DEVELOPING A COST-EFFECTIVE STOCK CONTROL SYSTEM FOR

THE ASHESI SHOP

Applied Project

For the Public Relations Office of Ashesi University

Prepared by

Elorm Dela-Brown

ASHESI UNIVERSITY

DEVELOPING A COST-EFFECTIVE STOCK CONTROL SYSTEM FOR THE

ASHESI SHOP

Undergraduate Applied Project Submitted to the Department of Business

Administration, Ashesi University in Partial Fulfilment of the Requirement for the

Award of Bachelor of Science Degree in Business Administration

B.Sc. Business Administration

Elorm Dela-Brown

April 2019

STOCK CONTROL SYSTEM FOR ASHESI UNIVERSITY

Table of Contents

DECLARATION

I hereby declare that this Applied Project is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ……………………………………………………………

Candidate's Name: Elorm Dela-Brown

Date: 23rd April 2019

I hereby declare that the preparation and presentation of the Applied Project were supervised in accordance with the guidelines on supervision of Applied Project laid down by Ashesi University.

 Supervisor's Signature: …………………………………………………

Supervisor's Name: Gloria Emefa Dako

 Date: 23rd April 2019

ACKNOWLEDGMENTS

EXECUTIVE SUMMARY

The Ashesi souvenir shop is a relatively small shop with a restricted target market. The shop since its inception in 2016 has been experiencing lapses in its inventory control as there have been continuous stockouts due to a poor understanding of what to order, when to order and how to order.

According to research, the shop can prevent significant losses in revenue by developing a cost-effective stock control system which provides key information on the usage value, unit cost and accessibility of the shop's items, which are all strategic elements of arriving at the optimal decision of what to order, when to order and how to order. To address the problem, the following solution was proposed. The solution entails the combined application of two models; namely, the SDE model and the HML models which arrive at optimal decision areas of what to order, how to order, and when to order items essential to revenue generation in the shop. Both models reduce wastage and improve the efficient disbursement of funds to increase profitability.

The final element of the solution is an all-inclusive POS system to synchronize all stock related information. To bring this to bear, the management would need to spend resources and time to find the multiple vendors within the region as well as expend financial resources on the POS system. To complete this project, it is critical that the solution is carried out during the off-season when the shop is not in full operation. This will enable that the models are effectively carried out with little distractions.

CHAPTER ONE: INTRODUCTION

1.1 CHAPTER OVERVIEW

In this chapter, a brief description of Ashesi University – the mother company, and the Ashesi souvenir shop company will be given. This will include key insights into the internal and external environment of the shop. Conclusively, this chapter gives details on the purpose and significance of the study, which is to develop a cost-effective stock control system for the Ashesi souvenir shop.

1.2 Significance of a cost-effective stock control system

According to Agrawal and Smith (2013), one of the key challenges facing manufacturing and retail industries is arriving at the optimal point of what to order, how much to order, when to order and even how much to stock. The optimal decision point is where all these critical questions are answered in a way that leads to an efficient and effective organization, capable of consistently making profits. Baten and Kamil (2009) echoed this point in their paper by stating that the survival of companies in this competitive world depends on effective management of inventory. In an increasingly competitive world, new and more effective cost reduction strategies are key in not only surviving as a company but maximizing profitability and establishing a competitive position in the market. Inability to provide these cost-effective stock control strategies can lead to overstocking or stock-outs, both of which are detrimental to companies. According to Stevenson (2009), the overall aim of inventory management is to have what is needed, when it is needed and to minimize the number of stock outs in each period. A doctoral study by Johnson (2016) on retail inventory control strategies stated that a cost-effective stock control system not only

mitigates stockouts but reduces demand fluctuations and logistics costs across the supply chain.

1.3 Principal purpose of the proposed solution

Concerning this project, a cost-effective strategy should assist the Ashesi souvenir shop to mitigate stockouts, reduce logistics costs, specifically in procurement and reorder quantities as well as determine an optimal decision point of what to order, when to order and how to order the relevant quantities of the shop's items. Over time, demand fluctuations should reduce and inventory turnover increase, thereby increasing the cash flow generation of the shop. This project neither focuses on the customer experience nor does it focus on how to generate revenue from customers. The project seeks to address the internal, structural problems of the shop with the hope of establishing a solid internal structure based on an effective stock control system.

1.4 Rationale for choosing Ashesi Souvenir Shop

Ashesi University has many internal structures which support its growth and development, especially in cementing strategic partnerships. Because the university is a nonprofit organization, besides accumulating revenue from semester fees, it relies on donors and some other forms of partnerships. One of these internal revenue generating structures is the Ashesi souvenir shop. The focus of this entire study is the Ashesi souvenir shop.

It was founded on October 2, 2016. Its strategic purpose is to increase awareness of the university's presence by promoting its brand. It aims to do this by selling quality branded items to the Ashesi community as well as other stakeholders. The shop sells Ashesi branded items, including items such as sweatshirts, t-shirts, stationery and books and well as electronic gadgets such as pen drives and power banks.

However, since its inception, it has experienced several key issues. Primarily, poor inventory management and ineffective stock control systems have led to low customer patronage. Most items have an extended shelf life and tend to deteriorate in quality. Items sold at the shop are often in low demand because the target group either find it expensive or have a genuine lack of preference for it. Secondly, the procurement process, especially securing cost-effective suppliers of the desired branded items has been substandard. Order quantities come late, often with several defects. The procurement process is not detailed and officially documented thus there is no guide to follow in executing a purchase order. Though the shop faces several challenges, a good starting point to address them would be assessing the effectiveness of its stock control position. As such this project seeks to address the inventory and stock control issues involved in determining the optimal decision point of what to order, when to order and how much to order.

1.5 Company Profile of Ashesi Shop

The Ashesi shop was established operationally in 2016. It is a subsidiary of the university with the primary goal of selling Ashesi souvenirs to stakeholders such as students, faculty, alumni, parents, and donors as well as guests. It is currently run by the Public Relations department of Ashesi University. The shop employs a maximum of five students working annually, after which new recruits may be hired. The employees who work and co-run the shop are restricted to students, who work as work-study interns.

<div align="center">Mission statement</div>

To provide the Ashesi Community with quality souvenir items that reinforce a sense of belonging and oneness

<div align="center">Vision statement</div>

To expand the brand of Ashesi across the globe through retail.

Products of the Ashesi Shop

As at the end of the spring semester in 2017, the shop had the following products for sale;

- Clothing: - T-shirts, hoodies, polo shirts, caps, lapel pins

- Stationery: - Notebooks, notepads, pens, files

- Electronics: - Power banks, pen drives,

- Bags: - Backpacks, Tote bags

- Miscellaneous: - Mugs, umbrellas, lanyards, stickers

Primary Customers

The Ashesi shop's main customers are members of the Ashesi community, specifically students ranging between 16 and 26 years and alumni, currently numbered at 1001 people. However, other relevant customers include staff and faculty who usually purchase items under their respective departments.

Primary Market

The shop is located on the Ashesi campus. There are no delivery services to reach out to external markets hence the primary market is relatively small and clearly defined. However, some purchases are made internally and distributed externally to stakeholders. This is mainly done by departments within the university.

Industry Analysis

The Ashesi shop operates in a relatively undefined industry. By default, it is a retail shop but has a niche position in this industry. Its product line is very differentiated from market players in that it sells customized products that are tailor made for the Ashesi community, a specific consumer group. It is therefore hard and partially illogical to define the industry as a souvenir industry. A direct and more succinct description of the industry

could be the tertiary souvenir industry. Even with this definition, assessing the industry performance remains poked with loopholes.

Primarily, this is a relatively new market in which competition is very indirect and somewhat intangible. Tertiary education souvenir shops seek to serve the interest of its university and will promote the brand of the university by selling branded items to all relevant stakeholders of the university – staff and students. It is therefore very unlikely for a non-stakeholder to be a beneficiary of the existence of a souvenir shop for another university. From this, the competitive rivalry in this industry is very low and somewhat non-existent. This is because of high switching costs and no real incentive to purchase another university's branded item when there exists one of their own. Because of this, the threat of new entrants is often disregarded. Though competitors may have differentiated products, psychologically, because there is no tangible affiliation to the competitor (the other university), switching costs will be still be high.

However, the threat of substitutes is somewhat high. This is because, outside of the tertiary education souvenir industry, there are many other alternatives to some of the items sold at such shops. The main and only difference between the items are the brand and direct affiliation of one shop to a particular small group of customers. This force is high because whereas the tertiary education souvenir shop is niche market focused, the non-affiliated shops are mass market focused. At the base level, since the two options are both clothing, price differences and other competitive factors such as quality can lead to low switching costs. Supplier power over small shops such as souvenir shops tend to be high. According to Sillem (2011), the waterbed effect usually pans out for small shops. For small shops, suppliers would increase the price for small buyers when a large buyer has demanded a discount. This request for a discount by a more strategic buyer is offset by a consequent

increment in the price charged to the small shops. In this industry, small shops normally serve the interest of a niche market group and thus tend to charge high prices.

In the case where high prices are not charged by the small shops such as the souvenir shops, it is usually hard to recoup the costs associated with operating, especially when suppliers charge high price. This seems to be the case also for the Ashesi shop. Other universities in Ghana do not have shops within their campus space retailing such products. Rather, students often freelance and start their own branded items with no legal affiliation with the university. They simply design products and imprint the logo or name of the university on it with the intention to display for personal use or sometimes to retail.

Macroeconomic analysis

PEST Analysis

Political

High import duties in Ghana affect its trade with global markets. The tax burden falls heavily on the individual company importing. Therefore, if the company importing does not purchase in bulk, it is likely to incur immediate losses. However, not all companies desire to purchase in bulk because it tends to affect their inventory holding costs. This is accurate in the case of the Ashesi Souvenir shop which serves a relatively small customer base and return purchases do not happen regularly.

Economic

Ghana's economy has been experiencing a downturn in terms of its trade with the global market. Though inflation has been reducing, imports has been falling and this is primarily due to the depreciation of the cedi to all the major world currencies. Importing has become a very unlucrative business venture because the risks involved are very high. Again,

the high exchange rate against the cedi forces importers to purchase in bulk and this comes with its high inventory and in some cases, an extended shelf life. Ghana's exchange rate remains unfavorable with its major trading partners – the US dollar and the British Pound. This continues to make it difficult for local companies to competitively negotiate with foreign companies. The Ashesi Souvenir shop imports almost all its products and due to this consistent depreciation of the cedi, sales have fallen because importing has become more expensive and it has led to a general increase in the price of these imported products. Items at the shop are viewed as luxury items and so the Ashesi community is more price sensitive.

Social

The customer base of the shop consists mainly of students and staff at Ashesi as well as visitors which include guest lecturers and donors from across the globe. Students and staff who are always on campus for the most part of the day are price sensitive because the items at the shop are relatively expensive and a majority of the items at the shop do hardly call for a return purchase. Departments within the university however purchase more frequently than students and staff because they tend to engage in more outreach events to increase brand awareness for the university. This includes receiving guests on campus and traveling across the globe to establish relationships and secure partnerships.

Technology

This is one critical factor that the shop has not taken into consideration. The shop needs to update its technological competencies. In this modern day, it will be efficient to adopt more online databases and systems to track, manage and control the activities of the shop. For example, the use of Google Analytics can help it gain a better understanding of its operational effectiveness. In order to gain traction from the Ashesi community, a more

streamline method of inventory planning and management as well as generating information about customer preferences will need to be developed.

SWOT Analysis

Strengths	Weaknesses
The Ashesi Souvenir shop increases awareness for the university in and out of the campus space. It increases the brand power.	Poor inventory management. Lack of effective stock control system. No formal procurement plans. Low customer retention due to high prices. Lack of variety on shelves.
Opportunities	Threats
Newer supplier alternatives from the home country due to increased entrepreneurial activities. An increase in the student body. Low competition.	Increased import duties. Weakening exchange rate.

Strengths

The shop has been a major contributor to creating lasting memories with strategic partners such as donors, guest lecturers and visiting schools. Items purchased by these stakeholders help to market the image of Ashesi and consequently. This is a cost-effective way of reaching potential customers, in the form of students from high schools and their respective parents as well as gaining market presence through awareness.

Weaknesses

Besides what has been mentioned earlier concerning the issues pertaining to the shop, expensive items and low-quality items make it hard to increase repeat purchases. Customers have complained about a lack of variety in stock and this corresponds to how quickly certain items in stock run out thereby affecting the re-stock period.

Opportunities

The student population of Ashesi University increased from about 800 students to 1000 students over the past academic year. This means an increase in the customer base and about 350 new students who are unlikely to own any items from the shop. With good marketing and affordable prices, there is a high chance to make some good sales for the shop.

Threats

As suppliers are mainly based out of the continent, Ghana's currently depreciating currency makes it hard to conduct profitable business, especially importing such supplies. The quantities and quality of items are affected because to purchase the right quantities at the standard quality, it will be relatively more expensive than if the cedi was performing better.

CHAPTER TWO: NEEDS ASSESSMENT

2.1 CHAPTER OVERVIEW

In this chapter, the problem statement of the company is clearly defined, and practical scenarios are given to validate the statement even further. In addition, the chapter discussed the techniques adopted to undertake the assessment of the company's needs as well as the chosen methodology.

Problem Statement

The Ashesi shop faces several key challenges that prevent it from maximizing revenue from its target market. From a careful assessment of their sales and inventory sheets, I, together with the director of the shop arrived at a meaningful conclusion. We concluded that the challenges the shop was facing were intertwined and needed a solution that addressed the root problem as a primary measure to consequently eradicate sub-related problems. One such problem was poor management of inventory, whether incoming or outgoing in the form of sales or damaged goods to be replaced. There is no outlined structure to guide this process and this has made tracking and updating of inventory tedious. As this continues to happen, the quality of items deteriorates due to the extended shelf life of some items. As such this project seeks to address the inventory and stock control issues by determining the optimal decision areas of what to order, when to order and how much to order.

2.2 Needs Analysis

In this section, Witkin and Altschuld's three-phase needs assessment model was used as an analysis, assessment, and action plan framework. While a theory is a logical attempt to explain and describe reality, models are a generalized and structured representation of

that reality (Richey, Klein, & Tracey, 2011). Witkins's needs assessment model describes a generalizable system with information and data inputs, internal processing phases, and potential solutions or interventions as outputs (Altschuld & Watkins, 2014). It consists of a pre-assessment, main assessment, and post-assessment and was conducted to validate the problem and set meaningful objectives to mitigate the identified problems. The information obtained thus far has documents on inventory for the Fall and Spring semesters of 2017 according to the university's calendar and the sales sheet for the respective semesters. The pre-assessment has been validated prior to the section. It was discussed in the problem statement as well as the rationale for conducting the study.

<div align="center">Pre-Assessment</div>

In exploring the problem space, I used the technique of observational shadowing to validate certain assumptions. These assumptions were that few people entered the shop and took an extra step to purchase items. The other assumption was that in the case that someone purchased an item, it was most likely a departmental sale and not a student (cash) sale. This was done from the beginning of October through to November. Per the information retrieved, the majority of sales came from departments with only a few cash sales coming from a few students and some guests of the university. This will be further discussed in the subsequent analysis.

<div align="center">Main Assessment</div>

Per the information retrieved from observational shadowing, the majority of sales came from departments with only a few cash sales coming from a few students and some guests of the university. Indeed, from this, we conclude that between the period, few people purchased items in the shop, specifically with cash.

Preliminary data was gathered from the client in the form of financial documents. This quantitative data would be further assessed through visualizing using charts and trends

to gain a deeper understanding of how the shop has been performing in terms of inventory and cash sales. The documents available for study are for the 2017 academic period. With this information. Projections would be made for the next academic period to better inform us of the appropriate strategies to use to mitigate further risks.

<div align="center">Post-Assessment</div>

A brief look at the sheets has already hinted at a low ratio for cash sales as supposed to credit sales. This means departments patronize the shop more than students and people who only have the option of paying with cash. Some reasons we believe can cause this is the relatively expensive prices of items in the shop. As the threat of substitution is high, students may deem the items to be a luxury good, hence would look for cheaper alternatives. Also, the restricted payment options limit the shop's sales. Departments in the university have budget allocations for such expenditure. Once it has been covered for already, it is easier to purchase more readily than the students who have cash as their sole payment option.

2. 3 Methodology and Data Assessment

Based on the problem identified, a more quantitative study was the preferred means of assessment. This is because the data presented by management was more data-driven in the form of numbers and statistics. Also, the underlying assumption is that the Ashesi shop has an inefficient stock management system. As this is the claim, a quantitative approach will draw relationships through the study of literature and analysis of data to bring about the best possible problem-solution fit. Per this understanding, the General Manager of the Ashesi shop provided me with their financial statements for the spring semesters in 2016 and 2017, which cover a three-month working period. However, for my assessment, I siphoned out the opening and closing stock figures coupled with the prices of each item to

properly assess the problem identified. A cross-analysis was done to identify any possible similarities between both periods and reasons, if any, why they exist.

Findings from 2016 Inventory Sheet

For 2016, the figure below shows the stock levels for the spring semester for 13 items, all with varying prices.
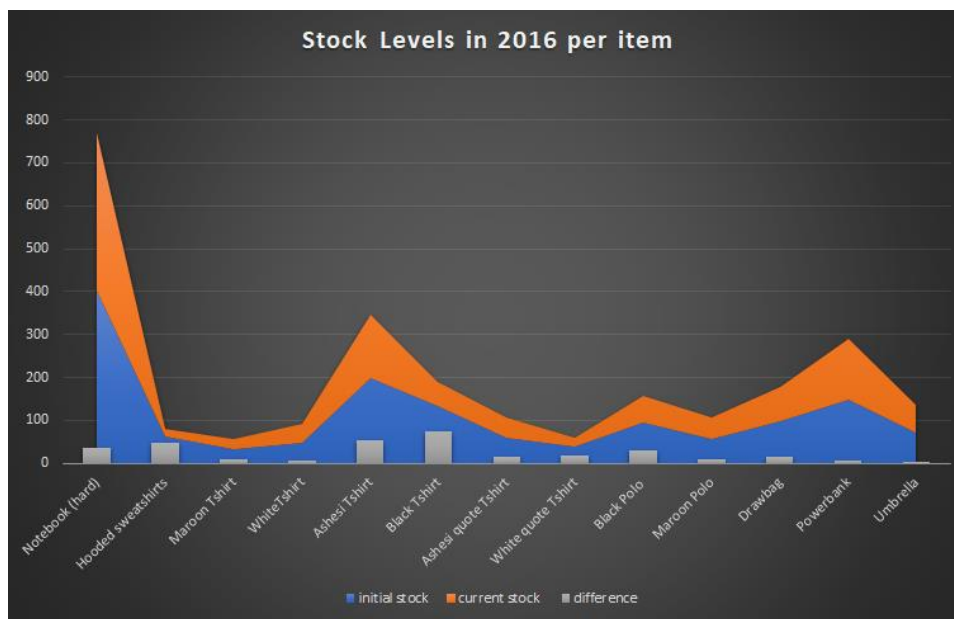
This is a multi-faceted graph showing the relationship between two or more variables, specifically the initial stock, current stock and the variance. The variance emphasizes on how readily stocks are depleted. The initial stock level shows the starting amount for each item which is coded in blue and the closing stock is in orange. The significance of the initial and closing stock is to visualize how many items were in stock and what was left after the period.

Therefore, more emphasis should be placed on the grey bar which shows the amount sold. From the grey bars, very few items were sold except for the black t-shirt and the Ashesi t-shirt. Every other item per the chart sold less than 20% of their initial stock. Of these sales, more than half were sold to departments in the form of credit.

From subsequent discussions with shop management, I was informed that per university policy, departmental sales were credit sales because departments within the university submit budgets before the semester begins and this disallows them from using revenue to reorder depleting stocks.

In the summer of 2016, sales were made to visitors who were on campus. The documents provided to me point to the fact that departmental sales far outweighed cash sales. Again, this is expected as departments have budgets approved before the semester beings and leverage upon this to purchase at will. Items worth GHS 17,312.85 was sold during the 2016 period from January through to December. Of this amount, GHS 10,022 was under departmental sales (58.4%).

In terms of weekly sales, the items which sold regularly were pens and hoodies. Interestingly, these two products sold out within the annual period. Aggarwal and Tyagi (2014), highlighted in their research article a critical point concerning credit sales. They stated that the credit period allowed by a retail shop has an influence on demand and hence it becomes a good foundation to determine inventory decisions.

Therefore, since inventory decisions and the credit period are closely related, the decision on inventory levels must synchronize with the credit period of the shop. If the shop has a high proportion of their sales in the form of credit, then inventory levels must replicate that reality to prevent the stockouts and overstocking that has been recurring.

Findings from 2017 Inventory Sheet

For the 2017 spring semester, the figure below presents data in the form of a chart on the sales and stock levels of 13 items mainly categorized into stationery, shirts and bags. Again, all with varying prices.
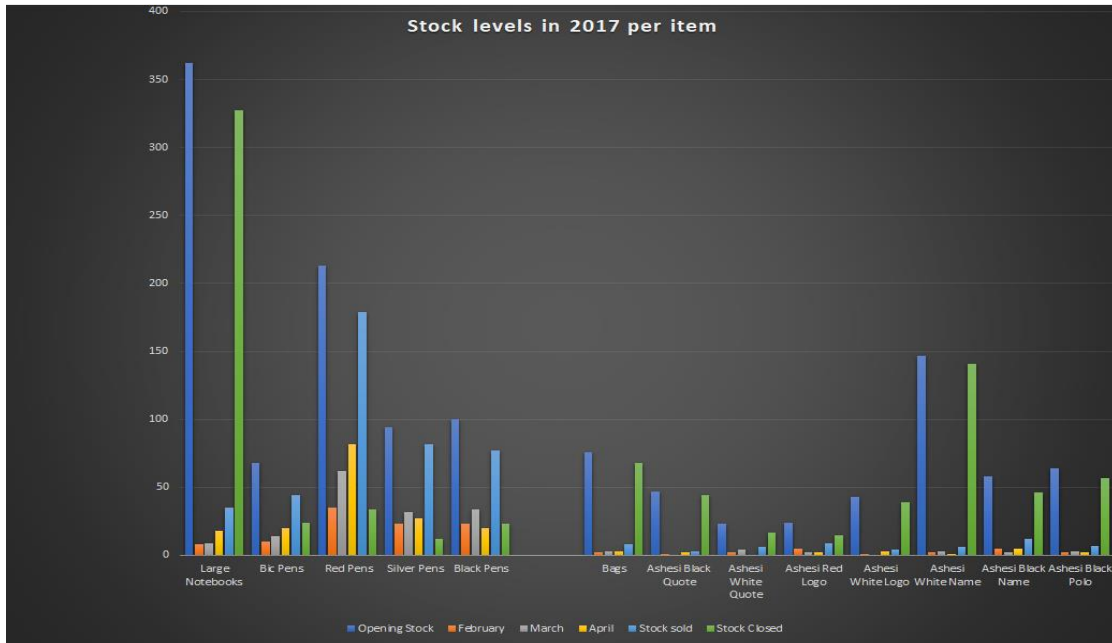
This chart shows how monthly sales performed and which products sold more. The stocks at the beginning of the year for 2017 was GHS 57,120. Of this amount, GHS 11,466 was sold in total. More than half of the sales amount was purchased by departments once more. Again, stationary products and hoodies contributed greatly to revenue as compared to other products. Stationary products were the cheapest products on the shelf besides the stickers. The hoodies are a popular item and came in small stocks, thus was cleared more quickly than other products.

One critical limitation faced when assessing the stock control needs of the Ashesi Shop was the accuracy of information presented in the documents given. Some figures did not tally. The opening and closing stock figures are highly unreliable as there were lapses in the weekly stock taking. For example, in 2017, the opening stock for caps was 80 and the closing stock recorded was 61. It is expected that 19 items would have been sold. However, the monthly report for the spring semester shows that 38 caps were sold between February, March and April. It would be therefore unclear the exact error that took place. Perhaps there

was a miscalculation in the counting of stock or pilfering or even restocking that item without making a distinct record of the new addition to stock.

CHAPTER THREE: LITERATURE REVIEW

3. 1 CHAPTER OVERVIEW

In this chapter, various frameworks and assessments used and conducted by other authors to develop a cost-effect stock control system will be discussed. Specific attention was given to scholarly articles which had direct relation to the problem at hand. The outline of the various articles are as follows.

3. 2 Outline

3.3 Identifying Stock control problems

One critical purpose of stock control strategies is to reduce waste and reach an optimal point for efficient decision making which reduces costs associated with the supply chain. A doctoral study by Mackie Johnson on retail inventory control strategies sought to explore cost-effective inventory control strategies used by discount retail managers. Chaos theory was the framework that was used to help identify why some business managers relied heavily on forecasting techniques amongst other cost-effective strategies.

 The aim of using these strategies was to prevent stock-outs. According to Corsten and Gruen (2003), retailers rely on their intuitive skills to evaluate their stock needs. Products are ordered, and demand is assumed using such intuitive knowledge and oftentimes, this led to stock-outs or over-ordering, and in some instances, both occurring at different times (Adusei & Awunyo-Vitor, 2014; Eroglu, Williams, & Waller, 2013). This knowledge suggests that relying on intuitive knowledge alone can be detrimental to stock

control activities. Mere assumptions based on no figures and data or inaccurate data can negatively affect a company's understanding of its stock position. Corsten and Gruen's article showed that the average retail business will lose 4% of realizable revenue due to the 31% of customers who will buy products from another retailer when items are not available for purchase. From this article, it shows that there is some possible link between stock taking, order quantities, the overall management of stocks and revenue generation. This was echoed by Helm, Hegenbart & Endres (2013) in their study when they concluded that customer satisfaction, customer loyalty, and company profits tend to fall as stockouts remain unchecked.

A specific article by Bala sheds more light on the significance of this. His study focused on improving inventory performance with cluster-based demand forecasts. He conducted a longitudinal study on eight retailer managed items and uncovered a sales failure rate of 28.77%. The problem identified was that current inventory practices increased the risk of stockouts, led to the loss of revenue and saw a downturn in customer loyalty. These articles seem to hinge on some key facts; attempting to arrive at an optimal decision point for a stock control strategy using forecasting techniques is detrimental and inefficient. It leads to stockouts and over-ordering. Secondly, the poor management of stocks has ripple effects, some of which directly relate to revenue generation, customer patronage, and demand fluctuations. The approach to identifying stock control issues should be a holistic and all-inclusive effort lest it affects the entire organization.

3.4 Managing stocktaking

Inventory management involves tracking products as they move in and out of inventory or through the supply chain. (Adusei & Awunyo-Vitor, 2014). Barwa (2015) conducted a study on inventory control as an effective decision-making model in 2015. The purpose of the study was to carry out research to analyze factors involved in inventory

control decision process and how it impacts the growth of companies. Secondary data was used to assess and draw conclusions. In assessing the inventory needs and position, it was realized that inventory represents one of the key components in a company's balance sheet and acts as a critical function to help identify the continued success of operational activities (Michalski, 2009). This portion of his study was pointing to the need to use the right data to manage stock and draw information from. His study showed the significance of the balance sheet as a good starting point for retrieving data on inventory levels.

According to Barwa, the effectiveness of inventory management and control is measured by how well a company can reduce its investments in inventory while achieving maximum throughput and meeting its customer service goals within the minimum operational costs. This knowledge relates to the preceding paragraph which focused on how poor stock control practices coupled with inaccurate information leads to low customer patronage. Barwa continues to explain how complex the management of inventory is because it goes beyond just determining what inventory items needs to be stocked, how much needs to be held on hand and when reordering is needed and at what levels.

Andersson et al., (2010) discovered two broad factors that led to inventory problems. The first was that there exist conflicts in objectives across several distinct segments in a company and secondly, there lies an uncertainty in the nature of its supply and demand. There is, therefore, a need to monitor stock at any given point. This also entails keeping track of excess and deficits too. They asserted that there are many methods that are used by companies and all are efficient its own right (Andersson et al., 2010). Some methods proposed or highlighted include the minimum stock level, stock review, batch control, just-in-time, EOQ, and many others. To being specific to the company at hand, a few of these methods will be discussed more in-depth but, in the end, a fair summary would be given which encapsulates all.

3.5 Minimum Stock Level

According to their research, the minimum stock level method fixes a minimum quantity at which the company will reorder and restock. This is also known as the reorder level. This is done to ensure that a customer is never unfulfilled and that the company is always capable of aiding a customer to make a purchase.

3.6 Stock Review

The study further discussed the stock review and describes it as a consistent crosscheck on stocks regularly. This is done at certain intervals where the stock is reviewed and if need be, products are reordered to the pre-set level. One drawback for this is the possibility of unforeseen occurrences. The margin of error for this approach is a bit higher per Andersson et al. However, it helps to keep the business operation is a recognizable pattern and a certain controllable pace.

3.7 Batch Control

A third option is batch control. This requires managing the production if the form of batches. For a retail business. Orders will be placed in batches and will need to be as accurate as possible to cover for the demand until the next batch is ready. If this is not properly managed, there could be a stockout and customers will have no choice but to find an alternative option.

The methods described by this study focused on eliminating any chances of stockouts and gave preference to different forms of companies, be it a large company or a small company, the methods stated are all applicable.

All these methods are to prevent poor inventory management. Again, Andersson et al. states that poor inventory management can cause sales to fall because of frequent stock

outs or deteriorating quality in products because it has had a longer inventory life. This being the case, it will not be able to supply according to the demand and so sales will keep falling (Alfaro & Rabade, 2009). The study went on to discuss factors involved in decision making of inventory. They recognize the difficulty in deciding the best quantity for inventory which does not adversely affect the cash flow but rather remains perfectly in line with the demand of the product. In managing inventory efficiently, they noted key success factors on which to deliberate on. These were order size, number of orders, safety stock, lead time, purchasing order cost and carrying cost. All these are very important, especially for small shops. The order size defines the units of products per order (Caro & Gallien, 2010). Is there going to be one large order or is it going to come in portions? With a question such as this, authors on this topic advise professionals to consider not only cost, but the demand forecasted over the given period. Safety stock is another crucial point to note. This is the backup stock which ensures that the company would never run out of stock to act as a supplier to the company in times of need.

The purchasing cost decision, as also identified by other authors deem it necessary to consider the best rates possible to keep the cost as low as possible. This will make the profit margin larger (Zhou & Yu, 2011). The carrying cost of the product is a key factor here. There must be some storage space for the new items to prevent pilfering amongst other drawbacks. Generally, the bigger the size of the order, the more money will be needed for investment, storage costs and warehousing.

From all these decision-making success points, though there are many benefits that may accrue from utilizing such techniques, stock overages and stockouts still occur. Much like the Ashesi shop, the frequent occurrence of stock overages and stockouts point to the fact that inventory levels are not being optimized. Thus, there is a need for an inventory optimization system. The most important takeaway from Andersson et al. is that there needs

to be a heavy investment into mechanisms that are designed to effectively classify multiple stocking levels. This is based on the analysis put forth through preceding demands and support the management of suppliers based on their recent performances while improving the forecasting of anticipated demand. Their charge to business directors is to invest in advanced inventory management systems that allow them to mitigate the factors involved in the inventory control decision-making process contributing to high inventory costs (Andersson et al., 2010).

3.8 Frameworks

An organization's objective should aim to increase wealth generation, and this means obtaining the optimum level of inventory. It must neither be excessive nor unable to meet customer needs. For this to happen, authors in this field of study suggest two sub-systems, that is, economic order quantity and reorder point. The economic order size deals with the arriving at the lowest total of order and carrying cost for the items in inventory. The reorder point answers the issues concerned with when an order should be placed to prevent it from running out of goods. If the shop can place the order when the inventory reaches the reorder point, the new stock will arrive before the existing stocks are depleted. From research, there are several certified stock control models that have continuously proved to be useful for retail and manufacturing shops in meeting their objectives. From the nine that were researched and found, only models and frameworks pertaining to the problem identified of the Ashesi souvenir shop were seen to be optimal. The solution chosen solves the problem of what, when and how to order.

3.8.1 HML Analysis

This model used the price of line items as the criteria to distinguish important items that need close attention from other more inexpensive items. The items under this model are

categorized into three groups, namely; high, medium and low. Management determines what the various cut-off points are for the items based on their varying prices. For example, all items GHS 10 and below are regarded as low and perhaps GHS 10 – 50 as medium and GHS 50 and above as high.

3.8.2 VED Analysis

This framework classifies items based on their cruciality. It classifies the items into three groups; vital, essential and desirable. For vital products, their non-availability halts normal business activity. These are not just finished goods but also include supplementary products such as takeaway bags and receipts. These vital items may be less costly innately but tend to have high costs and losses for the shop, thus it is required that they are adequately stocked and tracked. For essential items, their stockouts cost is extremely high and detrimental to the profitability of the retail outlet. For desirable products, the need of the product is assessed and ranked to distinguish what is essential and what is not.

3.8.3 SDE Analysis

This is very useful when dealing with the scarcity of supply, especially for products that are imported. This model classifies inventory based on how freely available an item or scarce an item is, or the length of its lead time. The items are classified based on their availability. The geographical location of suppliers, the lead time, scarcity and reliability of suppliers are all factors to assess. Ideally, scarce items are those that are imported and require longer lead time. An average of six months is set aside for such items in inventory. The second category deals with those line items that are difficult to make available. This normally takes less than six months to procure. However, it also has a long lead time as well. The last category are the products that are easy to procure and make available.

Normally, these products and items are close by to the organization, hence the lead time is reasonable.

CHAPTER FOUR: SOLUTION AND IMPLEMENTATION PLAN

4.1 CHAPTER OVERVIEW

This chapter will outline in detail the solution developed and proposed to address the Ashesi souvenir shop's problem. Firstly, it will first talk about the proposed solution and how it relates to the major problems identified from the research findings. Then it will emphasize on the importance of this solution – the framework that was selected and why it was the most preferable. Lastly, it will show the possible benefits to be reaped from this all-inclusive solution.

4.2 Reason for the selected solution

In the introductory stages of this project, it was shown that the souvenir shop at Ashesi did not have an effective stock control system, specifically, tracking stock effectively, arriving at what, when and how to order to create optimality and accuracy of data collection. The purpose of this study is to develop a cost-effective stock control system which addresses the key problem identified. The proposed solution is a combination of strategies and models which the management of the shop can use to solve these problems. The model adopted to advise on how to arrive at this optimal point was the SDE and HML model. These models serve as key success points and if properly executed, can become key

decision areas for success. Also, for the all-inclusive system for better stock tracking, management and accuracy, I propose the management of the souvenir shop purchase the Nextar software. Earlier, research in this study proved that stockouts reduced customer patronage and the ripple effect of that was lost profit. The combined effect of applying these models and the software should be a solid internal system that guides the shop in all its stock control activities, from stock taking, tracking, procurement and what kinds of products to have in stock. The following are the models to be used and how they can be impactful.

4.2.1 SDE Model

The SDE analytical model serves as a good foundation to effectively manage inventory. By classifying which items/products are scarce, difficult and easy to make available, the souvenir shop should promote overall productivity. Most of the shop's products are imported, thus, their availability is either scarce or difficult as it takes a longer time to reorder items. From the literature studied, it was pointed out that using forecasts alone to draw conclusions was irrational, especially in a highly competitive industry such as this were the threat of substitutes is high. Similarly, doctoral studies provided in the literature review showed that inventory problems are caused by uncertainties in the nature of supply and demand of products. Below is an example of how to use the SDE model for the shop using some items from the shop. It will show how this model addresses these facts presented by researchers.

Product	Scarce /Difficult/ Easy	Lead time
T-shirts/Polos	Easy	Reasonable Lead time
Hoodies	Scarce	Longer Lead time
Caps	Difficult	Long Lead time

Notebooks	Easy	Reasonable Lead time
Bags	Scarce	Longer Lead time
Paper Bags	Difficult	Long Lead time
Pens	Difficult	Long Lead time
Stickers	Difficult	Long Lead time
Mugs	Scarce	Longer Lead time
Umbrellas	Scarce	Longer Lead time
Lanyards	Scarce	Longer Lead time

From the table above, majority of the items for sale in the shop are scarce because of the vendor selection. Most of the shop's vendors are overseas and somewhat unreliable. The shop is relatively small and serves a targeted market. Therefore, it aims to be cost-effective. However, with their vendors being geographically far, costs increase, and this is evident in the prices charged on the items. With information from the SDE model, the shop can assess better options based on it. Would it need to get suppliers who are much nearer? How would that affect quality and quantity? Would prices be significantly reduced to increase customer patronage? These are a few questions to ask when using the SDE model. It is a popular model for improving efficiency, saving time and improving the accuracy of data. It can even help eliminate some products which may be too costly for the souvenir shop. This model addresses the uncertainty of the nature of the supply and demand. This is because it provides key insights into vendor selection and its related costs. Ideally, from the simple analysis done using the SDE model above, items that are scarce and do not attract high revenue when in stock may need to be reconsidered. The SDE model answers the question of when to order and to an extent what to order as it deals with lead times and nearness to items the shop procures.

4.2.2 HML model

Another model worth using is the HML model. This model classifies items based on their unit prices. In this analysis, cut-off points are fixed by management to classify items. Items would be classified as high, medium and low cost. The steps to take when using this model are as follows. Firstly, management must prepare a list of items and calculate their unit cost and annual demand. Due to inaccuracies provided in the inventory sheets, it will be irrational to use standardized methods of calculating annual demand. Using the inventory sheets, though inaccurate, still paints a better picture of the annual demand levels. This is particularly true because the sheets provided followed closely, from 2016 to 2017. Hence, in calculating the annual demand of each item, the average of the variance between the initial and closing stock can be used. The next step is to arrange items in decreasing order of their unit cost. Afterward, calculate the percentage of unit cost, cumulative of unit cost and then categorize the items in the inventory. In summary, these three steps organize the item list based on which items contributes the most to revenue. The cut-off points are then fixed by management based on the three categories – high cost, medium cost, and low cost. The last step involves tabulating the figures calculated based on the categories and this will inform the shop of which products are highest in terms of usage value and price. Ideally, items with high usage value are normally low cost and play a key role in revenue generation. High-cost items can sometimes be high, intermediate or have low usage value. An example of the shop can be t-shirts and power banks. While t-shirts sold continuously at GHS 35, showing its relatively low-cost nature and high usage rate, power banks which is twice the price of t-shirts had low sales and low usage rate.

Again, this model helps the shop to prioritize their items based on their usage rate and unit price. It informs management of which area to focus on more. Realistically, low-cost items generally contribute 60 – 70% of total items. The HML model provides a better

understanding of what the shop should invest more into. It gives the shop tangible information on what items contribute more to revenue. As such, the shop would know what to order and per their individual contributions to revenue, the shop will also know how to order, specifically in what quantities.

For the Ashesi shop, it will be beneficial to combine the SDE model with the HML model. Knowing the lead times for the items in the shop, the HML model will add critical information concerning each item's contribution to revenue. Thus, items which have longer lead times and contribute very little to revenue should be disposed of because their long inventory life would reduce the profitability of the total shelf space.

4.2.3 Software

Now, it has been identified that the shop has a problem with obtaining accurate information on its stock level as well as the incoming obsolete stocks. This lack of consistent and accurate stock tracking has led to several irregularities. Credit sales has been hard to track because the traditional bookkeeping method is what is in use currently at the shop and the downside to it is the inaccuracy in recording sales and its related information.

The shop runs a multiple employee system where each employee runs shifts. Sales are recorded as sales occur but usually, the items on stock do not tally with the book records. It is also a difficult task to draw up financial statements. Having a good understanding of the financial position of the shop and its worth is necessary to make informed decisions concerning the shop and its stock position.

With all these problems, there needs to be a cost-effective system that is all-inclusive and attempts to integrate all these issues by adopting a solution. From research, the downloadable software, Nextar would be a perfect fit. It is a POS software for small-to-medium scale stores. It has features targeted at sales and inventory, with a cash register,

suppliers and estimates – all of which are essential for effectively managing stocks and a shop at large. There is a free version with basic features and a premium version with access to added benefits.

I propose the shop's management try the free version for a one-month period and if it suits their structure, they upgrade to the premium service. The premium service costs $190 annually, that is, $16 per month (GHS 90 per month).

4.3 Implementation Plan

With all these proposed models, it would have been ideal to carry out the solution and show the results in this paper. However, that cannot be the case as there is more information that will be needed to carry out the solution. In the former paragraphs, I showed in part, how the solution will be carried out and how it will be of benefit.

This section provides the roadmap to executing this solution. Discussions have been made with the General Manager of the shop and due to constraints, such as time and money, it will be a seamless activity if carried out during the summer break, when the shop is relatively less busy. The reason for this decision was to formally classify the summer period as a review period for the shop. This period would be a period of assessing the shop and its support systems to determine what worked well and what did not, to see low performing items and high performing items. Per these facts, this is the implementation plan for the summer break over a one-week period:

I.   Determine Goals and Objectives

To effectively implement the SDE and HML models thereby arriving at what to

order, how to order and when to order with the PR department. The output should be a clear and achievable goal understood by all parties involved.

II.   Discuss the findings of the project

To critically review the project findings and link the findings with the literature review to enable that the action plan is feasible and wholistic enough to cater for the needs as recognized by the project. The output should be a realistic project scope with clear boundaries and a good understanding of the success criteria from the findings.

III.   Initiate the HML model

 - The HML model is carried out first because it is ideal to know the items and how much they contribute to revenue based on their usage value and unit cost. This will be done is Ms. Excel

 - Prepare a list of items in the shop and calculate their unit cost and annual demand. Annual demand would be calculated using the average of the variance between the initial and closing stock of each item.

 - Arrange items in decreasing order of their unit cost.

 - Calculate the percentage of unit cost, cumulative of unit cost and then categorize the items in the inventory.

 - The cut-off points are then fixed by management based on the three categories – high cost, medium cost and low cost.

 - Tabulate the figures calculated based on the categories and this will inform the shop of which products are highest in terms of usage value and price.

IV.   Initiate the SDE Model

  - Using Ms. Excel, list all the items in the shop and determine their accessibility in terms of geographic location using the keywords; scarce, difficult and easy

- Determine the lead times of each item based on their keyword.

- Attach the duration based on their lead times of the period between ordering and receiving the order

V. Combine the HML and SDE model

- Using the contribution per unit of each item and usage rate, determine the most essential products

- Compare them to their lead times and determine if the current vendor selection list should be changed.

- Using the current information, determine the average order and reorder quantities for each item as well as the safety stock

- Based on the markup on the cost to form the price, compute the expected revenue from each item and total the revenue.

VI. Apply this same process for any new product the management of the shop may deem necessary for the shop.

This one-week plan focuses on the implementation of the models to arrive at the optimal point of what, when and how to order. The implementation of the software follows this period and would be purchased and functionalized before the start of the next academic year.

CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSION

5.1 CHAPTER OVERVIEW

- Firstly, the shop would need to carry out a brief market research in the Ashesi community to gain insights into what items they would most likely purchase in the souvenir shop. This information would feed into the solution and better arrive at a solid list of items for sale at the shop

- The management of the shop would need focus more on its vendor selection process. As stated in the literature review, having multiple vendors is best advised because it allows competitive bidding, especially in such a competitive industry. Also, the unreliability of the local vendors may be a good reason to have multiple vendors with a binding contract in the form of a memorandum of understanding (MOU). This type of contract is a more formal approach and keeps all parties liable for their actions.

- Internet accessibility is poor at the shop's premise. It would be ideal for the management of the shop to ensure that there is a strong Wi-Fi connection. This is essential because of the POS system which has online features that offer a premium service. Thus, with this recommendation, it would be ideal to have a desktop computer installed and fixed permanently in the shop, preferably, the IdeaCentre AIO 510 (23", Intel). This powerful desktop computer is popular for its fast processing ability and multi-touch display. It will be a great choice to complement the POS system.

- Another recommendation would be to have an advertising campaign showcasing what the shop has to offer. From my observations, I realized that not many people come to shop and the few who do have very little idea about the items in stock. An advertising campaign coupled with a discount period may attract more buyers

- The management also needs to consider a storage facility to properly safeguard items in stock. Currently, items in stock and stored in a box in the shop. This has resulted in dusty items and a deterioration in quality. The use of part of the space as storage also makes the shop look overcrowded and stuffy. For these reasons, it would be beneficial to the shop to designate a storage facility for better inventory control.

- Considering the rate at which departments purchase items in the shop, and in the quantities, it purchases it in, it would be wise to strategically plan for the different departments per their semester or annual budgets. For example, the Admissions department may have a budget of GHS 4,000. Of this amount, a meeting could be set up to forecast what items they may desire from the shop so that the management can further plan the estimated time when they will need the desired items as well as the quantities too.

- Lastly, management should consider opening a role for a National service personnel. This person would be responsible for the overall management of the shop, including all activities related to stock control and procurement. This would affect the current work study role as they would now become redundant.

5.2 PROJECT LIMITATIONS

The main limitation to this project was interpreting the inventory sheets as accurately as I would have liked to. Some parts of the sheets were inaccurate as some fields in the excel sheet were empty. The margin of error on the analysis from the empty fields was not significant but it still was a problem throughout the project. Another limitation may be my inability to test the solution until the off-season. For the proposed solution to be effectively, carried out, it is essential that the activities occur outside of the normal business day-to-day operations. Due to this, it is somewhat hard to prove the facts of the proposed solution. However, that has been overcome by the action plan which is specific enough in outlining the requisite steps to implement this project successfully.

REFERENCES

Adusei, C., & Awunyo-Vitor, D. (2014). Determinants of stock-out in retail shops in

    Ghana: Evidence from Kumasi metropolis. Modern Economy, 5, 1240-1252.

    doi:10.4236/me.2014.513115

Agrawal, N., & Smith, S.A. (2013). Optimal inventory management for a retail chain with

    diverse store demands. European Journal of Operational Research, 225 (3), pp.

    393–403.

Alfaro, J. A., & Rábade, L. A. (2009). Traceability as a strategic tool to improve inventory

    management: a case study in the food industry. International Journal of Production

    Economics, 118(1), 104-110.

Andersson, et al. (2010). Industrial aspects and literature survey: Combined inventory

    management and routing. Computers & Operations Research, 37(9), 1515-1536.

Altschuld, J. W., & Watkins, R. (2014). A primer on needs assessment: More than 40

years of   research and practice. In J. W. Altschuld & R. Watkins (Eds.), *Needs*

assessment: Trends   and a view toward the future. New Directions for Evaluation, 144,

5-18.

Bala, P. (2012). Improving inventory performance with clustering-based demand

    forecasts. Journal of Modelling in Management, 7, 23-37.

    doi:10.1108/17465661211208794

Baten, A., & Kamil, A. (2009). Some Results on Bellman Equations of Optimal

    Production Control in a Stochastic Manufacturing System. Journal of Probability

    and Statistics, 2009, 1-23. doi: 10.1155/2009/370217

Caro, F., & Gallien, J. (2010). Inventory management of a fast-fashion retail network.

    Operations Research, 58(2), 257-273.

Corsten, D., & Gruen, T. (2003). Desperately seeking shelf availability: An examination

    of the extent, the causes, and the efforts to address retail out-of- stocks.

    International Journal of Retail & Distribution Management, 31, 605-617.

    doi:10.1108/09590550310507731

Eroglu, C., Williams, B., & Waller, M. (2013). The backroom effect in retail operations.

    Production and Operations Management, 22, 915-923. doi:10.1111/j.1937-

    5956.2012.01393

Helm, R., Hegenbart, T., & Endres, H. (2013). Explaining costumer reactions to real

    stockouts. Review of Managerial Science, 7, 223-246. doi:10.1007/s11846-012-

    0079-8

Michalski, G. (2009). Inventory management optimization as part of operational risk

    management. Economic Computation and Economic Cybernetics Studies and

    Research, 213-222.

Johnson, M. (2016). *Retail Inventory Control Strategies* (Ph.D). Walden University.

Otchere, A.F., Adzimah, E.D., & Aikens, I. (2016), "Assessing the inventory management
practices in a selected company in Ghana", International Journal of Development
and Sustainability, Vol. 5 No. 3, pp. 105-119.

Richey, R. C., Klein, J. D., & Tracey, M. W. (2011). *The instructional design knowledge
base: Theory, research, and practice.* New York, NY: Routledge.

Sillem, E. (2011). *Buyer Power in the Clothing and Footwear Sector in the Netherlands*
(Ph.D). Tilburg University.

Zhou, S. X., & Yu, Y. (2011). TECHNICAL NOTE-Optimal Product Acquisition, Pricing,
and Inventory Management for Systems with Remanufacturing. Operations
Research, 59(2), 514-521.