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Investigating into factors accounting for the effective implementation of reverse logistics in Ghana

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Abstract
The purpose of this study is to investigate into factors accounting for the effective implementation of reverse logistics (RL) in Ghana. The study further tries to determine the level of effective implementation of reverse logistics program in selected organizations and assesses the impact of environmental legislation, availability of infrastructure, economic implication and the level of stakeholder awareness on the effective implementation of reverse logistics program.
The study reveals that the level of effective implementation of RL in Ghana was moderate. It was also reveals that, environmental legislation, availability of infrastructure has a significantly positive impact on effective implementation of reverse logistics, while economic implication and level of stakeholder awareness have a significantly negative impact on the effective implementation of reverse logistics program.
It is recommended that firms should automate their reverse logistics program in order to reduce cost in the long run. It is also recommended that the environmental Protection Agency (EPA) must strictly enforce RL laws to protect our environment. Finally, it is recommended that RL infrastructure should be provided or subsidized by government in order to increase the adoption and effective implementation of the program.

Keywords: reverse logistics, environmental legislation, availability of infrastructure, economic implication and the level of stakeholder awareness

1. Introduction
Undisputedly, firms are competing to have urges over rivals and gain customer loyalty. Competition these days no longer directly exist between companies but between supply chains. The most responsive and resilient supply chain gains a competitive urge in the business environment. This has given rise to the emergence the concept of reverse logistics.

The European Working Group on Reverse Logistics (RevLog, 2002) describes reverse logistics as "the process of planning, implementing and controlling the flows of raw materials, in process inventory, and finished goods, from a manufacturing, distribution or usage point to a point of proper disposal". More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics. (Robinson A. 2014) [51].

Growing concerns about environmental issues, legislations and regulations, rapid technological changes have aroused the attention of the corporate environment on reverse logistic practices. Manufacturers are now not only focusing on forward logistics but reverse logistics in order to satisfy customers and gain their loyalty. It is disturbing to note that, manufacturers have come to appreciate the importance and benefits of reverse logistics yet find it difficult to implement and manage reverse logistics practices. (Gunasekaran & Spalanzani, 2011; Fernandez, Kalcsics, Nickel, & Rios-Mercado, 2010; Tsai, Chou, & Hsu, 2009) [31, 22, 66].

Many researchers have written literature on reverse logistics which reveals that a firm's reverse logistics programs are affected by sincere commitment to environmental issues and successful implemented ethical standards, availability of policy entrepreneurs who have strong commitment and take personal responsibility to ensure that the organization becomes environmentally friendly.

2. Problem Statement
The increase in awareness on environmental issues and the benefit of recycling places more pressure on corporations or firms to create a better reverse logistics program or strategy. Firms complying with environmental protection regulations gain goodwill, satisfaction or corporate citizenship among their customers (Leite, 2009) [40]. Despite these benefits associated with effective implementation of revesrse logistics, only few manufacturing companies in Ghana are effectively implementing this program.

Many literature and research work talking about the need for reverse logistics have been done but only a few have actually focused on investigating the factors accounting for effective implementation of the concept in Ghana. As a result, reverse logistics is yet not widely accepted in Ghana because of the barriers for its successful implementation. It is visible that more companies are interested in the development of reverse logistics processes, but not even 20% of examinees are implementing those activities. Pollution index of Ghana was estimated to be 97.85% in the mid 2016 at numbero.com. This affirms that the Ghanaian environment is gradually becoming unhealthy for living things due to the minimal attention on the environment. This scenario has contributed to the creation of packaging and electronic waste such as plastics, rubbers, televisions etc.

Some of the barriers that hinder successful implementation of reverse logistic in Ghana include; lack of systems and infrastructure, lack of strict monitoring and checking by regulatory bodies, financial resources, personal resources, and

company policies. It is a risky endeavor for the top management as it involves financial and operational issues which determine the performance of the company in the long run. The barriers mentioned not only affect the operations of reverse logistics but are also interlinked. (Price water coopers' report, 2008) [46].

3. Research Objectives

The *main* objective of the study is to investigate into the factors accounting for effective implementation of reverse logistics. However, this research intends to achieve the following specific objectives;

1. To determine the level of effective implementation of reverse logistics program in the selected organisations
2. To assess the impact of environmental legislation, economic implication, availability of infrastructure and the level of stakeholders awarenesson the effective implementation of reverse logistics program.

4. Research Questions

The following research questions will be posed for the purpose of this study;

1. What is the level of effective implementation of reverse logistics program in the selected organisations?
2. What is the impact of environmental legislation, availability of infrastructure, economic implication and the level of stakeholder awareness on the effective implementation of reverse logistics program?

5. Review of Literature

5.1 The Concept of Reverse Logistics

Reverse logistics can be defined as the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal(Rogers & Tibben-Lembke, An overview of reverse logistics practices, 2001) [54]. However in recent years, a number of definitions have emerged. The Reverse Logistics Association, (2009) refer to reverse logistics as "all activity associated with a product/service after the point of sale; the ultimate goal is to optimize or make more efficient aftermarket activity, thus saving money and environmental resources". Robinson (2014) [51] also defined reverse logistics as "the process of planning, implementing and controlling the efficient and cost effective flow of raw materials, in-process inventory, finished goods and the related information flow from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal."

The division of logistics into forward and backward has begun and is highlighting the benefit of providing reverse logistics activities with excellence. Even though there is priority in distribution logistics, the tendency is to handle returns quickly and efficiently because of the ability of returned product losing its value when unnecessarily retained in reverse logistics chain. After returning a product in a company, the firm has many options, depending on which reverse logistics channel included in the company's chains. Some of those channels are return to supplier, sell through outlet store, resell, remanufacture, re furbish, landfill, etc. Recapture value or proper disposal are two main channels in reverse logistics. When implementing reverse logistics activities, managers in companies often mistakenly believe that outbound operations can also handle returns simply by running everything in reverse (Rogic, Babic, & Bajor, Analysis of Reverse logistics on the Croatian Market, 2012) [57].

Reverse logistics operations must manage a number of unique functions that are not included in outbound operations: collection of outdated, unwanted or damaged products as well as packaging. Except perfectly organized activities that must be created based on the company's needs, a good and effective reverse logistics must provide information system that will follow existing program to reduce cost (Rogers & Tibben-Lembke, An overview of reverse logistics practices, 2001) [54]. The ultimate goal of these activities is to recapture value from waste and used products and to divert end-of-life products away from landfill (Schwartz, 2000; Richey, Tokman, Wright, & Harvey, 2005) [60, 50]. Reverse logistics focuses primarily on the return or take-back of products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reuse, remanufacture, repair, refurbishing, or safe disposal of the products and materials (Alvarez-Gil, Berrone, Husillos, & Lado, 2007) [1]. Used or end-of-life products are returned into the forward supply chain for three main purposes (Wells & Seitz, 2005) [68]

- **Reuse** - which is the process of collecting used products from the field, and distributing or selling them used. Thus, although the ultimate value of the product is reduced from its original value, no additional processing is required.
- **Remanufacturing** - which is the process of collecting a used product or component from the field, assessing its condition, and replacing worn, broken, or obsolete parts with new or refurbished parts? In this case, the identity and functionality of the original product is retained.
- **Recycling** - which is the process of collecting used products, disassembling them (when necessary), separating them into categories of like materials (e.g., specific plastic types, steel, glass, paper, etc.), and processing them into recycled products, components, or materials. In this case, the identity and functionality of the original materials is lost.

5.2 Effective Implementation of the Reverse Logistics Program

According to Rogers, *et al.,* (2013) [56], Companies can no longer afford to treat reverse logistics as an afterthought. It needs to be a core capability within the supply chain organization. For years, most firms paid little attention to returns. That has changed as companies increasingly realize that understanding and properly managing their reverse logistics cannot only reduce costs, but also increase revenues. It can also make a huge difference in retaining consumer loyalty and protecting the brand. Capturing the potential benefits begins with clearly understanding the nature of reverse logistics. Retailers and manufacturers design supply chains to quickly and efficiently send a continuous flow of product from production facilities to retailers' shelves. All of the boxes on a pallet are typically identical and stacked in neat rows, and they arrive at the distribution center or retail outlet like clockwork. Furthermore, Rogers *et al.,* (2013) stated that the reverse flow is different in a number of ways. First, product arrives whenever customers decide to return an

unwanted item, or a retailer decides to pull slow-moving product, or a manufacturer institutes a packaging change, or any number of other possible causes. Second, the product is not all in new condition. Third, much of the packaging is damaged or shelf-worn. The result: the company must look at each individual item and make a decision as to its disposition. Also in planning a reverse logistics concept, companies should pay attention to implementing activities that will support green logistics management.

5.3 Drivers of Reverse Logistics Activities

In reverse flow, the varieties of product types affect reverse logistics practices. Reused packages, disposed computer equipment, unsold commercial goods, spare parts, packaging materials are among these product categories (Van Hoek, 1999) [67]. Companies are therefore urged to be responsible for the consequences of their activities (from raw material supply to after-sale services) and these responsibilities are reinforced by legal and social enforcements. Moreover, companies economic, corporate or marketing objectives affect the implementation of reverse logistics practices (Lee, Lee, & Lee, 2000; Wu & Cheng, 2006) [39, 70]. In practice, the presence or absence of factors such as economic, legal and corporate citizenship are considered drivers or barriers to reverse logistics (Lau & Wang, 2009) [38].

Reverse logistics starts with the products moving back in the supply chain (De Brito & Dekker, A framework for reverse logistics, 2004) [9]. In this process there are two parties involved. The returner party initiates the returning with several purposes (i.e. product recalls, value recovery etc.) and the receiver party carries on activities with returned products to resell, redistribute, reuse, reprocess or recover remaining value.

Previous studies suggest that reverse logistics can be affected by various factors inside and outside an organization. Internal factors include top management commitment and support, and the existence of an incentive system that rewards employees and managers for their involvement with reverse logistics activities (Routroy, 2009) [59]. External factors include pressures from government and regulatory bodies, customers, suppliers and competitors (Lin, 2007; Peng & Lin, 2008; Zhu & Sarkis, 2006; Zhu, Sarkis, & Lai, 2007) [44, 41, 72, 73]. Moreover, literature suggests that the factors influencing reverse logistics activities differ from those of forward logistics (Wu & Cheng, 2006) [70]. Extensive review of the available literature reveals four basic drivers of reverse logistics: Environmental regulations, customer pressures, social responsibility and expected business benefits.

For instance, Daher *et al*. (2006) [8] argued that the main reasons that cause firms to make efforts to adopt reverse logistics are:

- Environmental legislation, which forces companies to take back their products.
- Economic implication of using returned products in the production process such as recapture of value and recovery of assets.
- Availability of infrastructure.
- Growing public environmental awareness.

5.4 Environmental Legislation and Reverse Logistics

The legislation driver refers to any jurisdiction indicating that a company should recover its products or take them back (Peters, 2009) [45]. Since the strict legislations about the environmental issues express the extended producer responsibility, companies are entitled to recover their products or accept them back. Companies are being held accountable for the whole product life cycle. In some industries like automobile, the producers are obliged to take back the products. Especially in European Union, regulations such as End-of-life Vehicles Directive (ELV), Waste Electrical and Electronic Equipment Directive (WEEE), Restriction of Use of Certain Hazardous Substances Directive (RoHS), packaging and packaging waste directive dictates the prevention of waste and promotes the recovery of waste.

Reverse logistics has important environmental aspects. The environmental aspects focus on resource reduction, materials substitutions and waste reduction, whereby companies become more environmentally efficient and contribute to the solution of environmental problems (Carter & Ellram, 1998; Mclntyre, Smith, Henham, & Pretlove, 1998; Stock, Development and Implementation of Reverse Logistics Program, 1998) [5, 42, 63]. Firms try to avoid potential costs, uncertainty and legal liabilities inherent in existing and anticipated regulations (Clemens & Douglas, 2006) [6]. Moreover, regulatory institutions may provide inducements for organizations to behave in a certain way. Inducement mechanisms include providing incentives to organizations for conforming to the demands of the agency that offers the inducement (Grewal & Dharwadkar, 2002) [31].

Currently, there are more strict legislations and regulations in many countries, especially in Europe, that require business organizations to take responsibility for their products from production up to the final disposal stage and promote recycling and take-back of end-of-life products (Ferguson & Browne, 2001; Tibben-Lembke, 2002) [21, 65]. In particular, there exists the Waste of Electrical and Electronic Equipment (WEEE) Directive in Europe in 2003, which forces manufacturers to take responsibility for their products at the end of their life, and RoSH, which requires safe disposal or recycling of consumed products. Previous studies found that firms adopt reverse logistics initiatives in response to these regulations (Alvarez-Gil, Berrone, Husillos, & Lado, 2007; Ravi, Shankar, & Tiwari, 2005; Murphy & Poist, 2003) [1, 47, 43].

EU is taking measures to prevent the generation of electrical and electronic waste and to promote reuse, recycling and other forms of recover in order to reduce the quantity of such waste to be eliminated. The European Union wishes to prevent waste from end-of-life vehicles and promote the collection, re-use and recycling of their components to protect the environment.

The Chinese Government initiated four major environmental policy initiatives that affect the energy efficiency, hazardous material content, and end-of –life disposition of high-tech products, as well as the collection and recycling of spent batteries. The General Law of Ecological Equilibrium and Environmental Protection (LGEEPA) (1998) defines the environmental legislative model applied until today. In 2003, the General Law for Integral Management and Reduction of Waste was approved. Information dissemination and use mechanisms are;

- **Economic "Sticks":** Deposit refund systems, raw material tax, waste disposal tax, non-recyclable goods tax

- **Producer Responsibility:** The "producer" of goods that produce waste take responsibility for those waste, rather than expecting society to pay for waste collection and disposal.
- **"Carrots" Subsidies for:** Waste prevention programmes, research and development, new central treatment facilities and developing the demand of recycled materials.
- **Legislative "Sticks":** Restrict the availability of landfill**,** mandatory separate collection and recycling programmes**,** system of licensing for storage, treatment and disposal facilities.
- **Effects of the Policy**

  According to Rodriguez & Ozdemir, (2007), if it is necessary to fulfill regulations, then managing the flows of spent products has become a priority for manufacturers and porters. Manufacturers have to deal with the collection and recycling of their products even if no profit can be expected. Companies will have to comply with new environmental legislation but there is no need to do it inefficiently. A careful economic analysis is needed to determine the best way to perform reverse logistics activities.

  The broad scope and strict nature of these environmental policies will impact on product design and innovation, cost, and processes. (Rodriguez & Ozdemir, 2007) [53]. From the discussions above, the hypothesis below can be developed;

  H_1: *Environmental legislation has a significant positive relation with effective implementation of reverse logistics program*

5.5 Economic Implication and Reverse Logistics

Many firms decide to or not to adopt reverse logistics program while bearing in mind the economic implications associated with the adoption of such a program.

Even though network formulation in the context of forward flow systems has been widely studied, the system performing forward activities in a traditional supply chain is not directly applicable to the network structure of reverse logistics since the forward flow system is not originally designed to handle returned products due to on-equipment of handling return products in the forward system and different cost structures, such as the costs of collecting, classifying, testing and disassembling returned goods that occur only in the reverse channel but not in the forward system (Jayaraman, Guide, & Srivastava, 1999) [35].

With respect to the economic implications of reverse logistics, Reece & Norman (2006) [48] came out with the six hidden cost of reverse logistics which are as follows:

- **Labor:** companies undeniably incur labour cost if their returns are not using an automated system or process. Labour helps in performing task ranging from customer relations to Sarbanes-Oxley compliance. The adoption of an enterprise returns management software which can be assessed by authorized customers and other related stakeholders are the key in adopting an automated reverse logistics process. Specific costs in this category are: Customer relations labour costs, Customer service labour costs, Financial reconciliation labour costs: Sales labour costs, Traffic and shipping labour costs, Receiving and warehousing labour costs.
- **'Grey market' item:** Companies face the risk when returned goods end up on grey market where goods are sold outside the company's original distribution channel. This is a cost that companies incur when assets signed off as scrap reappear for warranty service and it is wasteful to refurbish a system that has little to no residual value.
- **Lack of visibility:** The merchandising staff, design team and third party service provider also desire visibility of return to plan and get their work ongoing. Customers will call up and email repeatedly to access the status of returns and that comes with cost of paying personnel's time for answering customer's questions.
- **Inability to forecast accurately:** With returns data trapped in Excel spreadsheets, your salespeople can't "see" enough to make accurate predictions, and the operations team can't prepare for a returns influx.
- **Credit reconciliation:** Large customers often calculate their own credits and take a debit on the next payment, which is time consuming to reconcile. Approved return requests that are not matched with receipts hinders accurate accruals, effective vendor management and claim recouping.
- **Poor response time and brand toxicity:** delays are caused due to manual processes of accepting and rejecting return requests. This communicates a lack of concern and tarnishes brand or reputation due to frustration. Customers expect you to comply with them throughout the lifecycle.

  According to Dhooma, (2011) [17], reverse logistics cost comprise; Handling and processing, in store to disposal, product. Loss in product value – 5 'D's, Depreciate, Deteriorate, Damage, Discontinue, Disappear (stolen), Poor processes tolerated to mask theft and fraud.

  Also in the views of Robinson, (2014) [51], Reverse logistics management cost components are as elaborated below;
- **Processing Costs:** are all costs incurred to process and handle your returns. For example, your returns process may start with the authorization of the return by a call center representative, followed by the receipt of the returned item at your warehouse and then the repair or refurbishment of the returned item.
- **Logistics Costs:** are all costs related to moving and handling the returning units as well as the cost related to the shipping of any replacement units. This may include freight costs for pickup and for shipping. It may also include warehouse handling and storage costs not already captured as a processing cost above.
- **Credits/Replacement Costs:** most products that are returned require the issuance of a credit or the exchange with the same or a similar replacement product.
- **Asset Depreciation:** most returned products have some value, whether it can be re-stocked, refurbished or even sold as scrap. Often these items have a higher recovery value than you may think. It is very important to consider the financial value that may be lost over time if these returned products are held too long and not disposed quickly. The hypothesis below can be developed from the discussions above;

  H_2: *Economic implication has a significant negative relation with effective implementation of reverse logistics program*

5.6 Reverse Logistics and Availability of Infrastructure

Infrastructure plays a vital role in reverse logistics implementation. Researchers and practitioners felt that affordable recycling technologies with the support and coordination of all the members would enhance the success of reverse logistics implementation (Rogers & Tibben-lembke, Differences between Forward and Reverse Logistics in Retail Environment: Supply Chain Management, 2002; Dibenedetto, 2007; Jack, Powers, & Skinner, 2010) [65, 18, 34]. The existence of good reverse logistics infrastructure provides a company with the capability to quickly and efficiently handle returns and/or recalls (Dibenedetto, 2007; Jack, Powers, & Skinner, 2010) [18, 34]. The fact is that majority of organizations don't have the knowledge, infrastructure or manpower needed for reverse logistics processes, such as processing returns and running an operating system of returns. In these cases, outsourcing the reverse logistics processes to a qualified third party logistics organization is usually the most effective and budget-friendly alternative. The presence of good returns-handling system can be a source of significant cost savings and even function as a profit center (Stock, Speh, & Shear, 'Many Happy (product) returns', 2002) [64].

Conversely, a lack of reverse logistics infrastructure will impede a company's ability to quickly and efficiently deal with returns and/or recalls and any effort at handling returns will be a financial burden with the costs exceeding the benefits (Jack, Powers, & Skinner, 2010) [34]. Reverse Logistics infrastructure covers but not limited to the following;

- **Information Technology**: software and hardware, is essential for end-to-end control and transparency along the reverse chain. This study reveals a clear gap between the importance and satisfaction of IT in Reverse Logistics management. Best-in-class companies are able to align and integrate information systems, although the availability of appropriate software is a challenge. Create visibility concerning performance and automate processes to reduce the chance on errors and tax gaps. Apply appropriate information technology to integrate and standardize reverse chain processes (Price water coopers' report, 2008) [46].
- **Warehouse Space**: Processing returns through regular forward distribution and service centers slows the delivery process – i.e., forward movement for first-sale products. This is a problem because the longer it takes for products to flow to points of sale, the greater the risk of lost sales through stock outs or customer abandonment of shopping carts, both physical and virtual. Returns also place burdens on infrastructure such as warehouse space where they can take up as much as 25 percent of total available space due to low turns of refurbished products (Deliotte, 2013) [15]
- **Transportation Facility:** From the location of your returns processing center and necessary transportation support to the staff you have assigned to execute your reverse logistics plan, consider what strengths and weaknesses might exist. Getting value out of any reverse logistics program relies on being efficient and taking advantage of every opportunity to squeeze more revenue from all returned products (Greve & Davis, 2013) [30].
- **Returns Centers:** Hawks, (2006) [33] stated that, developing optimum locations and facility layouts for returns centers facilitates network flow.

From the above review, the following hypothesis can be deduced;

H₃: *Availability of infrastructure has a significant positive relation with effective implementation of reverse logistics program*

5.7 Level of Stakeholder Awareness and Reverse Logistics

The interest for reverse logistics is expected to emanate not only from the external environment (regulations and customers) but also from the internal sense of responsibility of a firm towards the society in which it exists. For reverse logistics, such sensitivity is intensified by the ever-increasing environmental problems such as global warming and pollution. Such problems are expected to raise the awareness of firms to behave in a more socially responsible manner and reflect an image of due diligence and commitment to sustainability and social responsibility. The ordinary supply chains are based on a linear production paradigm, which relies on constant input of virgin natural resources and unlimited environmental capacity for assimilation of wastes (Geyer & Jackson, 2004) [28]. Therefore, through reverse logistics, a firm can be more socially responsible by considering minimizing its use of virgin materials and reducing the level of waste. Murphy & Poist, (2003) and Ravi *et al.,* (2005) [47, 43] found stakeholder awareness to have significant effect on green supply chain initiatives (green purchasing and reverse logistics).

Ravi & Shankar, (2005) [47] indicated that higher level of stakeholder awareness is paramount to effective implementation of reverse logistics and the lack of awareness about reverse logistics is one of the barriers to its implementation. There is a strong relation between awareness and practice of reverse logistics (Zhang, 2007) [71]. Moreover, Cain, (2008) found that there is a considerable effect of reverse logistics on a company; thus, higher awareness should be generated on the importance of reverse logistics. Sharma *et al.* (2011) [62] also suggest that the awareness of reverse logistics could bring economic benefits by recovery of the returned product for use. According to Alvarez-Gil *et al.,* (2007) [1], supply chain players or stakeholders are suggested to be the motivators of reverse logistics implementation.

Customers represent the major financial stakeholders that buy products and services of organizations. As such, customers can exert considerable pressures and may communicate goals of sustainability or environmental performance on these organizations. Previous studies found that customer pressure is one of the major drivers for reverse logistics. For instance, Alvarez-Gil *et al.,* (2007) [1] found that customers have significant influence on the final decision of implementing reverse logistics programs. In the context of Ghana, it can be noticed that most customers of manufacturing organizations are not aware of the essence and existence of reverse logistics and thereby do not put pressure on the manufacturing companies to adopt reverse logistics activities effectively. The following hypothesis can be deduced from the review;

H₄: *The level of stakeholder's awareness has a significant positive relation with effective implementation of reverse logistics program*

5.8 The Role of Reverse Logistics in Packaging and Waste Management

An Environment Agency survey in 2002/3 suggested that approximately half of all commercial and industrial waste in England and Wales was produced by small to medium sized enterprises (SMEs), making up around 1/3 of industrial wastes and 2/3 of commercial wastes. The difficulty that small businesses face in terms of recycling opportunities was also highlighted in the recent waste strategy (Defra, The Producer Responsibility Obligations, 2006) [14] where it was suggested that only 37% of commercial waste was recycled. The review recognized that smaller businesses often had particular difficulties in obtaining affordable recycling and recovery services, and suggested that coordinating operations across different waste streams was a potential way to improve efficiency and performance.

The redistribution of reuse packaging has to be minimized for environmental and economic reasons. One solution to minimize these costs is standardization (Golding, 1999) [29]. Using a common type, reusable packaging could be exchanged between several companies (Kloon & Vrijens, 1995; DfT, 2005) [37, 16]. Returnable packaging may appear to increase the logistics cost due to the requirement for extra handling equipment and storage space. However, since manufacturers factor in the costs of packaging into their prices to customers, the total cost of the supply chain is likely to be reduced, since such materials can be used many times and the disposal costs minimized (Wu & Dunn, 1994) [69].

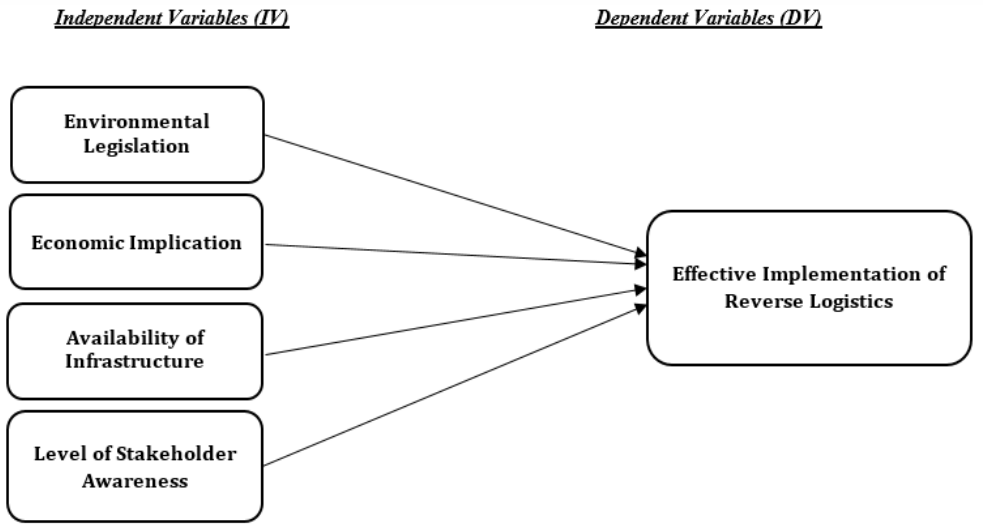
Simply using back-loading can allow manufacturers to reduce costs and meet some of the above targets (a distribution vehicle picks up pallets or other packaging and distribution materials previously deposited at the delivery location). The return trip adds value to the process by returning back to their point of origin those recovered materials that are re-usable (Shakantu, Tookey, & Bowen, 2002; Fernie & McKinnon, The Grocery Supply Chain in the UK: Improving Efficiency in the Logistics Network, 2003) [61, 24]. It is important that the processes of producing and disposing of returnable containers, together with the additional return logistic activities, should not be more harmful to the environment than the use of one-way packaging material (Kloon & Vrijens, 1995) [37]

In a review of the impacts of legislation on food retailers, Fernie *et al.,* (2001) [23] noted that while large retail chains maximize vehicle utilization with backhauls from suppliers, including trays and other re-usable, recycled material, wholesalers have to deliver small loads to many small shops. For hygiene and cost considerations, it is impracticable to recover packaging waste from these shops. A review of case studies carried out by De Brito *et al.,* (2002) [10] found that certain public reverse logistics networks were created in order to comply with legislation to reduce waste. However, their review did not include case studies regarding networks set up purely for waste disposal; such cases did not in their opinion consider what to do with the waste and were not considered typical reverse logistic activities involving sorting, disassembly and recycling.

6. Methodology

Any research method must be appropriate for the objectives of the study. This research uses the Causal Research Design which determines the cause and effect relationship between variables, manipulate one or more independent variables and determine the nature of the relationship between the causal variables and the effect to be predicted. As a result, quantitative approaches with the appropriate experimental designs are used throughout the study to establish the relationship between variables.

Haven considered the research problem, research question, research objectives, and review of the necessary literature, the framework which focuses on investigating the factors accounting for effective implementation of reverse logistics is developed.



Author's source, April 2017

Fig 1: Research Framework**.**

Hypotheses involve statements that are taken to be true for the purpose of argument or investigation (Burns & Bush, 2010). For the purpose of this study, the following hypotheses derived fron review of various litetrature will be tested:

H_1: Environmental Legislation has a significant positive relation with effective implementation of reverse logistics

program

H_2: Economic Implication has a significant negative relation with effective implementation of reverse logistics program

H_3: Availability of infrastructure has a significant positive relation with effective implementation of reverse logistics program.

H_4: Level of stakeholder awareness has a significant positive relation with effective implementation of reverse logistics program.

For the purpose of this research, our population of interest is defined as all stakeholders of reverse logistics practices in Ghana.A sample size of 60 is used in this research for the purpose of data collection and analysis. The selection of this samples size is due to the fact that this number is seen to be large enough to be used to make inferences about the population.

The data which is mainly used in this research is the primary data and the main instrument used to collect data from respondents for analysis is the survey questionnaire. The choice of this data collection tool is as a result of its cost effectiveness, convenience, easy to administer, and anonymity of respondents which could help to collect sensitive information (Burns & Bush, 2010) [3]. To be able to obtain the necessary information from respondents which will help to accomplish the purpose of this project, a survey using the questionnaire was conducted among Voltic Gh. Ltd, Fan Milk Ltd, J. A. Biney co. Ltd and Tobinco Pharmaceuticals.

The analysis of the data was aimed at making valid inferences from the overwhelming amount of data collected. As a result, the following steps were followed during the analysis;

First, since the primary data obtained from the questionnaire is quantitative, it was analysed by the use of Statistical Package for Social Sciences (SPSS) 19.0. The analysis began by the preparation of a data file. Data clean-up and reduction was also conducted by recoding, re-computing and finally tables were derived. These were done to help get a precise data for the analysis.

Descriptive statistics was carried out. This involved preparing various frequency distribution tables, calculating various measures of central tendencies such as the mean, various measure of dispersion such as the standard deviation, percentiles etc. were also done. These analyses were done to help describe various important variables in the research. It also helped to know the level of effective implementation of reverse logistics in the companies. The multiple regression analysis was finally carried out to help establish the relationship between our dependent variable and our independent variables. Hypothesis testing was conducted to help establish the significance of each of the independent variables.

For validity purposes, the questionnaire developed after reviewed to check for the sufficiency of the face and content validity. For reliability purposes, the Cronbach's Alpha is used in our case for the measure and the results are displayed below;

Table 1: Reliability Analysis

Scale	Cronbach's alpha (α)	Number of Items
1. Environmental Legislation	0.423	4
2. Economic Implication	0.719	4
3. Availability of Infrastructure	0.795	5
4. Level of Stakeholder Awareness	0.717	5
. Effective Implementation of Reverse logistics	0.879	5
Overall	0.720	24

Source: Field Survey, April, 2017

From the above table 1, the overall Cronbach's Alpha for the data is 0.720. If we contrast our reliability value with the standard value alpha of 0.7 advocated by Cronbach (1951) and Bagozzi & Yi's (1988) it implies that generally the scales used by the researcher are reliable for data analysis.

7. Results and Discussions

7.1 Descriptive Statistics for Demographic Information

Table 2: Frequency Distributions

Gender			
		Frequency	**Percent**
Valid	Male	43	71.7
	Female	17	28.3
Age			
Valid	21-30	30	50.0
	31-40	20	33.3
	41-50	5	8.3
	Above 50	5	8.3
Education			
Valid	Certificate	13	21.7
	Diploma	32	53.3
	Degree	14	23.3
	Masters	0	0
	PHD	1	1.7

Stakeholder of co.			
Valid	Voltic Gh. Ltd	15	25.0
	Fan Milk Ltd	15	25.0
	J. A. Biney Co. Ltd	15	25.0
	Tobinco Pharmaceutical	15	25.0
Years Dealing with the Company			
Valid	Below 5yrs	14	23.3
	6-10yrs	23	38.3
	11-15yrs	20	33.3
	16yrs & above	3	5.0

Source: Field Survey April, 2017

Out of the total of 60 respondents who answered the questionnaire, according to table 2., 43 (71.7%) of them are males whiles 17 (28.3%) of them are females. Table 2 further depicts that 30 (50%) of the total respondents are between the ages of 21-30, 20 (33.3%) of them are between the ages 31-40, 5 (8.3%) of them are between the ages of 41-50 and 5 (8.3%) of them are above age 50. In terms of level of education, from table 2., it could be observed that 13 (21.7%) of the total sample of 60 respondents had certificate, 32 (53.3%) had diploma, 14 (23.3%) were degree holders while 1 (1.7%) of the respondents had a PhD.

Table 2 again depicts that 15 (25.0%) of the total sample of 60 respondents were stakeholders of Voltic, 15 (25.0%) were stakeholders of Fan Milk Ltd, 15 (25.0%) were stakeholders of J. A. Biney Co. Ltd while 15 (25.0%) were stakeholders of Tobinco Pharmaceutical. As far as years of dealing with the company is concern, according to table 2., 14 (23.3%) of the respondents had dealt with their company for years below 5, 23 (38.3%), of the respondents had dealt with their company for about 6-10 years. 20 (33.3%) of the respondents had dealt with their company for about 11-15 years while 3 (5.0%) of the respondents had dealt with their company for 16 years and above.

7.2 Answers to Research Questions

7.2.1 Research Question

Research question one seeks to discover the level of Effective Implementation of the reverse logistics program in the selected companies.

Table 3: Descriptive Statistics

	Mean	Std. Deviation	Maximum	Minimum
	Statistic	Statistic	Statistic	Statistic
Ave. RL Program	2.5200	1.25155	4.40	1.00

Source: Field Survey, April, 2017

Table 3 shows the basic statistics such as the mean and the standard deviation for the dependent variables in the research. From table 3, the average level of effective implementation of reverse logistics program among the companies is 57.3% (i.e. $\frac{2.52}{4.4} \times 100\%$). This percentage according to the researcher's judgment shows that the level of effective implementation of reverse logistics in the companies is relatively high since it is more than 50%. However, there is more room for improvement.

7.2.2 Research Question 2

Research question three seeks to assess the impact of environmental legislation, availability of infrastructure, economic implications and level of stakeholder's awareness on the effective implementation of reverse logistics program. In an attempt to answer these questions, the hypothesis for this research will be tested.

To be able to answer this research question, the use of the multiple regression analysis becomes paramount.

Table 4: Multiple Regression Results

	Beta	T	Sig
Ave. Env. Leg.	.117	2.085	.042*
Ave. Ec. imp.	-.328	-5.294	.000**
Ave. av. Of inf.	.881	13.423	.000**
Ave. level of st aw.	-.022	-.306	.761
R Square			.859
F			83.589
Sig.			.000[a]
$* p < 0.05$ $** p < 0.01$			

a. Independent variables: Ave. Environmental Legislation, Economic Implications, Ave. Availability of Infrastructure, Ave. level of stakeholder awareness.

b. Dependent Variable: Ave. Effective Implementation of Reverse logistics.

Source: Field Survey, April, 2017

7.2.3 Significance of the Individual Independent Variables

The use of table 4 is required to identify the significance of each of the individual independent variables. This will further help to answer our main research hypotheses;

H_1: Environmental legislation has a significant positive relation with effective implementation of reverse logistics program

H_2: Economic implication has a significant negative relation with effective implementation of reverse logistics program

H_3: Availability of infrastructure has a significant positive

relation with effective implementation of reverse logistics program

H_4: The level of stakeholder's awareness has a significant positive relation with effective implementation of reverse logistics program

The *p-values* in table 4 show which of our independent variables is significantly impacting on the dependent variable at 5% significance level.

Environmental Legislation has a beta value of 0.117 with a *p-value* of 0.042 $<$ 0.05 at 95% confidence level. This implies that Environmental Legislation significantly impact on effective implementation of reverse logistics. The beta value of 0.117 supports the claims that Environmental Legislation is positively related to effective implementation of Reverse Logistics; the relationship is significant, which makes the first hypothesis in this research supported. As a result, the finding in this research show that increasing environmental legislation impacts positively on effective implementation of reverse logistics.

Economic Implication has a beta value of -0.328 with a *p-value* of 0.000 $<$ 0.01 at 99% confidence level. This shows that economic implication of implementing reverse logistics significantly impact on effective implementation of reverse logistics. The beta value of -0.328 for economic implication of implementing reverse logistics supports the second hypothesis of this research which claim that economic implication of implementing reverse logistics has a significant negative effect on effective implementation of reverse logistics. An increase in the economic implication of implementing reverse logistics would reduce the effective implementation of reverse logistics and vice versa.

Availability of Infrastructure has a beta value of 0.881 with a *p-value* of 0.000 $<$ 0.01 at 1% significant level. This implies that availability of infrastructure for reverse logistics significantly impact on effective implementation of reverse logistics. The beta value of 0.881 supports the claims that the Availability of infrastructure is positively related to effective implementation of reverse logistics, the relation is significant thus making the third hypothesis in this research supported. As a result, the availability of infrastructure for reverse logistics implementation does significantly improve the effective implementation of reverse logistics.

The level of stakeholder awareness also has a beta value of -0.22 with a *p-value* of 0.761 $>$ 0.05 at 95% confidence level. This implies that the level of stakeholder awareness does not significantly impact on level of effective implementation of reverse logistics. The beta value of -0.22 affirms that the level of stakeholder awareness of reverse logistics program is not significantly positively related to the level of effective implementation of reverse logistics thus making the fourth hypothesis of this research not supported. This finding further implies that the level of stakeholder awareness of reverse logistics activities or programs adopted by companies does not significantly predict level of effective implementation of reverse logistics. Reasons attached to this finding could be that, since most of the selected organizations provide basic necessities, even if stakeholders are aware that these firms do not implement reverse logistics programs, they would find it difficult reducing their purchase since the products these companies sell are necessities and their demand is inelastic.

Table 5 shows the hypothesis for this study and their status after the analysis at 5% significant level.

Table 5: Hypothesis and Their Status after the Analysis

Hypothesis	Status
H_1: Environmental Legislation has a significant positive relation with effective implementation of reverse logistics program	Supported
H_2: Economic Implication has a significant negative relation with effective implementation of reverse logistics program	Supported
H_3: Availability of infrastructure has a significant positive relation with effective implementation of reverse logistics program.	Supported
H_4: Level of stakeholder awareness has a significant positive relation with effective implementation of reverse logistics program.	Not Supported

***Source*:** Field Survey, April, 2017

7.3 Model Fit

7.3.1 Coefficient of Determination and Correlation Coefficient

Co-efficient of determination (r^2) measures the percentage of the dependent variable that can be explained by the independent variables (Jim Frost, 2013). From table 4, the Coefficient of Determination(r^2) = 0.859 $\approx$ 0.8600. This implies that about 86.0% of the variation in the dependent variable, (effective implementation of reverse logistics) can be explained by the independent variables (Environmental legislation, Economic Implication, Availability of infrastructure, level of stakeholder awareness) and that the other 14% of the variation in the dependent variable can be explained by other variables or factors not captured in this study.

It must be noted that since r^2 is approximately 0.86, the regression model for this study can be seen to have strong predictive power. This implies that at least one of the independent variables can actually predict our dependent variable. This conclusion is further justified by the F-value of 83.589 at $p = 0.000 < \alpha = 0.05$, showing the predictive power of the regression model.

7.3.2 Multi-Collinearity Analysis

Under the multi-collinearity analysis, we want to check the level of correlation among our independent variables. This is because if our independent variables are highly correlated, $(|r| > 0.7)$ it becomes difficult to determine the separate effects of any particular independent variable on our dependent variable. For a data to have a serious multi-collinearity issues, it must satisfy the following conditions;

- $\text{VIF} > 10$
- $Tolerance < 0.1$
- $Condition\ index > 30$

Table 6: Multi-Collinearity Analysis

Collinearity Statistics			
Tolerance		VIF	
.816		1.226	
.669		1.495	
.596		1.677	
.502		1.991	
Collinearity Diagnostics[a]			
Model	**Dimension**	**Eigenvalue**	**Condition Index**
1	1	4.795	1.000
	2	.087	7.409
	3	.066	8.526
	4	.030	12.657
	5	0.022	14.821

Source: Field Survey, April, 2017

From The multi-collinearity table 6, it could be observed that none of the figures satisfy the multi-collinearity conditions. This shows that there are no serious multi-collinearity issues in the independent variables. Thus it might not be a difficult to determine the separate effects of any particular independent variable on the dependent variable in this study.

8. Conclusions and Recommendations

8.1 Conclusions

The motivation behind this study is to investigate into the factors accounting for effective implementation of reverse logistics program by assessing the factors from the organizational perspective.

Analysis in this study reveals that, the average level of effective implementation of reverse logistics program among the companies selected was 57.3%, which is relatively on the average.

In addition, the study reveals that environmental legislation has a significant positive impact on effective implementation of reverse logistics program. This implies that when environmental laws are formulated and are strictly enforced, the level of effective implementation of reverse logistics will increase significantly and vice versa. Economic implication from the study showed a significant negative relation with effective implementation of reverse logistics program, implying that, if the cost of establishing and operating reverse logistics program is high, effective implementation of reverse logistics program will decrease significantly and vice versa. Availability of infrastructure showed a significant positive relation with effective implementation of reverse logistics program according to this study. However, this study shows that the level of stakeholder awareness does not significantly impact on effective implementation of reverse logistics.

8.2 Recommendations

Since the findings in this study indicate a significant positive relation between environmental legislation and effective implementation of reverse logistics, it is recommended that in order to ensure effective implementation of reverse logistics program to help protect the environment and reduce waste, the environmental protection agency (EPA) must formulate reverse logistics laws and strictly enforce them.

From the findings, it can also be recommended that capital intensive infrastructure needed for the implementation of reverse logistics program should be provided or their cost subsidized by the government so as to increase the adoption and effective implementation of reverse logistics program in the manufacturing sector of Ghana.

To reduce the cost of establishing and operating reverse logistics program, it is recommended that companies adopt an automated reverse logistics program with a web interface that demands a return merchandize authorization (RMA) and compliant label for every return. This RMA system must be linked to a firm's central enterprise resource planning (ERP) system which customers are required to use. This can help to cut cost by 50 to 80%. Companies that implement automated enterprise returns management systems often achieve return on investment in a remarkably short time.

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