance, and such trends triggered an interest in humanitarian logistics research (Kovacs and Spen, 2011). After the magnitude 7.0 earthquake stuck Haiti at January 2010, Whybark et al. (2010) made a literature review about the relatively issues and suggested that the Disaster Relief Supply Chains (DRSC) should be treated as a subset of humanitarian supply chains. And there are important differences between the DRSC and the Commercial Supply Chain (CSC), such as the extremely uncertain and dynamic in their operating environment.

To the researches about the impact of variable lead times and delayed information transfer, Song and Zipkin (2009) studied the performances of inventory management systems having deterministic lead times that been assumed constant, stochastic and exogenous.

The study therefore seeks to address the influence of good receipt and sorting, loading and delivery practices on Inventory Management Performance in Humanitarian Organizations; A Case Study Of Afghan Red Crescent Society Medical Supply Chain.

1.2 Specific Objectives

i. To what extent can Goods receipt and sorting practicess affects inventory management perfomancemeasured through leadtime
ii. To what extent can Loading and delivery to client practices affects inventory management perfomancemeasured through leadtime

2.0 LITERATURE REVIEW

2.1 Theory of Internal Control

A system of effective internal control is a critical component of an organization's management and a foundation for its safe and sound operation. A system of strong internal control can help to ensure that the goals and objectives of an organization will be met, that it will achieve long-term targets and maintain reliable financial and managerial reporting. Such a system can also help to ensure that the organization will comply with laws and regulations as well as policies, plans, internal rules

and procedures, and reduce the risk of unexpected losses and damage to the organization's reputation.

The following presentations of internal control in essence cover the same ground. In USA, the Committee of Sponsoring Organizations of the Tread way Commission (COSO) issued Internal Control – Integrated Frameworking 1992, which defined internal control as a process, effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories: Effectiveness and efficiency of operations; Reliability of financial reporting; Compliance with applicable laws and regulations. The Rutteman Report (1994) in UK defined internal control as the whole system of controls, financial and otherwise, established in order to provide reasonable assurance of Effective and efficient operations; Internal financial control and Compliance with laws and regulations.

2.2 Empirical Literature Review

Lead-time (also referred to as cycle-times) is the time it takes to process an order from the request till the delivery (Carreira, 2005). An analysis and improvement of lead-time is highly relevant. Not being able to deliver in short lead-times leads to a number of disadvantages on the market, identified in the study of Bratthall et al.(2000): The risk of market lock-out is reduced (Schilling, 1998). Bratthall et al. (2000) provided a concrete example for that where one of the interviewees reported that they had to stall the introduction of a new product because the competitor was introducing a similar product one week earlier; An early enrollment of a new product increase probability of market dominance (Urban, Carter, Gaskin &Mucha, 2006). One of the participants in the study of Bratthall et al. (2000) reported that due to introducing a product three months after a competitor the company is holding 30 % less of the world market in comparison to the market leader. Another benefit of being early on the market is that the product conforms more to the expectations of the market (Stalk, 2003). This is due to the market dynamics. Petersen et al. found that a large portion (26 %) of gathered requirements are already discarded during development. Furthermore, the long lead-time provides a time-window for change requests and rework. The review of literature revealed that, to the best of our knowledge, an empirical analysis of lead-times in incremental and agile development has not been conducted so far. However, as there is an increasing number of companies employing incremental and agile practices it is important to understand lead-time behavior.

Bosire et al. (2011) conducted a study on the impact of outsourcing on lead time and customer services in supermarkets in Nairobi. The study indicates that supermarkets outsource several services such as; marketing and advertising, maintenance, fleet operation etc. The study also reviled the impact of outsourcing on lead time. It established that there is a positive correlation between outsourcing and lead time and those supermarkets that implement the variables manifest customer service management as a strategy to retain customers and remain competitive.

According to Hetzel (1988), forecast errors cause expediting to meet unexpected demand, and the disruption adds to queuing and missed deliveries. The entire supply chain becomes asynchronous with high lead time variability and rising safety stock needs. The cycle time grows even longer, thus forcing a longer forecast horizon and even less forecast accuracy. This type of feedback cycle can grow throughout the organization without a focused effort toward cycle time reduction. Gross and Soriano (1969) demonstrate that lead-time variation has a major impact on lot size and inventory costs. Furthermore, they indicate that an inventory system is more sensitive to lead-time

variation than to demand variation. Variations in lead time can occur for purchased items and for those that are manufactured in-house. A major factor related to these variations is quality problems. Typically, either safety stock or safety lead time is utilized to cushion the impact of this variability. In either case, larger variability requires increased inventories. High lead-time variability is a major reason for a plant's inability to achieve inventory goals and to incur longer average throughput.

3.0 RESEARCH METHODOLOGY

This study used descriptive survey design. The population of this study was all the 45 end user clinics being serviced by Afghan Red Crescent Society. Another population set was the 916 procurement professionals and experts in logistics management. The sampling frame for end users clinic was the list of end user clinics in the database of ARCS. The sampling frame for procurement professionals and experts was the list of contacts in the researcher email database. This study used simple random sampling for selecting 96 respondents (41 end user clinics and 55 experts). This

2.3 Conceptual Framework

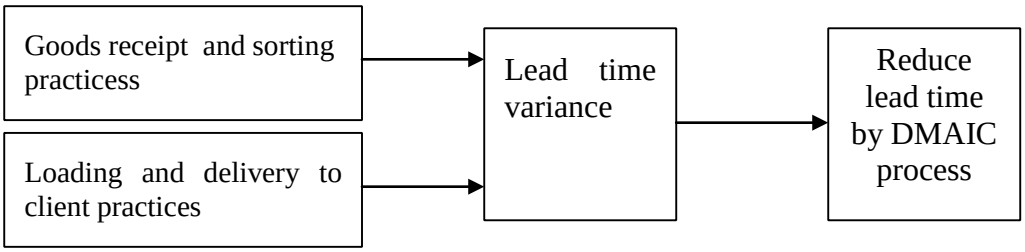

Figure 1: Conceptual framework

study utilised both primary and secondary sources of information which was gathered by use of questionnaires and secondary collection data sheet. The study analysis was done by establishing the lead time of the Requisition stage, Quotation stage, goods receipt and transport stage up to customer (end user clinic). The above lead times were linked through a multivariate regression model to see which of the lead time emanating from various procurement stages contribute more significantly to the lead time data generated from system.

4.0 RESULTS AND DISCUSSIONS

4.1 Response Rate

The number of questionnaires that were administered was 41 to the employees in end users clinics. A total of 33 questionnaires were properly filled and returned which represented an overall successful response rate of 80% as shown on Table 1.

Table 1: Response Rate for End Users

Response Rate	Frequency	Percent
Returned	33	80%
Unreturned	8	20%
Total	41	100%

4.2 Demographic Characteristics

4.2.1 Level of satisfaction of end users

The study sought to find out the level of satisfaction of end users with the actual lead time for some consumable items such as cotton wool. Figure 1 illustrates that 70% of end users were lowly satisfied while 30% were highly satisfied with the actual lead time for consumable goods. The findings imply that the end users felt that the actual lead time could be improved so as to improved service delivery.

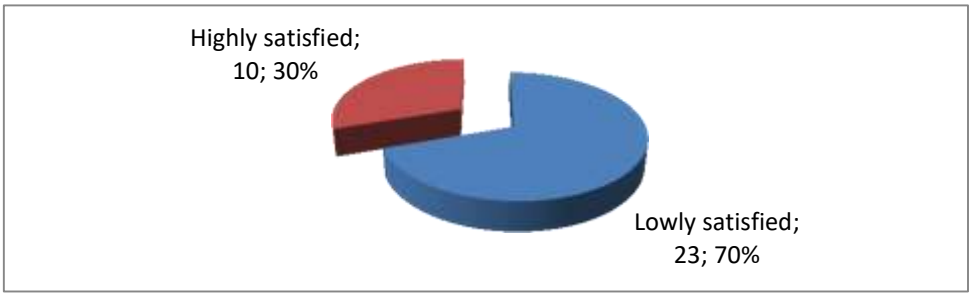

Figure 1: Level of Satisfaction

4.2.2 ACRCS internal process

In regard to question what portion of contribution to the overall lead-time would you attribute to ACRCS internal processes, 76% of the end users indicated between 76% to 100%, while 18% indicated 51 to 75% and 6% indicated between 26 to 50%. The study findings imply that internal processes such as quotation process, LPO generation, goods receipt and loading processes took much time and days hence contributing to deteriorating lead time in procurement process. Results are presented in Figure 3.

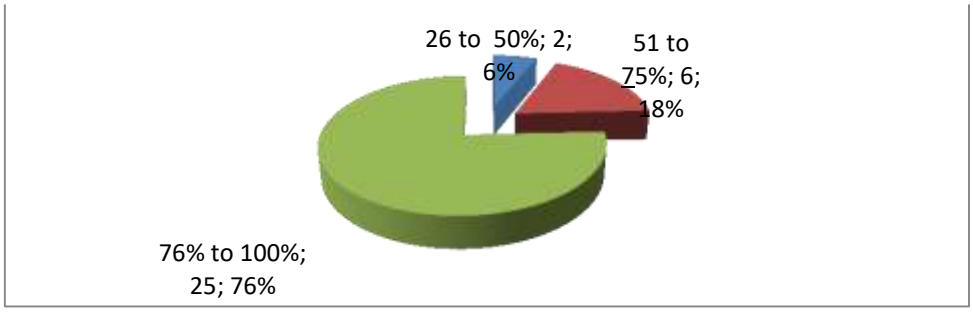

Figure 3: Internal Processes Contribution to Overall Lead Time

4.2.3 Effect of Current Lead Time on End User Clinic Service Delivery

Figure 4 shows that 87.9% of the end users indicated that current lead time affected end user clinic service delivery negatively. This could be attributed to due to many days taken to get goods once the requisition is raised.

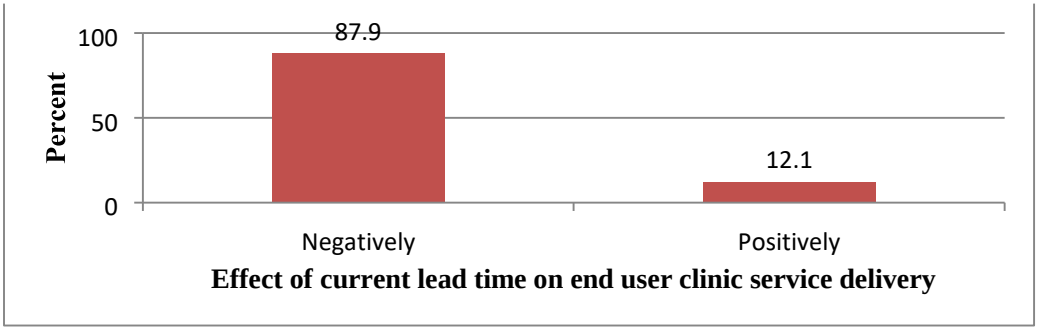

Figure 4: Effect of Current Lead Time on End User Clinic Service Delivery

4.2.4 Effect of Current Lead Time on End User Clinic Processes

Figure 5 shows that 75.8% of the end users indicated that current lead time affected end user clinic processes negatively. This could be attributed to due to many days taken to get goods once the requisition is raised.

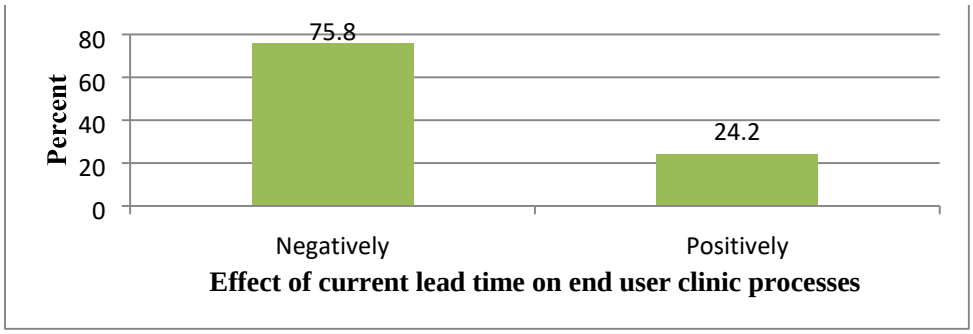

Figure 5: Effect of Current Lead Time on End User Clinic Processes

4.3 Descriptive Statistics

4.3.1Goods Receipt and Sorting Process Lead Time

The study sought to find out the goods receipt and sorting process lead time (the time the process takes to receive all ordered goods once delivered at gate, including offloading, picking and packing, labeling and consigning). Table 6 indicates that it took a maximum of 110 days and a minimum of 55 days for the entire goods receipt and sorting process. The average mean was 72 days to receive all ordered goods once delivered at gate, including offloading, picking and packing, labeling and consigning. The skewness statistics was 1.224 which indicates that the variable was skewed to the right which implies that the goods receipt and sorting process lead time had massive outliers. The standard deviation was 14.189 and a variance of 201.323

Table 6: Goods Receipt and Sorting Process Lead Time Descriptive Analysis

Description	Coefficient
Mean	72.1
Std. Deviation	14.189
Variance	201.323
Skewness	1.224
Kurtosis	0.516
Minimum	55
Maximum	110

The study findings agree with those of Christopher (1992) who asserted thata poorly organized and executed receiving system can put patients at risk and elevate health care costs. For example, if the wrong concentration of a product was received in error, it could lead to a dosing error or delays in patients' receipt of therapy. Misplaced products or products not in stock also jeopardizes the patients' care and increases health care costs. To avoid these unfavorable outcomes, pharmacy technicians should become familiar with the process for receiving and storing pharmaceuticals.

Figure 6 illustrates that the goods receipt and sorting process lead time was not normally distributed but was skewed to the right due to outliers in the number of days to receive all ordered goods once delivered at gate, including offloading, picking and packing, labeling and consigning in different end user clinics.

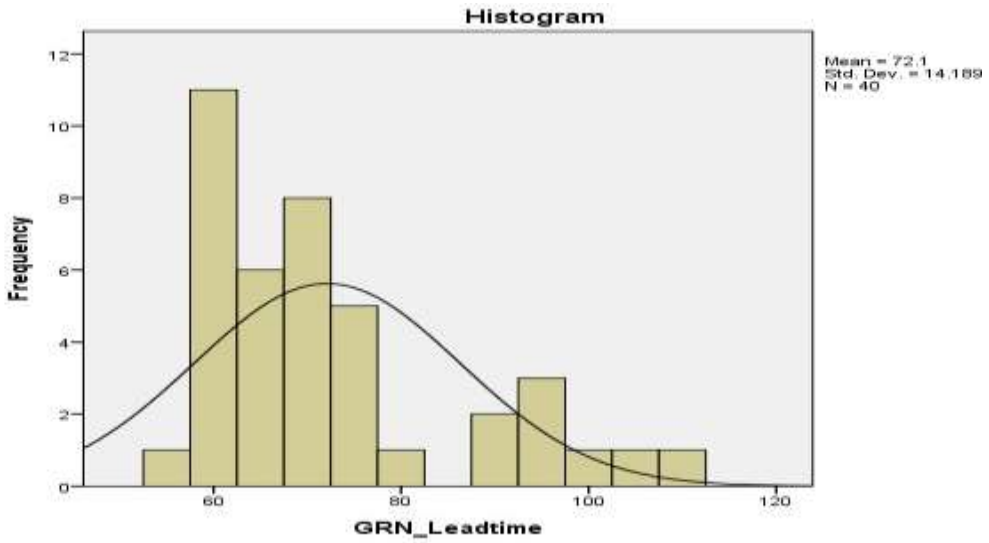

Figure 6: Histogram for Goods Receipt and Sorting Process Lead Time

4.3.2Loading Delivery Lead Time

The study sought to find out the loading and delivery to client lead time that is the time taken to arrange transport including hiring/contracting transport, loading and up to the date goods are delivered to clinic and packing list signed.

Table 7: Loading and Delivery Lead Time Descriptive Analysis

Description	Coefficient
Mean	3.78
Std. Deviation	1.368
Variance	1.871
Skewness	2.581
Kurtosis	6.877
Minimum	3
Maximum	9

Table 7 indicates that it took a maximum of 9 days and a minimum of 3 days for the entire loading and delivery process. The average mean was 3.78 days to arrange transport including hiring/contracting transport, loading and up to the date goods are delivered to clinic and packing list signed. The skewness statistics was 2.581 which indicate that the variable was skewed to the right which implies that the loading and delivery to client lead time had outliers.

Figure 7 illustrates that the loading and delivery to client lead time was not normally distributed but was skewed to the right due to outliers in the number of days to arrange transport including

hiring/contracting transport, loading and up to the date goods are delivered to clinic and packing list signed in different end user clinics.

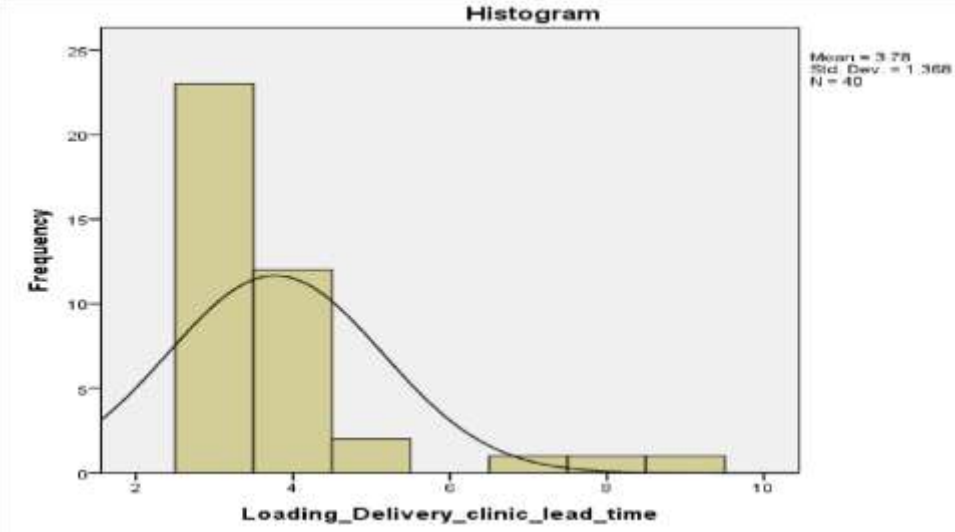

Figure 7: Histogram for Loading Delivery Lead Time

4.4 Inferential Statistics

4.4.1 Bivariate Correlations

Table 8 displays the results of correlation test analysis between the dependent variable (overall lead time) and independent variables and also correlation among the independent variables themselves.

Table 8: Bivariate Correlations

Variable	Time	Overall Lead	Quotation Lead Time	LPO Lead Time	GRN Lead time	Loading Delivery clinic lead time
Overall Lead Time	Pearson Correlation	1				
	Sig. (2-tailed)					
GRN Lead time	Pearson Correlation	0.831**	0.500**	0.247	1	
	Sig. (2tailed)	0.000	0.001	0.125		
Loading Delivery clinic lead time	Pearson Correlation	0.655**	0.344*	0.212	0.600**	1

	Sig. (2tailed)	0.000	0.03	0.19	0.000

Results on Table 8 show that overall lead time was positively correlated with all the independent variables. This reveals that any positive change in quotation lead time, LPO lead time, goods receipt and sorting lead time and loading and delivery lead time was associated with an increased overall lead time in the procurement process.

4.4.2 Regression Analysis

Table 9 shows that the coefficient of determination also called the R square is 82.8%. This means that the combined effect of the predictor variables quotation lead time and LPO lead time explains 82.8% of the variations in overall lead time of end user clinics. The correlation coefficient of 91% indicates that the combined effect of the predictor variables have a strong and positive correlation with overall lead time of end user clinics.

Table 9: Regression Model Fitness

Indicator	Coefficient
R	0.910
R Square	0.828
Std. Error of the Estimate	11.9327

Analysis of variance (ANOVA) on Table 10 shows that the combine effect of quotation lead time, LPO lead time and delivery lead time was statistically significant in explaining changes in overall lead time of end user clinic in ARCS. This is demonstrated by a p value of 0.000 which is less than the acceptance critical value of 0.05. The results indicated that the overall model was significant, that is, the independent variables were good joint explanatory variables/determinants for overall lead time (F=42.254, P value =0.000).

Table 10: Analysis of Variance (ANOVA)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	24066.1	4	6016.52	42.254	0.000
Residual	4983.62	35	142.389		
Total	29049.7	39			

Table 11 displays the regression coefficients of the independent variables. The results reveal quotation lead time was statistically significant in explaining changes in overall lead time of end user clinics. LPO lead time was not significant.

Table 11: Regression Coefficients

Variable	Beta	Std. Error	t	Sig.
Constant	9.54	21.379	0.446	0.658

GRN Lead Time	0.988	0.184	5.38	0.000
Loading Delivery clinic lead time	4.326	1.754	2.467	0.019

5. CONCLUSIONS AND CONTRIBUTION TO POLICY PRACTICE AND THEORY

5.1 Discussion

The third objective of the study was to determine the effect of goods receipt and sorting practicess on inventory management perfomancemeasured through leadtime. Descriptive results indicated that it took a maximum of 110 days and a minimum of 55 days for the entire goods receipt and sorting process. The average mean was 72 days to receive all ordered goods once delivered at gate, including offloading, picking and packing, labeling and consigning. The skewness statistics was 1.224 which indicates that the variable was skewed to the right which implies that the goods receipt and sorting process lead time had massive outliers. Regression results indicated that the relationship between goods receipt and sorting lead time and overall lead time was positive and significant (b1= 0.988, p value, 0.000). This implies that an increase in goods receipt and sorting lead time by 1 unit leads to an increased overall lead time by 0.988 units.

The fourth and final objective of the study was to establish the effect loading and delivery to client practices on inventory management perfomance measured through leadtime. The study findings indicated that it took a maximum of 9 days and a minimum of 3 days for the entire loading and delivery process. The average mean was 3.78 days to arrange transport including hiring/contracting transport, loading and up to the date goods are delivered to clinic and packing list signed. The skewness statistics was 2.581 which indicate that the variable was skewed to the right which implies that the loading and delivery to client lead time had outliers. Regression results revealed that loading and delivery to client practices was statistically significant in explaining overall lead time. The relationship between loading and delivery to client practices and overall lead time was positive and significant (b1= 4.326, p value, 0.019). This implies that an increase in loading and delivery to client practices lead time by 1 unit leads to an increased overall lead time by 4.326 units.

5.2 Conclusions

From the study, it was possible to conclude that there was high lead time in Afghan Red Crescent Society Medical Supply Chain. This may could be have been attributed to by the delays in the procurement processes since the requisition stage to the day of delivery and receipt to the end users.

Goods receipt and sorting process and loading and delivery processes were found to be a key determinant in explaining overall lead time in Afghan Red Crescent Society Medical Supply Chain. It was therefore possible to conclude that the supply chain for ARCS was vulnerable and needed to be managed effectively to reduce the lead time in the procurement process. Results also led to the conclusion that there were no well laid procedures and policies that could address the amount of time to be taken from one process to the other.

5.3 Recommendations

The lead time reduction on inventory system has attracted more and more attention and many researchers have conducted extensive studies in this area. Lead time can be reduced at an added crashing cost which means that it is controllable. By shortening the lead time, it was found that safety stock can be lowered, reduce the loss caused by stock out, improve the service level to the

customer, and increase the competitive ability in business. It is therefore recommended to the management of ARCS to embrace strategies that can lead to reduction of lead time such as vendor managed inventory which enables the customer's partnership channel to be more efficient due to better planning coordination, reduced needs for inventories with increased sales by focusing on selling what end-customer wants.

REFERENCES

Bratthall, L., Runeson, P., Adelsw¨ard, K., Eriksson, W. (2000). A survey of lead-timechallenges in the development and evolution of distributed real-time systems. Information& Software Technology 42(13), 947–958 (2000)

Carreira, B. (2005). Lean manufacturing that works: powerful tools for dramatically reducingwaste and maximizing profits. American Management Association, NewYork (2005)

Gross, D.& Soriano, A. (1969). The *effect of reducing lead time on inventory level-simulation analysis, Management Science, vol. 16, pp. B61–B76.*

Hetzel, W. (1988).*Cycle Time Reduction and Strategic Inventory Placement across a Multistage Process. Massachusetts Institute of Technology*

Kowalski, (2009). Supply management orientation and supplier/buyer performance, *Journal of Operations Management*, Vol. 18 No. 3, pp. 317-33

Nordas, H. K., Pinali, E. &Geloso, G. M. (2006). Logistics and Time as a Trade Barrier, *OECD Trade Policy Working Papers*, No. 35, OECD Publishing. Doi:10.1787/664220308873 on Safety Stocks. *Decision Sciences Volume 35 Number 1 Performance through Enterprise Logistics Management*, Oliver Wight, Brattleboro, VT. Pp. 29-31.

Pearson, J.N., Ellram, L.M.&Carter, C.R. (1996). Hybrid stockless: a case study: lessons for supply chain integration, *International Journal of Operations & Production Management*, Vol. 22 No. 4, pp. 412-24.

Petersen, K., Wohlin, C. (2009). A comparison of issues and advantages in agile andincremental development between state of the art and an industrial case.Journalof Systems and Software 82(9) (2009)

Rivard and Royer et al., (2002). Innovation generation in supply chain relationships: a conceptual model and research propositions, *Journal of the Academy of Marketing Science*, Vol. 32 No. 1, pp. 61-79.

Schneller, Eugene S. and Smeltzer, Larry R. (2006).*Strategic Management of the Health Care Supply Chain.*San Francisco, CA: Josey-Bass

Singh, et al., (2006). Supply management orientation and supplier/buyer performance, *Journal of Operations Management*, Vol. 18 No. 3, pp. 317-33.

Stevenson, W. J. and Hojati, M. (2004). Operations management (2nd ed.). Canada: McGrawHill Ryerson Higher Education.

Teece (2007). Explication dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13) pp. 13101350.

Whybark, D. C. , Steven, A. M. &Jamison, D. (2010). Disaster Relief Supply ChainManagement: New Realities, Management Challenges, Emerging Opportunities, *Decision Line*,no. 5, pp. 4–7, 2010.