

REVERSE LOGISTICS PRACTICES IN PHARMACEUTICAL MANUFACTURING INDUSTRY: EXPERIENCES FROM GHANA

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ABSTRACT

This paper examines reverse logistics practices in the pharmaceutical manufacturing industry in Ghana. The sample were selected on hierarchical levels using stratified sampling methods. With a 100% response rate, data gathered from both primary and secondary sources were analyzed using quantitative and qualitative techniques. The research revealed a gap in the flow of reverse logistic activities; from drug returns to its disposal. Most returns were from wholesalers with the end consumer playing little or no role. Drugs were frequently disposed of by burning in open containers or through open uncontrolled nonengineering dumps. However such practices are recommended as a last resort in the extant literature. We recommend adoption of an enterprise system such as enterprise resource planning (ERP) for drugs reverse logistics activities and implementation of an efficient method for drug disposal by pharmaceutical manufacturing companies in Ghana.

JEL: M11, M19, I10

KEYWORDS: Reverse Logistics, Supply Chain, Waste Disposal, Pharmaceutical Industry, Ghana

INTRODUCTION

Recently, considerable attention has been given to the study of reverse logistics in the pharmaceutical manufacturing industry. Ample time and resources are now being devoted to the understanding of reverse logistics practices by companies who previously did not do so. Almost all businesses must deal with some nature of return due to issues of marketing returns, quality problems, overstock, goods brought back for refurbishing or re-manufacturing. Learning to manage reverse flow is of key importance for various industries since return rates differ significantly from business to business (Rogers and Tibben-Lembke, 2001).

Reverse logistics involves the collection of goods from end consumers, sorting of the goods received, disposal of goods and retrieval of components at various stages in the supply chain and remanufacturing processes (Bhavin, 2010). Various reasons such as warranty failures, incorrect product orders or shipment, damaged products, product recalls, reusable packaging materials and product upgrading account for reverse flow (Kabir, 2013). In the pharmaceutical industry, reasons for product returns are often associated with damages and product expiry, counterfeits, product recalls and clinical trial recoveries (Bhavin, 2010). Issues of temperature excursion and product expiry are often not evidenced in Ghana and can cause losses and negative side effects. For instance temperature excursions can reduce effectiveness, reduce shelf life, or alter the potency of a drug and make it harmful. Counterfeit and stolen product continue to be a major threat

in the pharmaceutical manufacturing industry (World Health Organization, 2010). Improper management of returned drugs can involve rerouting into the black market and relabeled for sale or disposed of into sewerage and landfill. This would have negative impact on the health of the people and the environment in the long term. Another aspect has to do with securing and proper disposal of returned products. Thus, it is increasingly important to implement an improved reverse logistical chain to provide a cost effective, tract and trace options for the pharmaceutical supply chain.

The remainder of this paper is organized as follows: The next section examines literature on reverse logistics practices. The subsequent section briefly describes the methodology employed, outline and analyzed results obtained from the data. The final part of this paper will discuss the conclusion and recommendation respectively.

LITERATURE REVIEW

The success of any industry in today's highly competitive business environment depends to a large extent on supply chain effectiveness. Competition has extended from business to business to competition between supply chains (Anindya, 2003). Supply chain describes all direct and indirect parties who comes together to fulfill a customer's needs (Chopra and Meindl 2007). Management understands that mistakes from any member of the supply chain can affect the operation and profitability of the organization. Reuse of material is a common practice in supply chains. However, the backward or reverse supply chain has long been overlooked by some companies. Such reverse supply chain is referred to as reverse logistics.

Originally reverse logistics was defined as the process of recapturing value through planning, implementing and controlling effective and efficient flow of materials from customer's end towards the origin (Murphy and Poist, 1989; Kroon and Vrijens, 1995). A more environmental oriented definition was given by some authors describing it as a process of becoming environmentally efficient through recycling, waste disposal, reusing material and material reduction (Stock 1998; Carter and Ellram, 1998, Giuntini and Andel 1995). This is considered green logistics by others (Rogers and Timben-lembke, 1999). Most of these definitions focus on the return process but reverse logistics is more recently defined as the management of assets across various industries and disciplines. This does not only focus on the returns process but on other areas such as order fulfillment, customer service, parts management and end of life manufacturing (Pinna and Carrus, 2012). According to De Brito and Dekker, 2004, four perspectives need to be considered in analyzing the reverse logistics process; the "Why" referring to the reverse logistics driving force; the "What" describing the product type, the "How" in reference to the recovery process and the "Who" referring to the facilitators of the reverse.

The nature of work in this industry differs from other manufacturing industries as such, products returned and retrieved in times of reverse logistics are seldom repaired or resold but instead destroyed and disposed-off properly (Kabir, 2013). Blumberg in 2008 indicated that the general direction of global pharmaceutical reverse comprises recall management, disposal & destruction, Asset recovery & liquidation, Rebalancing & restocking of products as well as Optimization of transportation & shipping costs. The ability to track, retrieve and manage return product in the entire supply chain is of prime importance in the pharmaceutical manufacturing sector. Lots of pharmaceutical products are unable to be recovered in times of reverse logistics. It was estimated that only 3-4 % of pharmaceutical products are returned to manufacturer for disposal (Sartori, 2010).

Majority of pharmaceutical reverse logistics concerns deal with counterfeit and drug expiry, low shelf live, unscrupulous mediators and improper disposal of unused and unwanted pharmaceuticals (Kan and Subzwari, 2009). It has been estimated that in developed countries approximately 1% of pharmaceutical trade involves counterfeit drugs. This ranges from 30% to 40% in developing countries (World Health Organization, 2010). Also 80% of waterways tested in the USA showed traces of common medication

(Amporful, 2012). In Ghana, 20% of chronic diseases like kidney disorders have been attributed to the intake of expired drugs (Addo, 2005). Due to this, a lot of consideration is taken into account with reverse activities in pharmaceutical manufacturing industry, among these include; accurate tracking and visibility, batches and expiry control, cold chain requirements, proper storage and disposal.

DATA AND METHODOLOGY

The population for the study included managers, assistant managers, supervisors and staffs of pharmaceutical manufacturing companies in Ghana. The total sample size was fifty-two respondents. Qualitative and quantitative tools were applied in collection, processing and analyzing the data. To ensure the representative of various departmental members, stratified sampling was used to categorize the population into four strata based on hierarchical levels as follows; managerial level, deputy managerial level, supervisory level and staff level. The data collection methods employed was questionnaires and personal interview. The questionnaire was comprised of both closed and open-ended questions and was self administered. Key informants were interviewed using structured and semi- structured questionnaire. The study also sourced data from secondary sources such as journals, research books and the internet. The data was collected in May 2013 using the cross sectional method.

RESULTS AND DISCUSSION

Respondent View on Product Returns

Table 1 shows, 96.154 % respondents answered yes to the fact that drugs were allowed to be returned to their company whereas 3.846% answered no, indicating a high level of knowledge in reverse logistics processes with regard to drug returns. When respondents were asked about the frequency of drug returns, 57.692% of respondent stated that drugs were returned when the need arose; 1.923% answered daily, 3.846% said weekly, 7.692% said monthly, 5.769% answered quarterly, 15.385% answered annually and 7.692% respondents had no knowledge. When a follow up question was asked to ascertain the reason for return of the drugs, 65.385% of the responses stated reason of damage to the drug content or its package. 9.615% shared similar response but added that, drugs are sometimes ordered for recall from the market by the Food and Drugs Board (FDB). In addition, 3.846 % of respondents stated that, aside from FDB mandatory orders, drugs are mostly returned when their life span was exceeded (expired). An additional 3.846% ascribed drug return to expiry only. 3.846% said it was solely due to FDB order. The remaining 13.461% gave other reasons, among which include 1.) Damaged drug/package and expired drugs, 2) Damage drug/package and temperature excursion damages, 3) Temperature excursion damages only, 4) Wrong shipment only, 5) Wrong shipment and FDB order, 6) Wrong shipment and expired drugs.

The respondents view indicates that, drug returns were dependent on prevailing circumstances. Nevertheless, it could be deduced that, damage to drug contents or its package were noticeable to most customers and hence triggered returns as opposed to temperature excursion damages and drug expiry. In responding to the question about which partner(s) often returned the drugs, 44.231% of respondents revealed that drugs were mostly returned by wholesalers. 25% said by retailers; 19.231% opined that both wholesaler and retailer returned drugs while 11.538% of the respondent had no prior knowledge. This meant any partner of the chain, aside from the end consumer is allowed to returned drugs. This could be attributed to the fact that most pharmacies do not accept prescription drug returns as it is illegal to dispense such drugs (Greenberg, 1988). The integrity of the returned prescription drugs cannot be guaranteed hence once received and must be destroyed. Moreover, it can be attributed to the fact that end users usually do not receive refund for drug returns, hence are not compelled to return.

Table 1: Respondents View on Product Returns

	Frequency	Percentage	Cumulative Percent
Are products allowed to be returned to the organization			
Yes	50	96.154	96.154
No	2	3.846	100
Total	52	100	
How often are product returned	1	1.022	1.022
Daily	1	1.923	1.923
Weekly	2	3.846	5.769
Monthly	4	/.692	13.461
Quarterly	3	5.769	19.230
Annually	8	15.385	34.615
Other reasons	34	65.385	100
Totals	52	100	
What reason account for the return of products			
Damage to product/ package (A)	34	65 385	65 385
Wrong shipment (B)	1	1.923	67.308
Expired drugs(C)	2	3.846	71.154
FDB order(D)	2	3.846	75.000
Temperature excursion damages (E)	1	1 923	76 923
Wrong shipment & expired drugs (B and C)	1	1 923	78 846
Damage product/package & expired product (A and C)	2	3 846	82.692
Damage product/package & FDB order (A and D)	5	9.615	92.307
Damage product/package & temperature excursion damages (A and E)	1	1 923	94 230
Wrong shipment and FDB order (B and D)	1	1 923	96 153
Expired drugs and EDB order (B and D)	2	3 846	100
Total	52	100	100
	0-	100	
Which partner(s) often return products			
Wholesalers	23	44.231	44.231
Retailers	13	25.000	69.231
Wholesalers and Retailers	10	19.231	88.462
No fore knowledge	6	11.538	100
Total	52	100	

The table shows respondent views on reason for product return, how often products are return and partners of the chain that often return product. The various question respondents were asked are presented in the first column. The subsequent columns consist of the various frequencies, their percentage and cumulative percent obtain from their responses

Respondent Views on How Companies Obtain and Dispose of Returned Drugs

Table 2 shows results of how companies obtain and dispose of returned drugs. The results show companies received such returns 75% of respondents stated that the department responsible goes for the drug when notified. Some 9.615% of respondents said drugs are sent to a central location point provided by company. Another 3.846% stated by retailers and 5.769% noted the drugs are returned by the wholesalers. Some 3.846% stated drugs were returned by both the retailers and wholesalers.

Another 1.923% of respondent stated that drugs sale/marketing department goes for it or it is returned by the wholesaler. This implied that companies have a system to receive return drugs and also bore most of the cost during drug return confirming why 75% of the respondents chose that answer. The respondents further indicated that aside from the above reasons, their company also resorted to drug recalls when a drug exceeded its shelf live. The reason was to protect the product brand and build customer loyalty. When respondents were asked of other means by which their company could receive the drugs, (56%) stated that their company could have a central designated location where the entire drug will be deposited and collected by the company. Another 20% stated that all drugs could be sent to the wholesales' end to enable the company to collect directly from them (16%) said drug could be collected on a daily basis. Another 4% suggested the use of the media as a medium to inform and collect drugs from the customers the company deals with.

Table 2: How Does the Company Obtain Returned Drugs?

Channels	Frequency	Percentage	Cumulative Percent
the product are sent to a central location point provided by the company (A)	5	9.615	9.615
The department responsible go for the product when notified (B)	39	75.000	84.615
Product are returned by wholesalers(C)	3	5.769	90.384
Product are returned by Retailers(D)	2	3.846	94.230
The department responsible go for the product when notified & product are returned by wholesalers (B and C)	1	1.923	96.153
Product are returned by wholesalers & retailers (C and D)	2	3.846	100
Total	52	100	
What disposal method(s) is/are used to handle expired drugs			
Burning (A)	38	73.077	73.077
Landfill (B)	4	7.692	80.769
Incineration (C)	1	1.923	82.692
Sewer (D)	1	1.923	84.615
Burning and landfill (A and B)	3	5.769	90.384
Landfill and Incineration(B and C)	2	3.846	94.230
Burning and Incineration (A and C)	2	3.846	98.076
Landfill and sewer (B and D)	1	1.923	100
Total	52	100	
What disposal method(s) is/are used to handle damage drugs			
Recycle(A)	18	34.615	34.615
Salvages(B)	9	17.308	51.923
Landfill(C)	6	11.538	63.461
Burning (D)	14	26.923	90.384
Landfill and salvage (B and C)	5	9.615	100
Total	52	100	
What method(s) are employed for wrong shipments			
Re-deliver	49	94.231	94.231
Donate	1	1.923	96.154
No fore-knowledge	2	3.846	100
Total	52	100	

The table describes respondents view on the method(s) used to dispose of expired, damaged, and wrongly shipped drugs. The column labeled methods employed represent the methods used. The corresponding frequency, percent and cumulative frequency of various responses to method employed is depicted in the next three columns

Some 73.077% of respondents stated that, expired drugs are disposed through burning. Landfill was given by 7.692% of the respondents. "Burning and Landfill" was given by 5.769% of the respondents. Besides this, "Burning and Incineration", "Landfill and Incineration" as well as "landfill and sewer" were given by 9.615%. The remaining 3.846% gave other methods such as only "Incineration" and "sewer" as depicted in Table 2. In answering the reason for the chosen methods above, 34.615% out of the 73.077% respondents who chose burning stated it prevents theft and drugs being consumed by third parties. Preventing the drug from entering the production floor was given as a reason by 11.538% respondents and 7.692% respondents said burning completely destroys the drug avoiding residue. However, 19.231% said it was the only option available but hope to use better mechanisms in the near future. Some 5.769% out of the 7.692% respondents who chose landfill method for disposing expired drugs was the best option available. All the 7.692% respondents who chose "Burning and Incineration" as well as "Landfill and Incineration" gave reason of total destruction of drugs avoiding any remains. A total of 11.539% had no idea about why such methods were used.

The survey confirms that, incineration which is better than burning in the open air is hardly used by the companies. The use of burning can be attributed to the cost involved in the use of incineration. Even though

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incineration prevents the release of toxic pollutants, it is economically expensive and hence is rarely used by developing countries (Salah, 2010; World Health Organization 1999).

By our analysis of the data collected, 34.615% of respondents stated their company recycles damaged drugs. 17.308% said their company salvages damaged drugs. Landfill was given by 11.538% respondents. 9.615% respondents stated that the company adopt "Landfill and Salvage" and 26.923% said burning was used for damaged drugs. Some 21.154% out of the 34.615% responded who choose recycling specified that active ingredient of the damage drug can be reused. The remaining 13% said recycling saves their company cost. All 17.308% respondents who chose salvage specified that not all damaged drugs could be recycled hence the need to select the good from the bad. Some 7.692% out of the 11.538% respondents who chose landfill gave reasons of preventing air pollution while the remaining 3.846% of the respondents said they had no ideas of the reason for such method. The 9.615% respondents who chose (landfill and salvage) stated that damaged drugs due to package were sorted out and repackaged while those due to the drug itself were destroyed by landfill. All 26.923% who choose burning stated damage product could not be recycled hence needs to be burnt thoroughly.

Concerning disposal options, a majority of respondents (94.231%) said their company re-delivers the drug to the rightful customer. Some 1.923% said the company donates and 3.846% said their company recycles. In answering the reason for the chosen methods, all respondents 94.231% who chose "re-deliver" stated that the drug was not faulty in any way. The remaining 5.769% respondents who chose donate and recycle had no idea of why such methods were used.

Respondent View on Disposal of Drugs by Partner of the Chain

This part of the questionnaire was to solicit the role of partners in drug disposal. A mean of 4.3077 obtained from the assessment showed respondent disagreement to the statement. The standard deviation of 0.98097 showed the proximity of various responses to each other as shown in Table 3 below. Most respondent were of the view that disposal of drugs should be the sole responsibility of the manufacturing company. Despite these revelations, drug manufacturing companies had little control on disposal of drug after sale to subsequent partners of the chain. This explains why many agencies, such as FDB, Drug Association often offer consumer help on appropriate disposal of drug. Many of such documents are made available for customers view.

Table 3: Should Disposal of Drugs Be Done by Any Partner of the Supply Chain

Frequency	Minimum	Maximum	Mean	Standard deviation
52	1.00	5.00	4.3077	0.98097

The table presents overall result on respondent view on disposal of drugs should be done by any partner of the chain. The first column represents the total number of responses. The subsequent columns represent the minimum and maximum responses as well as the mean responses and the deviation from the mean. The result of the table was obtained using the variable following variable weight: 1 = "Strongly Agree"; 2 = "Agree"; 3 = "Neutral"; 4 = "Disagree"; and 5 = "Strongly Disagree". This depicted a strong disagreement to the statement.

Respondent Views on Difficulty with Reverse Logistics Practices

Asked if the company experiences any form of theft or pilferage in the course of returning drugs, 59.615% of respondents were uncertain. 38.462% of respondents stated no, that such incidents do not occur when returning drugs. Only 1.923% said yes that such incidents do occur. A follow up question asked about measures put in place to curb incidents, the respondent said strict supervision has been put in place to mitigate this problem. In responding to the question of whether drugs get damaged in the course of transporting them back to the company as a result of wrong shipment, 48.077% of the respondents said no whilst 3.8% respondents answered yes to the question. However, 48.077% were not sure if drug gets damaged when being returned. Combined, this indicates that theft and pilferage barely happen when

returning drug. This can be attributed to tight security and supervision.

Table 4:	Theft	and	Damage	Challenges	with	Regard to	Returned	Drugs	Management
				0		0			

	Frequency	Percentage	Cumulative Percent
Does the company experience theft in the course of managing the returned			
drugs			
Yes	1	1.923	1.923
No	20	38.462	40.385
Not sure	31	59.615	100
Total	52	100	
Does drugs get damage when returning wrong shipments			
Yes	2	3.846	3.846
No	25	48.077	51.923
Not sure	25	48.077	100
Total	52	100	

The table shows respondent views on returned drug management with regards to theft and damages. The various question respondents were asked are presented in the first column. The subsequent columns consist of the various frequencies, their percentage and cumulative percent obtain from responses to the question in the first column.

Challenges Companies Face in Practicing Reverse Logistics

In responding to the challenges faced by companies practicing reverse logistics, half of respondents stated the expense to be a major challenge their company faces. Time consuming was also given by 21.154% of the respondents as a challenge. Furthermore, 15.385% specified that practicing reverse logistics requires extra work. Some 5.769% of respondents were not sure of any other challenges that their company faces. The remaining four, 7.692%, of respondents answered that not all drugs are able to be obtain in time of reverse logistics. An overall assessment on reverse logistics challenge was also carried using the likert scale in Table 5. A 1.981 mean of mean was obtained implying an overall agreement to the statement. A mean of the standard deviation of 0.814 further gives indication of the proximity of the various responses to each other. In other words, the responses are clustered around the mean of 1.981 as depicted in Table 5.

The general views of the respondents suggest that the cost of collecting and disposing of drugs is expensive. This is depicted in Table 5 by a mean of 2.00. Analysis of answers from respondents was clustered around the mean. A standard deviation of 0.758 was obtained. These showed the proximity of various responses to each other. Furthermore, respondents viewed the cost of disposing drugs as more expensive (mean of 1.8846) compared to the cost of collection and returning the drugs (mean of 2.1154). Respondents noted that even though reverse logistics is a drain on their organization's resources, it is also of great importance to the organization. This assertion is ably depicted by a mean of 1.5962 and standard deviation of 0.79852 in Table 5.

Management Measures Put in Place to Improve Reverse Logistics Practices

Some 40.385% of respondent's specified management ensures that staff members who collect drugs from the market were well trained and equipped to handle the return of drug effectively and efficiently. Also tightening of inspection to ensure proper supervision and prevent theft was affirmed by 19.231% of respondents to be another measure put in place by management. Some 15.385% answered that their company ensures proper bar coding of every drug to enable easy recall. Furthermore, 9.615% of the respondents said their company maintains good customer relationships to enable easy communication and recall. While 9.615% said they had no idea of the measures put in place by management to improve reverse logistics activities.

Table 5: Res	spondent	View on	Reverse	Logistics	Challenges

	Frequency	Minimum	Maximum	Mean	Standard deviation
Reverse logistics is difficult to practice	52	1.00	5.00	2.1731	0.87942
Reverse logistics affects your finance	52	1.00	5.00	1.7885	0.74981
Mean of mean/mean of standard deviation	an/mean of standard deviation 1.9808 0.81				0.814615
Respondent view on cost of collecting and dispos	sing of				
It is very costly to collect and return drugs sold	52	1.00	5.00	2.1154	0.73174
It is very costly to dispose of drugs	52	1.00	5.00	1.8846	0.7835
Mean of mean/mean of standard deviation				2	0.758
Reverse logistics is important to my company	52	1.00	5.00	1.5962	0.79852

The table presents overall result on respondent view on challenges with reverse logistics practices and its importance to the companies. The question respondents were asked is presented in the first column together with the mean of means and mean of standard deviation. The subsequent columns represent the minimum and maximum responses as well as the mean responses and its deviation from the mean. The result of the table was obtained using the variable following variable weight: 1 = "Strongly Agree"; 2 = "Agree"; 3 = "Neutral"; 4 = "Disagree"; and 5 = "Strongly Disagree". This depicted a strong disagreement to the statement

CONCLUSION

This research examined reverse logistics practices in the pharmaceutical manufacturing industry using the mixed method approach (quantitative and qualitative) to gather primary data. With a response rate of 100%, data gathered was analyzed descriptively. Findings from the study revealed the companies have a system in place to aid in tracking and collecting drugs. Several reasons accounted for the return of products with damage products or packages accounting for the most returns. Among the companies supply chain partners, the wholesalers often return the product and collection of the return product was done solely by the marketing department which was responsible for the sale of the product. The literature review and primary data showed that reverse logistics is difficult to practice in the sense that, it was time consuming and negatively affecting the finances of the company. Also it was labor intensive since personnel that could have been used for other productive activities were deployed for the collection of products. Despite this, companies held reverse logistics in high esteem and this was attributed to the fact that, failure to engage in this practice results in loss of goodwill and customer loyalty and can also wreck the life of the company's customers and the environment at large. The companies also primarily disposed of expired drugs by burning in the open air with a major reason of total destruction of drugs component even though such methods were recommended as a method of last resort. This was attributed to cost factors which affect the effective implementation of appropriate disposal methods and the acquisition of IT software such as Enterprise Resource Planning (ERP) system, to enable the companies operate efficiently. We could not involve consumers in the research. Thus, this research lacks the input of consumers. We would therefore recommend that future research examine the views of retailers and consumers. This comparison will depict the actual picture of reverse logistics practices of the various actors in the pharmaceutical manufacturing supply chain.

The researchers recommend that companies should provide a central location point for the collection of returned product. This will reduce the costs involved in collecting drugs from multiple locations and saves time for other productive activities. Instead of burning drugs in the open air, we recommend the use incineration for the disposal of drugs. Incineration helps destroy toxic pollutants completely and prevent such toxic emission getting into the atmosphere. The use of incineration will also prevent the outbreak of fire. ERP system should be adopted in managing the return of products. Such a method will enable the company to gain insight and visibility into the supply chain activities taking place at distance customer location. This will help the companies better track the sold product to enable easy recall.

The companies could also introduce instance pressure-sensitive temperature indicators which enables labels integrate phase-change chemistry to irreversibly change color and provide a visual indication that thermal

parameters are being breeched. With this, the drug can be easily detected and the necessary action taken. The companies could also come out with a drug "take back day" program which can be organized periodically to enable drugs that are no longer needed by the customer or drugs that have expired to be collected from the market. Such programs can also be used to educate the consumers on the effect of improper disposal and consumption of expired drugs.

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