

**DISTRIBUTION MANAGEMENT AND QUALITY OF FRESH FOOD SUPPLIES IN  
UGANDA POLICE FORCE: A CASE OF KAMPALA METROPOLITAN POLICE**

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## **DECLARATION**

I, **Natuhwera Gloria** hereby declare that this dissertation is my original work and that it does not incorporate without acknowledgement any material previously submitted for a Master's degree or any other academic award in any University; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text to that effect.

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## **APPROVAL**

This is to certify that this dissertation has been prepared and compiled by Natuhwera Gloria and that it was done under our supervision. It is now ready for submission to the Graduate School Kyambogo University in partial fulfilment for the requirements of the award of a Degree of Master of Science in Procurement and Supply Chain Management.

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## **DEDICATION**

This dissertation is dedicated to my parents Mr. Namanya Yoram and Miss. Asingwire Constance for they have been my motivation to improve again and again.

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I thank my supervisors Dr. Francis Ssenoga and Dr. Obanda Peter for the guidance and counselling during the dissertation writing and for the sacrifice of their time. The discussions we held and the advice they gave me not only helped me to complete this dissertation but also to look at work-life issues in more practical and logical ways as an up to date academician. Their patience, critical comments and constructive suggestions gave meaning to the ideas expressed in this dissertation.

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## **LIST OF ABBREVIATIONS**

CT	:	Counter Terrorism
CVI	:	Content Validity Index
EDI	:	Electronic Data Interchange
ERP	:	Enterprise Resource Planning
FAO	:	Food and Agriculture Organisation
FEFO	:	First Expired First Out
FFU	:	Field Force Unit
GIS	:	Global Information Systems
IARW	:	International Association of Refrigerated Warehouse
IFPRI	:	International Food Policy Research Institute
IIR	:	International Institute of Refrigeration
KMP	:	Kampala Metropolitan Police
UPF	:	Uganda Police Force
VIPPU	:	Very Important Peoples' Police Unit
WFLO	:	World Food Logistics Organization
WHO	:	World Health Organisation?
WRAP	:	Waste and Resource Action Programme

## ABSTRACT

The general objective of the study was to examine the effect of distribution management on quality of fresh food supplies in Uganda Police Force at Metropolitan Police. The study specifically assessed the effect of transportation, storage and information flow in the UPF at Metropolitan police. The study used a case study design adopting quantitative and qualitative approaches. The study sample included 248 respondents consisting of police officers, quarter masters and mistresses and logistics officers. The study found a moderate positive and significant relationship between transportation and quality of fresh food supplies in UPF although it was the second most significant predictor of the variance in quality of fresh food supplies ( $r = 0.491^{**}$ ,  $p = 0.000$ ,  $\beta_1 = 0.234$ ,  $t = 2.200$ ,  $\text{Sig.} = 0.029$ ). There was a moderate positive significant relationship between storage and quality of fresh food supplies and it was not a significant predictor of the variance in quality of fresh food supplies ( $r = 0.478^{**}$ ,  $\beta_1 = 0.120$ ,  $t = 1.103$ ,  $\text{sig} = 0.271$ ). Information flow had a moderate positive significant relationship with quality of fresh food supplies and it was the most significant predictor of the variance in quality of fresh food supplies ( $r = 0.517^{**}$ ,  $\beta_1 = 0.354$ ,  $t = 3.805$ ,  $\text{Sig.} = 0.000$ ). The study recommended that UPF should procure vehicles with different temperature-insulated containers or other climate control solutions which are required in the transportation of fresh food supplies, UPF should take advantage of technology improvements in data capture and processing, product tracking and tracing, synchronized transport transit times for time compression along the supply chain, UPF should invest in fresh food cold chains, UPF should also adopt the FEFO ideology where the first expired should be the first to be issued out in order to reduce on the loss, UPF should budget for the construction of modern and efficient storage facilities, UPF should invest in technology, where appropriate, and become as efficient as possible in tracing and tracking the shelf life of these fresh food supplies and finally, UPF should draft a clear communication channel from the point of receipt by the quarter masters to the logistics personnel and also encourage constant feedback from the end consumers with the aim to reduce delays in deliveries and use feedback to improve on the quality of fresh food supplies.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.0 Introduction**

The distribution of fresh food is different from the distribution of other products. Fresh food products, show continuous quality changes throughout the supply chain, all the way until final consumption. Hence, in fresh food distribution, quality, health and safety require central consideration (Akkerman & Grunow, 2010). The significance of food safety has continually been vigorously discussed after the incidence of food scares. The distribution of fresh food in the current globalized economy is a key discussion point in society at the same time as in academic literature and the food industry has been at the forefront in developments related to sustainability. This study therefore intended to examine the effect of distribution management on the quality of fresh food supplies in Uganda police force. This chapter presented the background of the study, problem statement, study objectives, research questions, scope, significance and conceptual framework of the study.

### **1.1 Background to the study**

#### **1.1.1 Historical background**

Over the past decade, the fresh produce (food) supply chain has undergone numerous changes, with retailers becoming increasingly powerful (Hingley, Lindgreen & Casswell, 2006). The overall trend is towards the industry being dominated by a few large corporations operating with some corporations even operating on a European or global scale. The challenge of fresh foods quality is a global challenge given the high perishability levels of fresh foods with huge waste.

The United Nations estimates that a third of the global human food is wasted each year (He et al., 2018). In the United States alone, about \$218 billion while in Europe \$143 billion and \$ 27

billion in Canada worthy of fresh food loss was lost due to poor food handling and distribution (FUSIONS, 2016). Fresh food quality is a serious health concern worldwide and specifically in developing countries with the World Health Organization WHO (2015) reporting, that about 600 million people suffered effects of contaminated food of which 420,000 died. The same report shows Africa with the highest food contaminants burden per population followed by South-East Asia (WHO, 2015).

Fresh Food spoilage is one of the key issues related to food safety and quality. When food products move from farms to food processors, food retailers, and end consumers, spoilage cannot be avoided and hence perishability. In addition, other reports, opines that 40% of total production was wasted FAO (2007), NRDC (2012). The global incidence of food borne disease is difficult to estimate, but it has been reported that in 2000 alone 2.1 million people died from diarrhoeal diseases ( United Nations, 2007). This report postulates that a great proportion of these cases can be attributed to contamination of fresh food and drinking water. Similarly, in industrialized countries, the percentage of people suffering from food borne diseases each year has been reported to be up to 30%. In the United States of America (USA), for example, around 76 million cases of food borne diseases, resulting in 325,000 hospitalizations and 5,000 deaths, are estimated to occur each year ( United Nations, 2007). While less well documented, developing countries bear the effect of the problem due to the presence of a wide range of food borne diseases, including those caused by parasites. This is reported to be due to poor transportation means, storage challenges and lack of effective information between the producers and the consumers. As such, the high occurrence of diarrhoeal diseases in many developing countries suggests major underlying food safety problems ( United Nations, 2007).



### **1.1.2 Theoretical background**

Economic Distribution Theory by Domschke and Schild (1994) guided the study. They emphasise that distribution encompasses a system of all activities that are related to the transfer of economic goods between manufacturers and consumers. It includes such a coordinated preparation of manufactured goods according to their type and volume, space and time, so that supply deadlines can be met (order fulfilment) or estimated demand can be efficiently satisfied (when producing for an anonymous market (Domschke & Schild, 1994). This theory assumes that the distribution systems are divided into two that is the logistic physical distribution system and the acquisition distribution system. In this case, the theory is helpful in explaining the channels through which fresh food moves from one point to another. In this case, the distribution of fresh food in Uganda police follows the logistics physical distribution system, and as such, the theory helped in explaining the transportation, storage and information flow management of fresh food at Uganda police.

However, Specht (1988) stated out that this division is partly inaccurate since both of these subsystems exhibit certain common starting points. According to Specht (1988), acquisition distribution system management includes the management of distribution routes for example, distribution channels. Logistic distribution system is focused on bridging the space and time by transportation and storage, as well as order processing and shipment, supply logistics, such as the movement of materials (Specht, 1988).

### **1.1.3 Conceptual background**

The study had two major concepts that is, Distribution Management and Quality of Fresh Food Supplies as discussed below;

**Distribution management** refers to the process of overseeing the movement of goods from supplier or manufacturer to point of sale (Kenton, 2019). This involves the physical flow and storage of products from the production point to the customer or end user and it is conceived as the activities associated with movement of materials from source to destination (Rushton, Croucher & Baker, 2006).

Distribution management mechanism of transportation, storage and information flow are relied on in fresh foods supply to ensure quality delivery of fresh foods to the final consumer (He et al., 2018). Distribution Management under this study was conceptualised as transportation, storage facilities and information flow these were chosen because of their direct effect on quality of fresh food supplies from supply to the final consumer that's why it's worth the study to understand how these three activities in the supply chain influence quality of fresh supplies.

### **Quality of fresh food Supplies**

Noelke and Caswell (2000) defined Food quality as a spectrum of attributes notably food safety, naturally expected nutritional content, physical attributes, shelf life, and safety. Kramer (1965) defined the Quality of foods as the composition of the traits that separate individual units of a product and have an effect in determining the satisfactoriness of that unit to the user. The quality of fresh-cut vegetables can be defined, from a consumer point of view, as combination of the attributes including health (high nutritional value), shelf life (freshness) and convenience (easy to use, to prepare) (Rico, Martin-Diana, Barat & Barry-Ryan, 2007). Quality of fresh supplies or food is measured by texture, nutritional value, flavour (taste and aroma), colour and appearance, freshness and firmness of the supplies (Barrett, Beaulieu & Shewfelf, 2010). Food quality is related to food availability that is the quality of available food fruits, vegetables, meat and

packaged foods that influence purchasing decisions (Zenk, Odoms-Young, Dallas, Hardy, Watkins, Hoskins-Wroten & Holland, 2011).

However, in the context of this study, the shelf life, food safety and sensory characteristics indicators were considered for appropriate measurement. Physical attributes indicators of the food quality include test, appearance, colour, smell, and freshness as sensed by the consumer. Shelf life of the fresh food includes the length of time that the commodity may be stored without becoming unfit for use or consumption and safety (Noelke & Caswell, 2000).

Sensory characteristics were measured as flavour, colour and appearance and finally texture. The sensory perception of food is determined by the overall sensation of odour, taste, colour, texture and appearance, which is determined by physical features and chemical composition (Aramyan, Ondersteijn, Kooten & Lansink, 2006). Shelf life is the time required by a fresh-cut product to lose quality attributes, such a colour, aroma, firmness, freshness nutritional value and texture, below a level acceptable to the consumer (Nicola, Tibaldi, G & Fontana, 2009).

#### **1.2.4 Contextual background**

The UPF in the delivery of its mandate of protecting life and property, the department of logistics does procure and ensure effective and efficient distribution of consumables and non-consumables to its field personnel. Among the key and sensitive consumables, include fresh food supplies such as meat, tomatoes, potatoes, cabbages, onions, milk, eggs and bread that are distributed to feed officers within the Kampala Metropolitan areas ( UPF- Logistics Report, 2017).

The UPF adopted a well distribution mechanism in its logistics function where orders are placed on a weekly basis and specific quantities of fresh food quality are delivered as per call off orders.

The Director Logistics and Engineering who doubles as accounting officer issues call off orders to the undersecretary for signing which are later sent to the suppliers informing them to deliver when need arises. After it has been approved, the document goes to the Quartermaster who issues it to the supplier to make supplies. From the stores, the store personnel receive stock with the help of store committee to ensure quality as defined in contract specifications. When fresh food is supplied, the store personnel then calls regions, divisions and units field logistic officers to come, pick fresh food, and take for consumption (UPF Logistics Structure, 2019).

**Table 1. 1: Trends in Fresh Foods Supplies in UPF**

Item	2015		2016		2017		2018		2019	
	Quantity orders	Reject/ perished	Quantity orders	Reject Perish	Quantity orders	Reject Perish	Quantity orders	Reject Perish	Quantity orders	Reject Perish
Meat (Kg)	53,940	12,940	60,304	10500	35,932	5,232	18,561	7100	23,000	5,200
Cabbages (Kg)	53,000	14,400	68,812	12600	26,113	4,500	21,040	3200	18,259	2,740
Onions (Kg)	36,000	6,000	48,000	8900	30,000	5,000	26,324	5224	15,056	4,756
Potatoes (Kg)	36,000	2,000	72,000	3400	18,000	3,000	19,000	400	18,000	200
Tomatoes (Kg)	72,000	14,100	96,800	13770	68,400	9,800	71,800	11200	54,600	7,700
Eggs (Tray)	3,000	150	6,000	150	2,400	192	5,000	120	4,000	95
Milk (Litres)	36,000	2,400	72,000	7000	24,000	2,500	1,200	600	600	20

**UPF Fresh Food Returns Report (2015- 2019)**

Table 1.1 above showed an increasing challenge of quality of fresh foods supplies in UPF in virtually all items. Unless the force examines its distribution, management practices, value for money in fresh food supplies is threatened due to losses arising from reject or perished fresh foods.

**1.2 Problem statement**

The Uganda police force in its distribution management mechanism has put in place a distribution mechanism where fresh supplies are availed at the quartermaster stores and distributed to the divisions and units using police pickups. There is also a distribution structure

following the police organizational structure from quartermaster to division level for enhanced quality of fresh food supplies. Despite the distribution management mechanisms, UPF is faced with a persistent burden of spoilage of fresh food supplies in all their orders. These burdens are due to challenges such as inadequate transport arising from shortage of transport system among regions, divisions and units, shortage or lack of fuel, shortage of drivers. Besides, in its storage system, the UPF faces challenges such as inadequate space, poor or no ventilation, lack of pallets, lack of refrigerators and among others. To regulate efficient communication between store personnel and logistic field officers, the UPF is faced with the problem of information flow arising from the fact that officers in the distribution channels lack communication tools like radio calls, mobile telephone or late allowance of air time to their personnel mobile phone to speed up the distribution of fresh food from the stores to the field staff for consumptions (UPF reports 2015, UPF report 2016, UPF report 2017, UPF report 2018, and UPF report 2019). To support these observations, the Uganda Police Force suffered fresh food spoilage, which amounted to 25.34% meat, 18.55% cabbages, 20.5% onions, 5.52% potatoes, 15.54% tomatoes 3.46% eggs and 12.30% milk (UPF Fresh Food Returns Report, 2015-2019). It is due to these statistics that this study therefore intended to fill the gap by examining the effect of distribution management on quality of fresh foods supplies in the UPF right from storage, transportation and information flow within the Kampala Metropolitan areas.

### **1.3 General Objective**

To examine the effect of distribution management on quality of fresh food supplies in Uganda Police force at Kampala Metropolitan Police.

### **1.3.1 Specific Research objectives**

1. To assess how transportation affects fresh food quality in Uganda Police Force at Kampala metropolitan police
2. To analyse how storage affects fresh food quality in Uganda Police Force at Kampala metropolitan police
3. To assess how information flow affects fresh food quality in Uganda Police Force at Kampala metropolitan police

### **1.3.2 Research Questions**

1. To what extent does transportation affect fresh food quality in Uganda Police Force at Kampala metropolitan?
2. To what extent does storage affect fresh food quality in the Uganda Police Force at Kampala metropolitan?
3. How does information flow affect fresh food quality in the Uganda Police Force at Kampala metropolitan?

### **1.4 The Scope of the Study**

This study focused on the three dimensions of content, geographical and time scopes to understand the food perishability to get facts. This is based on the notion that if the extent of the content is clear it becomes easy to come to a logical understanding and give a satisfactory answer to the study. Besides, it makes it easier for the investigator to plan for the sources of data, which may be primary or secondary to discover facts, as they are not the ideal, for the researcher to have critical confidence in the conclusions.

#### **1.4.1 Content Scope**

The study concentrated on how distribution management affects the quality of fresh food supplies. This was limited to transportation, storage and information flow in relation to Quality of fresh food supplies under the indicators of shelf life, sensory characteristics and food safety indicators as the dependent variable

#### **1.4.2 Geographical Scope**

The study was conducted in Uganda Police Force's greater Kampala Metropolitan Policing area (KMP) which constitutes, KMP-East, KMP-South, and KMP-North covering the districts of Kampala, Wakiso, Mukono and Entebbe. KMP area has the highest consecration of police officers with higher ranks entitled to fresh food supplies and participates in the fresh food distribution chain (UPF Fresh Food Policy, 2015-2019). They were therefore deemed to possess the relevant experiences in distribution management and quality of fresh food supplies.

#### **1.4.3 Time Scope**

The study considered the period 2015-2020 the time UPF was implementing its five-year strategic plan but was experiencing challenges with its fresh food's quality associated with distribution management (UPF Fresh Food Returns Report 2015-2019)

#### **1.5 Justification of the Study**

Distribution management of fresh food supplies in the Uganda Police Force is still a challenge as evidenced by fresh food spoilage which amounts to 25.34% meat, 18.55% cabbages, 20.5% onions, 5.52% potatoes, 15.536% tomatoes 3.46% eggs and 12.30% milk (UPF Fresh Food Returns Report, 2015-2019). It's against this, that the study was worth an attempt to analyse the

current status of distribution management of fresh food supplies in UPF and to make recommendations to improve implementation.

### **1.6 Significance of the study**

The study is useful to the UPF Council, the supreme decision-making body which also help examine the distribution management practices affecting quality of fresh foods supplies in the force and generate distribution policy interventions to enhance fresh foods quality and attain value for money.

The study is one of the kinds used by other armed forces like the UPDF to understand and take caution on how distribution management affects the quality of fresh foods and providing insights on how better distribution could be handled.

Since there is scanty literature on distribution management and quality of fresh food supplies, this adds on the body of existing literature and also be used as a starting ground for other researchers who wish to explore the same area.

The study also provides useful insights to Uganda Police on the best ways of effectively and efficiently managing the distribution of fresh food supplies through the proposed recommendations made.

The study also helps suppliers of fresh foods to Uganda Police to supply the best quality supplies needed so that they avoid misunderstandings and losing their contracts with Uganda Police.

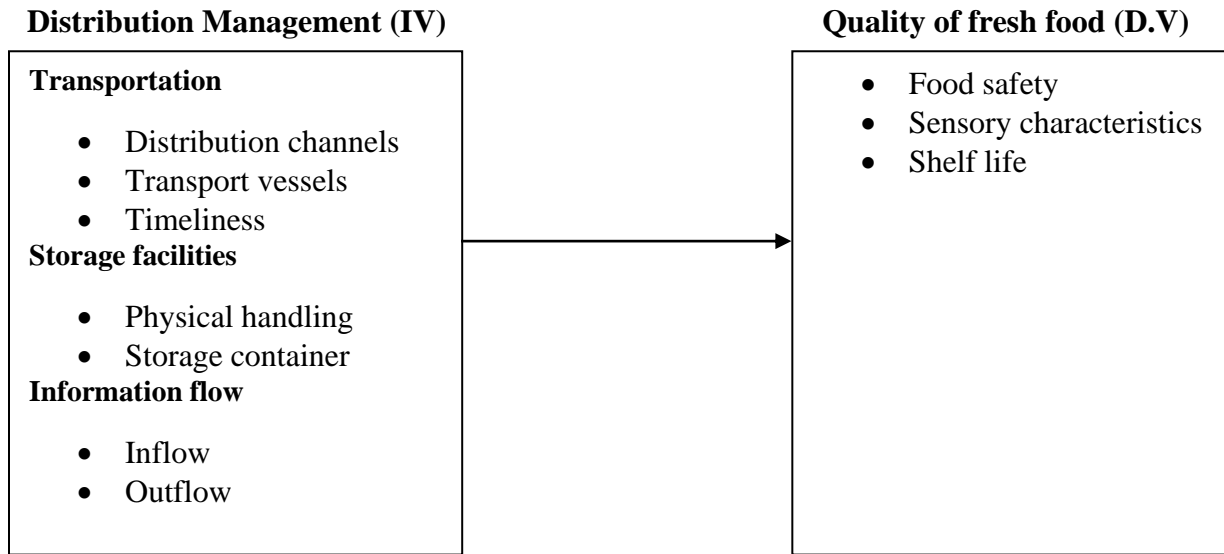
### **1.7 Conceptual Framework**

A conceptual framework is defined as generative frameworks that reflect the thinking of the entire research process. In the understanding of the conceptual frameworks, mostly, diagrams are



created to clearly define the constructs or variables of the research topic and their relationships are shown by the use of arrows.

**Figure 1. 1: Conceptual Framework illustrating the relationship between variables**



*Figure: framework showing the effect of distribution management on quality of fresh food supplies*

*Source: Adopted with modification from* (International Food Policy Research Institute(IFPRI), 2012)

Drawing from the above conceptual framework, the diagram indicates independent, dependent and intervening variables and shows how the different dimensions under the variables interact to cause food perishability as a problem, which this study investigated in the food distribution management. As reflected in the diagram and arrow, distribution management is the independent variable and quality of fresh food as the dependent variable. Since this study focused on fresh food distribution, the researcher envisaged that, the force would have an efficient transport with good storage and information flow systems as opined by the dimensions under the independent variable. On the other hand, the study assumed that when fresh food is delivered at the stores,

there is need for store managers to communicate to end users to pick in order to maintain the safety, sensory and shelf life of fresh food quality as stressed under the dependent variable.

On the other hand, much as the study would wish to see fresh food quality in terms of food safety, sensory characteristics and the shelf life with support from the dimensions under independent variable, these may not be possible because of the long organizational procedures where on delivery of fresh food at the stores, store assistant has to wait for auditors and others members of the store committee to come and verify or wait for permission from management to issue to consumers.

### **1.8 Key Terms**

**Supply chain management** is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements (Simchi-Levi, Kaminsky & Simchi-Levi, 2008).

**Food quality** refers to the physical properties of food products, but also to the way the product is perceived by the final consumer (Grunert, 2005). Noelke and Caswell (2000) defined Food quality as a spectrum of attributes notably food safety, naturally expected nutritional content, physical attributes, shelf life, and safety. Kramer (1965) defined Quality of foods as the composite of those characteristics that differentiate individual units of a product and have significance in determining the degree of acceptability of that unit to the user.

**Perishability** refers to the decay, damage, spoilage, evaporation, obsolescence, pilferage, loss of utility or loss of marginal value of a commodity that results in decreasing usefulness from the original one (Wee, 1993).

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter is a comprehensive overview of prior research regarding specific topic and showed the reader what was known about the topic and what was not known (Creswell, 2000). In this study, the researcher reviewed literature on the three dimensions of transportation, storage and information flow as shown in the conceptual framework on the topic; distribution management and its effects the quality of fresh food supplies in the Uganda Police Force. Therefore, this chapter starts with the theoretical framework that underpins the study and ends by reviewing related literature on the research questions in chapter one.

#### **2.1 Theoretical Framework**

Economic distribution theory (Domschke & Schild, 1994) guided the study. They emphasise that distribution encompasses a system of all activities that are related to the transfer of economic goods between manufacturers and consumers. It includes such a coordinated preparation of manufactured goods according to their type and volume, space and time, so that supply deadlines can be met (order fulfilment) or estimated demand can be efficiently satisfied when producing for an anonymous market (Domschke & Schild, 1994).

The theory assumes that the distribution systems are often divided into two such as the acquisition distribution system and the logistic, i.e. physical distribution system. In this case, the theory was helpful in explaining the channels through which fresh food moves from one point to another. In this case, the distribution of fresh food in Uganda police follows similar channels, and as such the theory helped in explaining the transportation, storage and information flow management of fresh food at Uganda police.

However, this theory presents some limitations that might limit this study on distribution management of fresh food supplies at Uganda police. For instance, Specht (1988) has pointed out that this division is not completely accurate, since both of these subsystems exhibit certain common starting points. According to Specht (1988), acquisition distribution system management includes the management of distribution routes such as distribution channels. Logistic distribution system is focused on bridging the space and time by transportation and storage, as well as order processing and shipment, supply logistics for example, the movement of materials (Specht, 1988).

## **2.2 Conceptual review**

They were two major concepts that informed this study namely;

### **2.2.1 Distribution Management**

Distribution management includes the physical flow and storage of products from the production point to the customer or end user and it is conceived as the activities associated with movement of materials from source to destination (Rushton, Croucher and Baker, 2006). To minimize food losses, Fonseca and Vergara, (2013) stated that an excellent logistics facility and logistics management should be adopted in the distribution process of food.

Food is an essential basic necessity which is a critical contributor to physical well-being and a major source of pleasure, its procurement, preparation and consumption are crucial for sustenance of life (Rozin et al., 2003).

It is due to this argument that Dharni and Rodrigue (2015) opined that distribution is essential to allow efficient movement of materials close to the consumers. Distribution management mechanism of transportation, storage and information flow are relied on in fresh foods supply to

ensure quality delivery of fresh foods to the final consumer (He et al., 2018). Distribution Management under this study was conceptualised as transportation, storage facilities and information flow these were chosen since they had a direct effect on the quality of fresh food supplies from the point of supply to the final consumer that's why it's worth the study to understand how these three activities in the supply chain influence quality of fresh supplies.

**The three parameters measuring Distribution Management are discussed below;**

**Transportation.** Transportation under this study has been measured using distribution channels, which simply means the networks that are used to make the fresh supplies available to the final consumers, transportation vessels on the other hand are containers that are used to carry the fresh supplies while in transit and timeliness referring to the urgency of delivery in order to avoid spoilage. Volpe, Roeger and Leibtag (2013) argue that transportation provide us with access to what people value and need to live their lives, work, education, food recreation and other essentials. In relation transportation of fresh food, Swinburn et al. (2017) underscores that it's imperative to use effective means to prevent fresh food from being spoilt.

Ajiboye and Afolayan, (2009) discussed about availability of transport facilitates in relation to food quality who assert the availability of transport facilitates are factors that stimulate economic growth through increased accessibility. After packaging the products, the supply chain consists of several more stages in which choices have to be made on using truck, rail or air to transport the products. Ahumada and Villalobos (2009), include product quality both in terms of a limited storage time and in terms of a decreasing value of the product over time (based on a linear decrease during the shelf life). Njenga (2015) hinges on the cooling facilities in the transportation process of food products where he asserts that if fresh food is not put in the

cooling facilities, the quality can be affected as a result of the bottlenecks and delays occasioned by undeveloped transport systems, weather and poor coordination of transport operations.

**Storage Facilities.** Under this study, storage facilities are conceptualised as physical handling and storage containers that are used to keep the fresh supplies and should be put in the favourable conditions to avoid going bad and keep the freshness of the supply. Food service operation needs to have noticeably defined storage areas and procedures for several reasons. These include; providing storage facilities it is possible to purchase supplies in large enough quantities to get price breaks. Having ability to store supplies on the premises reduces the cost and time needed to order supplies and handle them upon delivery and menu planning is easier when you are aware of the quality, quantity, and types of supplies that are on hand (Watkins and Nock, 2012).

Temperature control is the most significant factor in food preservation, especially for perishable commodities. Food packaging serves to protect products against deteriorative effects, contain the product, communicate to the consumer as a marketing tool, and provide consumers with ease of use and convenience (Singh, Mishra, Ali, Shukla and Shankar, 2015). The use of suitable packaging is vital in this respect. Retail packaging maintained up to the point of consumption has the advantage of maintaining high relative humidity around produce, reducing moisture and weight loss, preserving their appearance and freshness, and increasing the storage life (Nunes, Emond, Dea & Yagiz, 2011). According to Rolle (2006) and Stuart (2009), highly perishable products require sufficient storage facilities with well-maintained conditions, mainly temperature, relative humidity and gas composition.

**Information Flow.** Jean-Luc Hainaut (2013) looks at Information flow as a particular view that focuses on the path followed by information entities. Donk (2001) opines that the relationship between information flow and fresh food quality ranges from ordering raw materials that may be highly perishable such as milk to the point of consumption. Reardon and Timmer (2007), states that through the use of communication tools, such as the web sites, institutions and industrial organizations can build value in the quality of fresh food supply.

As the development of cutting-edge technologies, Food Supply Chain Management has been widely recognized by both practitioners and academia. Information technology has brought dramatic improvements to FSCM in terms of automatic food processing like cleansing and packing as well as freshness storage (King and Phumpiu, 1996); (Caswell, Bredahl and Hooker, 1998); (Wang, Chan and Li, 2015). Traceability of a food refers to a data trail, which follows the food physical trail through various statuses (Smith, Tatum, Belk, Scanga, Grandin & Sofos, 2005). Telecommunications and computer technology allow all the actors in the distribution process to communicate among each other (Bozarth & Handfield, 2015).

The use of information technology allows suppliers, manufacturers, distributors, retailers, and customers to reduce lead-time, paperwork, and other unnecessary activities. New technological developments such as time-temperature integrators or indicators can be used to improve temperature monitoring throughout the distribution system (Koutsoumanis, Giannakourou & Taoukis, 2003). This also allows for improved shelf life estimation with a chain perspective, for example shown by Raab, Bruckner, Beierle, Kampmann, Petersen, & Kreyenschmidt (2008) for pork and poultry chains and Dalgaard, Paw and Peter Buch (2002) for fish chains.



Li (2001) identified such information technology tools, among them electronic data interchange (EDI), enterprise resource planning (ERP), internet, and extranets. The use of Information system to manage distribution increases efficiency, predictability and reduce waste in value chains, which has positive impact on all market players (Ceva, 2010). Such tools of information system as cell phone and internet services, radio, and a wide range of digital devices and related tools, including cameras, GIS, a wide range of hand-held computing devices if appropriately used, has a potential of raising efficiency in the following distribution activities. record keeping, monitoring field agent activities, procurement operations, credit and payment tasks, input distribution, measuring productivity, and forecasting (Cooper, 2006).

### **2.2.2 Fresh food quality**

Noelke and Caswell (2000) defined Food quality as a spectrum of attributes notably food safety, naturally expected nutritional content, physical attributes, shelf life, and safety. The quality of fresh-cut vegetables can be defined, from a consumer point of view, as combination of the attributes including health (high nutritional value), shelf life (freshness) and convenience (easy to use, to prepare) (Rico, Martin-Diana, Barat & Barry-Ryan, 2007). Quality of fresh supplies or food is measured by texture, nutritional value, flavour (taste and aroma), colour and appearance, freshness and firmness of the supplies (Barrett, Beaulieu & Shewfelf, 2010). Food quality is linked to food availability for example, fruits, vegetables, meat and packaged food that influence purchasing decisions (Zenk, Odoms-Young, Dallas, Hardy, Watkins, Hoskins-Wroten and Holland, 2011).

Shelf life is the time required by a fresh-cut product to lose quality attributes, such as freshness, firmness, texture, colour, aroma and nutritional value, below a level acceptable to the consumer (Nicola, Tibaldi, G & Fontana, 2009). Shelf life is an intrinsic attribute of food (Luning &

Marcelis, 2009), and can be defined as the time during which the food product will remain safe, be certain to retain desired (sensory, chemical, physical, microbiological) characteristics (the sensory part, that include texture, taste, odour/smell/aroma, colour, and appearance-volume, uniformity, visual defects. The quality of fresh-cut vegetables can be defined, from a consumer point of view, as combination of the attributes including health (high nutritional value), shelf life (freshness) and convenience (easy to use, to prepare)(Rico, Martin-Diana, Barat & Barry-Ryan, 2007). Thus, it is important to keep the products fresh, while supplying in a convenient form without losing the nutritional quality (Ahvenainen, 1996) because the value of fresh-cut vegetables relies on the primary characteristics of shelf life and convenience and consumers judge quality of fresh-cut vegetables on the basis of appearance and freshness (best before date) (Kader, 2002).

Food safety is the totality of characteristics of the food products that bear on their ability to satisfy all legal, customer and consumer requirements (Will and Guenther, 2007). Absolute safety is an unattainable goal for any food. However, food is considered to be safe if there is reasonable demonstrated certainty that no harm will result from its consumption under anticipated conditions of use (WHO, 2015).

### **2.2.3 The effect of transportation on fresh food quality**

Transportation planning generally deals with vehicle steering problems. When considering product perishability, more factors should be reconsidered in this research area. First, food safety is a main concern when enterprises distribute the food products from manufacturer to retailers and customers. For example, Rijgersberg, Tromp, Jacxsens and Uggtendaele (2010) developed a simulation model of the distribution chain of fresh cut iceberg lettuce under the consideration of

quality and safety during distribution stage. Second, different types of perishable products should be stored in different conditions during transportation.

According to Matta (2016), Planning for transportation and storage includes resources and procedures to ensure that all equipment and support items are preserved, packaged, packed, marked, handled, transported, and stored properly for short and long-term requirements. It includes material-handling equipment, packaging, handling, storage requirements, and pre-positioning of material and parts. It also includes preservation, packaging level requirements and storage requirements.

Furthermore, Ajiboye and Afolayan (2009) stated the availability of transport facilities are factors that improve the quality of fresh foods through increased accessibility. It can affect the efficiency and effectiveness of production, distribution, marketing and consumption in many ways and also influence the cost of commodity consumed and the purchasing powers of the consumers. This argument gains support from Federgruen, Prastacos and Zipkin (1984) who reported that distribution management and quality of fresh food can also be compromised by availability and in-availability of vehicles. To them if vehicles are available together with salesmen, then there is a likelihood of food to be distributed while in fresh condition.

The selection of transportation modes is also a main focus of Ahumada and Villalobos (2009), who studied the production and distribution of packaged fresh produce. After packaging the products, the supply chain consists of several more stages in which choices have to be made on using truck, rail or air to transport the products. The authors also included product quality both in terms of a limited storage time and in terms of a declining value of the product over time.

Taylor (2001) put across general conditions that ought to be put into consideration when transporting fresh foods that is means of transport have to be constructed in a way to enable efficient cleaning and disinfection, and have to be kept in a clean and good condition in order to protect the food from contamination.

Food that is transported by any of the means of transportation or in containers has to be secured and arranged as to prevent any form of contamination, Food in various forms (liquid, bulk, powder, granules or granular food) needs to be transported in canisters, containers, or tanks intended for food transportation, which must be vividly and clearly labelled with non-erasable labels in the language used in the international food transport, so their use could be clearly seen; they also have to be clearly labelled “for food transportation only”. When means of transport and containers are used for the transport of various kinds of food and other products at the same time, they must be physically separated in order to prevent contamination. Means of transport and containers used for the transportation of foods which needs to be at a specific temperature level, have to ensure proper temperature control.

The HACCP guide continues to show that vehicles used for food transportation have to be constructed for this purpose, clean, dust and exhaustion fumes cannot enter the vehicle, they have to be weather resistant and enable specific temperature conditions. Depending on the food being transported, we can also differentiate conditions for food handling during the transportation. For example, frozen foods have to be transported in the appropriately chilled (-18 °C) or isolated conditions. Likewise, food that requires special temperature levels needs to be stored at the appropriate temperature immediately after the delivery as to avoid the possibility of microorganisms to grow (Eppink, Oosterkamp, Hiller, Sluis & Timmermans, 2011).

Njenga (2015) hinges on the cooling facilities in the transportation process of food products. According to the scholar, if fresh food is not put in the cooling facilities, the quality can be affected as a result of the obstacles and delays occasioned undeveloped transportation system, weather and poor coordination of transport operations. On the other hand, the lack of dependable and adequate cold chain facilities in sub-Saharan Africa is one of the main causes of losses of perishable products, which are estimated to be about 25–30 percent for animal products and 40–50 percent for roots, tubers, fruits and vegetables (FAO, 2011).

However, several scholars Krejcie et al. (2018) explain that distribution is faced with a variety of transportation-related challenges, including capacity shortages, issues with security contamination, and concerns over environmental impacts and non-renewable energy consumption. Dennis, Ooninx, Sarah, Broekhoven, Arnold and Huis (2015) illustrated that transport related packaging also might account for a significant portion of the greenhouse gas emissions and compromises food quality in the market.

#### **2.2.4 The effect of storage on fresh food quality.**

Supply chain members dealing with food are responsible for food preservation they put on the market according to prescribed regulations during all the phases of production, processing and distribution. They are mainly responsible for complying with the hygiene conditions, ensuring traceability in all the phases of food production, processing and distribution, animal food, animals used for food production (Akkerman, Farahani and Grunow, 2010). An imperative characteristic of many food distribution systems is temperature control. For a broad variety of products, temperature control is essential in controlling food quality and food safety (Akkerman, Farahani & Grunow, 2010). In relation to temperature control, we can basically identify three types of food supply chains: frozen, chilled and ambient. For the frozen and chilled chain, a

number of different temperatures are used. The frozen chain mainly operates at  $-18^{\circ}\text{C}$ , although a product like ice cream requires a frozen chain with an even lower temperature of  $-25^{\circ}\text{C}$ . For the chilled chain, temperatures range from  $0^{\circ}\text{C}$  for fresh fish to  $15^{\circ}\text{C}$  for example potatoes and bananas (Smith and Sparks, 2004). Finally, an ambient chain concerns product that do not require temperature control, such as canned food. Availability and efficient use of the cold chain significantly affect food quality (Mittal, 2007).

Temperature control is the most significant factor in food preservation, especially for perishable commodities. It is estimated that the rate of deterioration of perishables increases two- to three-fold with every  $10^{\circ}\text{C}$  increase in temperature within the commodity's physiological temperature range. Mittal (2007) reported that about 30 percent of the fruits and vegetables grown in India are lost or wasted annually due to gaps in the cold chain. Fonseca and Njie (2009) found that the lack of capacity of the cold chain is the main reason for post-harvest losses in Latin America and Caribbean countries. Therefore, maintaining low produce temperature right from harvest to retail (cold chain) is of paramount importance in quality preservation.

Different authors have also suggested a solution being first-expired-first-out (FEFO), which was first introduced at the end of the 1980s. The basic idea is to apply stock rotation in such a way that the remaining shelf life of each item is most matched to the remaining transport duration options, to reduce product waste during transportation and provide product consistency at the store Jedermann et al. (2014). Evans, Scaecelli and Swain (2007) show that consumers tend to wait until the food cannot be consumed, or until its "use-by" or "best-before date" is passed, before throwing it away. It thus often hides more complex reasons.

According to the scholar, highly perishable produce requires adequate storage facilities with well-maintained conditions, mainly temperature, relative humidity and gas composition. If infrastructure for initial storage is lacking, perishable produce can be spoiled within hours (Rolle, 2006); (Stuart, 2009). Without storage facilities, growers and producers need to sell their production not considering market price (not being able to wait for better price conditions), or leave the produce unharvested, or face the risk of a total loss, in the case of delayed collection by transporters, wholesale or retail stores. Additionally, in most countries of sub-Saharan Africa, use of cold chain for meat conservation encounters challenges, including low number of refrigerated trucks, lack of cold storage in consumption areas, apart from some supermarkets, high cost and unreliability of electricity supply, lack of material as well as of specialized human resources to manage them (FAO and IIR, 2000).

In Uganda there is an important potential demand for the use of cold chain, for meat, fruits and vegetables. However, there are important constraints to the development of the sector, in addition to those mentioned above, difficulties to find spare parts for materials often bought second hand in Europe, high costs and a lack of organization of the sector, with many installations dedicated to single enterprises (FAO and IIR (2000), often for export.

More scholars also opined that the use of low-quality containers, or use wrongly of containers, leading for example to injuries from puncture, vibration and compression, was a key factor in determining the quality of food distributed and supplied in firms (IARW-WFLO, 2019). This practice includes practices such as using liners in rough containers (wood or baskets) or halving the size of huge containers (sacks or crates) were found to reduce damage and subsequent losses by up to 35 percent (IARW-WFLO, 2019). Stuart (2009) argues that suboptimal storage conditions often favour chemical and biochemical reactions that result in undesirable changes in

colour, flavour, texture and nutritional value. Poor storage conditions also favour microbial growth and rotting of stored products, which are eventually discarded.

However, in some cases, there are no storage facilities and farmers simply store the grains inside their houses (Bett and Nguyo, 2007). Lack of storage, again, may lead to food loss and economic losses, as farmers needing to sell their grains soon after harvest due to lack of storage facilities create conditions of oversupply in the market, which attracts low prices. In Uganda, study on food analysis by FAO, WFP and IFAD (2019) suggested that, when polythene bags are perforated the quality of fresh food can be compromised by pests and rodents, leading to food spoilage in the process of storage. Choudhury (2006) highlights high loss rates associated with a lack of packing houses in India, with fresh fruit and vegetables generally packed in the field and some even transported without transit packaging.

A study conducted in Sweden Williams, Wikstrom, Otterbring, Lofgren and Gustafsson (2012) suggested that packaging and its functions relate to 20 to 25 percent of food waste. Portioning and pack size are identified as key drivers associated with food waste, as consumers tend to buy large packs and bulk offers, to maximize value for money (FUSIONS, 2014). Research suggested that consumers are not necessarily unenthusiastic to paying a little more per unit of volume/weight to avoid being left with unnecessary surplus (WRAP, 2008).

### **2.2.5 The effect of information flow on fresh food quality**

Telecommunications and computer technology allow all the actors in the distribution process to communicate among each other (Bozarth and Handfield, 2015). The use of information technology allows suppliers, manufacturers, distributors, retailers, and customers to reduce lead time, paperwork, and other unnecessary activities. It is also mentioned that managers experience



considerable advantages with its use such as the flow of information in a coordinated manner, access to information and data interchange, enhanced customer and supplier relationships, and inventory management not only at the national level but also international. Also the advantages included supply contracts via internet, distribution of strategies, outsourcing and procurement (Simchi Levi, Kaminsky and Simchi Levi, 2008).

Due to the importance of product quality in the food industry, Trienekens and Zuurbier (2008) expect that quality assurance will dominate the process of production and distribution, and that the costs for certification, auditing and quality assurance may evoke responses like technological innovation to create higher efficiency and reduce costs. New technological developments such as time-temperature integrators or indicators, can be used to improve temperature monitoring throughout the distribution system (Koutsoumanis , Giannakourou and Taoukis, 2002). This also allows for improved shelf life estimation with a chain perspective, as is for example shown by Raab, Bruckner, Beierle, Kampmann, Petersen and Kreyenschmidt, 2008) for pork and poultry chains and Dalgaard, Paw and Buch (2002) for fish chains.

Notwithstanding, Donk (2001) opines that the effect of information flow on fresh food quality ranges from ordering raw materials that may be highly perishable such as milk and lack of information from cooperation between partners dealing with deteriorating goods. In sales, the importance of considering perishability can be found in determining where to locate the decoupling point that may not only depend on lead times and variability, but also on the shelf-life of the products.

A study carried out by Reardon and Timmer (2007), states that through the use of communication tools, such as the web sites, institutions and industrial organizations can build

value in food quality. Information has small value if it is not shared among partners. Trust among partners in the distribution management seems to have influence on the information flow. However, due to lack of trust, certain information may be withheld from partners. Relationship among party members, which is based on trust and commitment, would facilitate information sharing (Moberg, Cutler, & Gross, 2002). In support of this, Kwon and Suh (2004) noted that information sharing reduces the level of behavioural uncertainty, which leads to improvement in the level of trust.

The use of Information system to manage distribution increases efficiency, predictability and reduce waste in value chains, which has positive impact on all market players (Ceva, 2010). Such tools of information system as cell phone and internet services, radio, and a wide range of digital devices and related tools, including cameras, GIS, a wide range of hand-held computing devices if properly used, has a potential of raising efficiency in the following distribution activities. record keeping, monitoring field agent activities, procurement operations, credit and payment tasks, input distribution, measuring productivity, and forecasting (Cooper, 2006).

### **2.3 Summary of the literature Review and gap**

From the literature being reviewed, a lot was written on the challenges organisations and supply chain partners face while ensuring that fresh food supplies reach the end user while still fresh but less has been written on how companies or different players in the supply chain should effectively manage the transportation, storage and communication aspects to ensure that the quality of fresh food supplies is maintained until usage.

Also, models have been developed in form of network models that may not be applicable in developing countries like Uganda. And lastly research has been done in mainly developed

countries where they focus on the end user being customers or shopping malls. Less research has been undertaken within a particular entity like police yet organisations buy fresh food supplies for their own consumption. Therefore, this research intended to add on the existing body of literature and bridge a contextual gap on distribution management and its effect on fresh food supplies studying it using Uganda Police force.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

This chapter presents the method that was used in the study. This includes the research design, study population, sample size and sampling techniques, data collection methods and instruments data collection procedure, data analysis, limitations of the study and Ethical considerations. These were used in accessing information regarding the effect of distribution management on quality of fresh food supplies in UPF (KMP).

#### **3.1 Research Design**

A research design is a framework for conducting research (Malhotra, 2009). It specifies the details or procedures for obtaining the information needed to structure and solve research problem. This study was conducted using a case study research design that enabled the researcher understand Kampala Metropolitan Police in the entire Uganda Police Force. The study adopted both qualitative and quantitative approaches. The use of both quantitative and qualitative data helped to explain the outcome and process through observation, analysis, descriptive and inferential statistics obtained from sample responses as well as reconstruction of the case under study.

The qualitative method was utilised to obtain thoughts, opinions and feelings heard and document from participants. Like Amin (2005) explains, qualitative research includes the direction towards the solution of the problem, principles and theories that will be helpful in predicting future occurrences. Above all, qualitative research is based upon observable experiences or empirical evidence Amin (2005) the very essence for this distribution research.

The quantitative approach was used in order to describe current conditions and to investigate relationships (Amin, 2005). It was used to answer questions concerning the current status of the subject study in order to achieve representativeness.

### **3.2 Study Area**

The Kampala Metropolitan area covers the districts of Kampala central business districts, Mukono, and Wakiso. The five divisions of Kampala that are covered include; Kampala Central, Kawempe, Makindye, Rubaga, and Nakawa divisions. This expansion to cover the neighbouring districts of Wakiso (that surrounds Kampala) and Mukono from the East was due to the increasing and expansion of the city due to rural urban migration that increases the crime rate. This study on food distribution management and its quality targeted the participants in these districts.

### **3.3 Target Population**

Bryman and Bell (2003) stated that a population is the whole group that the research focuses on. Basing on the above definition, the study focused on participants within Kampala metropolitan region. According to the reports from Uganda Police Force (2017), there are a total of 7,000 police force officers. The sample for the study was determined from this population that basically targeted the quarter masters store managers, the logistic officers and the police officers in charge of the stations.

### **3.4 Sample Size**

A sample is defined as a set of people selected from the large population for the purpose of study (Webster, 1985). However, that doesn't mean that it will produce quality results due to the omission of important issues in the process. In this study, the researcher engaged a total of 248

participants who were sampled using the sampling techniques described below. The sampled participants were given questionnaires and administered interviews as the responses were analysed using appropriate processes. The sample size was estimated using Krejcie and Morgan (1970) Tables .

**Table 3. 1: Population category, population, sample size, and sampling techniques**

<b>Category of population</b>	<b>Target population</b>	<b>Sample size</b>	<b>Sampling technique</b>
Quarter masters/mistress	12	12	Census sampling
Logistic officers	40	36	Stratified Simple random sampling
Police officers' personnel (consumers)	6948	200	Stratified Simple random sampling
<b>Total</b>	<b>7000</b>	<b>248</b>	

**Source:** (UPF, 2019)

### 3.5 Sampling techniques

Census sampling and Stratified Simple Random Sampling were used.

#### 3.5.1 Census sampling

Census sampling aimed at considering all the quarter masters in the distribution department of UPF as they seemed to be knowledgeable with the study variables and gave insightful information on which conclusions were drawn.

#### 3.5.2 Stratified Simple random sampling

Stratified random sampling is a modification of random sampling in which you divide the population into two or more relevant and significant strata based on one or a number of

attributes. For purposes of this study UPF police personnel was divided into strata of specialized units such as VIPPU, FFU, CT marines, tourism from which respondents were chosen using simple random sampling which is a technique used in the selection of a sample consisting of a number of sampling units out of the population having number of sampling units such that every sampling unit has an equal opportunity of being selected. This technique allowed the researcher to identify respondents who had an equal chance to be selected to form a sample. According to Amin (2005) assert that simple random sampling allows the selection of a good sample for respondents for a study. The technique is free from errors and requires least knowledge of the population participating in the study.

### **3.6 Data collection methods**

This refers to the various methods that the researcher may wish to use when collecting data for the study. The choice of data collection tools majorly depends on the research problem under study, the research design chosen and the available information collected about the variables in the study. In this study the researcher intended to use a mixture of both quantitative and qualitative methods of data collection. These selected methods included the questionnaire and interviewing.

#### **3.6.1 The questionnaire method**

The questionnaire is to be the main research instrument. The study used questionnaire because it was self-administered with standard identical items for all respondents and easy to answer. This enabled the researcher to identify the major concerns of the respondents. Its structured form and the well sought questions are specific and evoke precise response (Kothari, 2004). The questionnaire allowed respondents to express their views and opinion in their convenient time with well thought answers. In the questionnaire, respondents were asked to give their reaction to

the same set of questions. This tool was chosen for use because according to Amin (2005) contend that its less expensive tool, offers great assurance of an anonymity in case where a researcher is handling a sensitive organization such as UPF, the questionnaire would be used to cover a wide geographical area (Bird, 2009). Amin (2005) contended that questionnaires give room for probing. Mugenda and Mugenda (2003) insists that it is an important tool because it can be used to collect vital information from the study population.

### **3.6.2 Interview survey**

The interview method enabled the researcher to collect information on how the participants felt, thought (Burns, 2000). Interview survey was done to ensure that there was triangulation of the results as it enabled the researcher to probe further on aspects that were not clear after conducting the quantitative analysis. One of the most important advantages of the interview is that it is a face-to-face interaction that enabled the researcher to ask difficult questions as they analyse the participant's body language, and to probe until clarity is obtained.

## **3.7 Data collection instruments**

This study used two instruments self-administered questionnaire and interview guide as explained below;

### **3.7.1 Questionnaire**

A questionnaire was designed with a number of closed ended questions on distribution management and quality of fresh food supplies based on a five Li-kert scale including Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). This was done to establish a standard level of assessment in terms of agreement and disagreement. The instrument was administered to the largest group consisting a sample. A questionnaire was used because it



would collect large volumes of information from a large number of respondents, who filled them at their own convenience (Sekaran and Bougie, 2010).

### **3.7.2 Interview guide**

This instrument contained a number of open-ended questions on effect of distribution management on quality of fresh food supplies. This instrument was designed based on the number of open-ended questions of which the researcher used to obtain answers with a view of leading the respondents towards giving data to meet the study objectives and probe the respondents in order to seek clarification about responses provided. The instrument was important because it was easier for a researcher to understand individuals' impressions or experiences as compared to questionnaires (Saunders et al., 2009).

## **3.8. Quality control methods**

The study realized that the instrument was required to be of quality and this was done by ensuring both validity and reliability techniques as explained below

### **3.8.1 Validity of instruments**

#### **3.8.1 Validity**

**Validity** is concerned with whether the findings are really about what they appear to be about.(Onen, 2016). A test was carried out prior to administering the questionnaires where three logistic experts were requested to provide an expert assessment about the study instrument thereafter while using the Content Validity Index (CVI) results were obtained and interpreted accordingly.

The formula for CVI is;

$$CVI = \frac{K}{N}$$

Where K is the number of items rated relevant and N is the total number of items x100% (Sekaran & Bougie, 2010) assert that a valid instrument should have a valid score equal to or above 0.6

### 3.8.2 Reliability

Reliability is the extent to which a research instrument uses consistent results when administered to a number of respondents Sekaran and Bougie (2010) the researcher planned to use the internal consistence technique specifically alpha Cronbach where a sample of ten respondents were identified and questionnaires administered to them the questionnaires were collected sorted, coded, entered and analysed using Statistical Packages for Social Sciences (SPSS) version 23. The results obtained were compared to Sekaran and Bougie (2010) asserts that for an instrument to be reliable its reliability score should be equal or above 0.50.

**Table 3.2: Reliability**

Variable	CVI	Cronbach's Alpha	Items
Transportation	0.72	.912	8
Storage	0.80	.910	8
Information flow	0.61	.912	8
Quality of fresh food supplies	0.80	.937	8

*Source: Primary data*

### 3.9. Data collection procedure

Using an introduction letter from Kyambogo University, the researcher obtained approval from UPF authorities to conduct the research. The researcher undertook a pilot study where the

questionnaire was tested on a sample of ten participants and interview guide on three respondents.

The researcher used the remarks from these participants to improve the questionnaire and interview guide. The researcher then made contacts with various authorities to whom the letter was addressed and together with authorities made appointments as to when the study was to be carried out to enable proper planning. On the agreed dates the researcher went to UPF to meet the respondents and collected the data. The researcher made sure that during data collection, questions were discussed in the presence of the respondents such that they understood and where possible made adjustments to reduce the chance of non-reliability and noncompliance of the tool.

The data collection was carried out for the period of three weeks, in the event of any delay or incompleteness of the data collection the research rescheduled the appointments on the consultation with the respondents. After data collection data analysis was done and a report was made which marked the final activity of the research process.

### **3.10 Data Analysis**

Data was managed and analysed both quantitatively and qualitatively as explained below

#### **3.10.1 Quantitative Data Analysis**

This is an efficient approach to research during which data after collected is transferred into numeric data, data from questionnaires was collected, sorted, coded and was entered into excel and imported into SPSS version 23. The data was checked for completeness as well as errors and there after descriptive statistics was obtained ranging from frequencies, standard deviation percentages and means.

Factor analysis was also done with the aim of ensuring that the particular sub variables measuring a parameter were consistent and in line of achieving the objectives. Statements whose factor loading were above 0.7 were considered for this study.

Multivariate analysis was done using multiple regression, but for these analysis to be utilized the researcher needed to ensure that the data was appropriate along the assumption of Field (2009) that data that exhibits non- normality characteristics may lead to inaccuracy and distortion of the results. In this study, different diagnostic tests were performed to ensure that data was normally distributed.

In the study, normality tests were carried out to test the normal distribution of the data before analysis. The Shapiro & Wilk (1965) was adopted to test for normality in the study since its appropriate for small samples. The table below shows the results corresponding to the Shapiro Wilk test for normality for the different variables used in the study.

**Table 3.3: Tests of Normality for transportation, storage, information flow and quality of fresh food supplies.**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Transportation	.084	232	.000	.971	232	.000
Storage	.051	232	.200	.978	232	.001
Information flow	.095	232	.000	.963	232	.000
Quality of fresh food supplies	.080	232	.001	.949	232	.000

**Source: Primary data 2020**

The Shapiro-Wilk test is deemed appropriate for samples that fall between 7 and 2,000 Shapiro & Wilk (1965). This implies that since the sample considered was 232 ranging between 7 and 2000, implying that the data was fairly distributed.

Multi-collinearity tests were also carried out to test for collinearity of the independent variables used in the study. Collinearity occurs when two or more independent variables used in the study are highly correlated with each other (Hair, Ringle and Sarstedt, 2013).

Multi-collinearity was assessed by computing the Variance Inflation Factor (VIF), which measures how much the variance of a regression coefficient is inflated due multi-collinearity in the model (Hair et al., 2013). This problem was evaluated by using variance inflation factor (VIF) estimates to detect multi-collinearity that decreases the reliability and accuracy of empirical results. The higher the VIF, this means that multi-collinearity effects are present. Hair, Ringle and Sarstedt (2013) stated that a problem of multi-collinearity is present if the factor is greater than 10.

**Table 3.4: Collinearity diagnostics for transportation, storage and information flow.**

<b>Model</b>	<b>Collinearity statistics</b>	
	<b>Tolerance</b>	<b>VIF</b>
Transportation	0.361	2.766
Storage	0.334	2.991
Information flow	0.465	2.151

**a. Dependent Variable: Quality of fresh food supplies**

The results in table 3.4 above revealed that the independent variables (transportation, storage and information flow) were not highly correlated since the Variance Inflation Factor (VIF) was below the threshold of 10.

On the other hand, inferential statistics were generated to establish whether a relationship (correlation, results lying between -1 for negative relationship and +1 for positive relationship) existed between the study variables. The results were based on a 99% significance level at 5% or 0.05 and a multiple regression was used to determine the variance that distribution management had on the quality of fresh food supplies.

### **3.10.2. Qualitative Data Analysis**

Interviews were organized and conducted to obtain non-numeric data from key respondents, through in-depth interviews. The information collected was sorted and organized in line with the set objectives. Thereafter, the content analysis technique was used to obtain useful and meaningful statements about the study.

### **3.10.3 Measurement of variables**

The study used both ordinal and nominal scales where the ordinal scale was used to measure distribution management and quality of fresh foods based on a five-item Likert scale. This was channelled to a Likert scale ranging from 5 strongly agree, 4 Agree, 3 not sure, 2 disagree and 1 strongly disagree (Mugenda and Mugenda, 2003). A nominal scale was used to measure respondents' demographic information.

### **3.11 Ethical Considerations**

In agreement with the rules and regulations of the university with regard to conducting research using human subjects, the following ethical considerations were taken into account during the

course of the research. These considerations applied to both the quantitative and qualitative research sections of this study

### **Permission**

The researcher obtained written permission from the Head of the Department, Kyambogo University to conduct this research, in order to ensure that it is a legal exercise. A letter of the ethical clearance from graduate school was obtained to guarantee the authenticity of this study.

### **Confidentiality and Privacy**

Respondents were assured that their names would be dealt with in the highest level of secrecy. This aspect included the principle of trust in which the researcher assured the participants that their trust would not be exploited for personal gain or benefit, by deceiving or betraying them in the research route or its published outcomes (Lubbe, 2003).

### **Voluntary Participation and Informed Consent**

The principle of voluntary participation was explained to the respondents and they were informed that they had the right to withdraw from the study at any time. The principle of informed consent was attached to the questionnaires and verbally explained to the interviewees. Both principles were explaining the research process and its purposes to the participants.

### **3.12. Anticipated Limitations to the study**

As participation in this study is voluntary, a selection bias existed as those who didn't wish to participate had similar characteristics and perceptions that wouldn't be captured.

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS**

#### **4.1 Introduction**

This chapter comprises of presentation, analysis, and interpretation of the study findings based on the collected data through questionnaire survey and interview guide. This chapter demonstrates the descriptive statistics of the study as well as inferential statistics of the variables under study. The presentation of the dissertation is based on the objectives and major study themes or research questions laid out in the report namely:

- 1.** To examine how transportation affects the quality of fresh food supplies in Uganda Police Force at Kampala metropolitan police.
- 2.** To examine how storage affects the quality of fresh food supplies in Uganda Police Force at Kampala metropolitan police.
- 3.** To assess how information flow affects the quality of fresh food supplies in Uganda Police Force at Kampala metropolitan police.

Section one presents the response rate which is followed by a presentation of background information about the respondents and the major findings and discussion based on the study objectives.

#### **4.2 Response Rate**

Two hundred forty-eight (248) respondents were selected to participate in the study and were issued with questionnaires. Out of 248 questionnaires that were administered to respondents, 232 were completed and submitted to the research assistant on behalf of the researcher. The overall response rate was 232 out of 248 which was equivalent to about 93.5%. According to Mugenda



(2008), a response rate of 70% and above is acceptable as representative of the sampled population. In this regard, a response rate of 93.5% was adequate and excellent for the study results to be valid.

### 4.3 Background information

Under this section, the demographic characteristics of the respondents who participated in the study are being discussed in terms of frequencies and the corresponding percentages for each category.

**Table 4.1: Demographic characteristics of the respondents**

	<b>Category</b>	<b>Frequency</b>	<b>Percentage %</b>
Gender of respondents	Male	170	73.3
	Female	62	26.7
Highest level of education	S.3 and below	8	3.4
	O' level	26	11.2
	A' level	40	17.2
	Tertiary institutions	158	68.1
	PhD	0	0.0
Period of service	Less than one year	8	3.4
	1-5 years	44	19.0
	6-10 years	72	31.0
	Over 10 years	108	46.6
Rank of respondents	Police constable	54	23.3
	NCO (SGT/ Corporal)	48	20.7
	Inspectorates	46	19.8
	Gazetted officer	84	36.2

**Source: Primary data**

As evidenced in table 4.1 above, it was revealed that the majority of the respondents 73.3% (n=170) were males and 26.7% (n=62) of the respondents were females. This implies that males are too courageous in the force than females and also initially females feared to join the force but due to the promotion of gender equality in all sectors in Uganda, even in UPF women have been encouraged to join the force that's why for this study, males were more than females.

In relation to gender of the respondents, the sample of this study was also characterized by 48.3% (n=112) of the respondents who reported that they had attained university qualification. This was followed by those who had attained tertiary institution qualification as reported by 19.8% (n=46). It was also revealed that 17.2% (n=40) of the respondents reported that they had attained A level certificate and only 11.2 % (n=26) of the respondents reported that they had attained O level certificate and finally 3.4% (n=8) had attained S.3 and below education. No one among the respondents had attained PhD. The implications are that each of the respondents were having some level of qualification indicating that there was understanding of questionnaire items on Distribution Management and Quality of fresh food supplies.

The responses given by the respondents about the period of service one has in UPF, 46.6% (n=108) of the respondents had been in UPF for over 10 years, 31.0% (n=72) for a period between 6 to 10 years, while 19.0% (n=44) corresponded to those who had been in UPF for a period between 1 to 5 years and finally 3.4 % (n=8) had been in UPF for less than 1 year. The implication to this finding shows that most of the respondents have been in UPF for some time therefore, have complete knowledge of how transportation, storage and information flow affect the quality of fresh food supplies.

Lastly, when the respondents were asked about their ranks in police, 36.2% (n=84) were at the rank of gazetted officers, 23.3% (n=54) were police constables, 20.7% (n=48) were NCO (SGT/ Corporal) and finally 19.8% (46) were inspectors and this implies the majority of respondents being gazetted is because there are directly involved in the distribution process and the rest are the consumers of what is being distributed.

#### **4.4 Descriptive statistics**

This section consists of the descriptive statistics of the variables being studied. The variables of the study whose descriptive statistics were computed include; Transportation, Storage, Information flow and quality of fresh food supplies.

##### **4.4.1 Quality of fresh food supplies**

The study dependent variable quality of fresh food which was conceptualized to include indicators of food safety, sensory characteristics and shelf life measured using 8 items scored on 5-point Likert scale ranging from 5= strongly agree to 1 = strongly disagree. Descriptive statistics relating to quality of fresh food supplies that's to say, percentages, mean and standard deviation were computed and the findings are displayed in the table below.

**Table 4.2: Descriptive results for Quality of fresh food supplies**

<b>Statement</b>	<b>SDA</b>	<b>DA</b>	<b>NS</b>	<b>A</b>	<b>SA</b>	<b>MEAN</b>	<b>S.D</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>		
1. Proper storage lead to proper hygienic conditions of fresh food supplies	6.9	12.9	8.6	44.0	25.9	3.67	1.204
2. Information flow in form of food supplies provides food content of fresh food supplies	9.5	12.9	16.4	44.0	17.2	3.47	1.195
3. Shorter delivery times help to maintain the freshness of the fresh food supplies	12.9	6.0	9.5	46.6	25.0	3.65	1.278
4. Use of specialize equipment like refrigerators provide good aroma	25.9	15.5	6.0	29.3	23.3	3.09	1.555
5. Proper storage of fresh supplies maintains the original colour	10.3	13.8	13.8	41.4	20.7	3.48	1.252
6. Traceability systems helps to avoid expiry	12.9	7.8	13.8	40.5	25.0	3.57	1.298
7. Information flow gives information on product remaining shelf lives	7.8	10.3	11.2	44.8	25.9	3.71	1.184
8. The adoption of various temperatures control allows information to be gathered to optimize inventory decisions	15.5	18.1	17.2	24.1	25.0	3.25	1.410
<b>Grand Mean: 3.48</b>							

The table 4.2 above, indicates the findings that reveal respondents perceive indicators measuring quality of fresh food supplies differently. For instance, in terms of information flow giving information on product remaining shelf lives the score by the respondents was 70.7% were in agreement, 18.1% disagreed while 11.2% were not sure with mean of 3.71 and standard deviation of 1.184, in relation to all the other aspects of quality of fresh food this constituted the highest score followed by proper storage lead to proper hygienic conditions of fresh food supplies where 69.9% of the respondents were in agreement, 19.8% disagreed and 8.6% were not

sure with mean of 3.67 and standard deviation of 1.204, this was followed by shorter delivery times help to maintain the freshness of the fresh food supplies where 71.6% agreed, 18.9% disagreed and 9.5% were not sure with a mean of 3.65 and standard deviation of 1.278 and traceability systems helps to avoid expiry with 65.5% of the respondents being in agreement, 20.7% disagreed and 13.8 % were not sure with a mean of 3.57 and standard deviation of 1.298. Finally, proper storage of fresh supplies maintaining the original colour with 62.1% in agreement, 24.1% disagreed while 13.8% were not sure with a mean of 3.48 and standard deviation of 1.252.

All the five items were above the grand mean of 3.48 implying that if UPF ensures proper transportation, storage and information flow, the quality of fresh food supplies will greatly improve and reduction in wastage and spoilage will be recorded.

The item information flow in form of food supplies providing food content of fresh food supplies with 61.2 % in agreement, 22.4% disagreed while 16.4% were not sure with a mean of 3.47 and standard deviation of 1.195, the adoption of various temperatures control allowing information to be gathered to optimize inventory had 49.1% of the respondents being in agreement, 33.6% disagreed while 17.5 % were not sure with a mean of 3.25 and standard deviation of 1.410 and use of specialize equipment like refrigerators provide good aroma 52.6% agreed, 41.4% disagreed while 6.0% were not sure with a mean of 3.09 and standard deviation of 1.555 had least scores in relation to other item and they were also below the grand mean of 3.48 suggesting that respondents didn't accord much importance to these quality of fresh food supplies indicators. When asked how you measure the quality of fresh food supplies, one of the interviewees said:

*“Quality of these fresh foods is mainly looked at in terms of the freshness, the aroma, taste, shelf*

*life*".

Another respondent emphasised:

*"The aspect of food safety with adequate food content is very paramount when measuring quality of fresh food supplies"*.

An interviewee from head nutritionist Uganda police noted:

*"Time is very key in determining the quality of fresh food supplies since they have a shorter lifespan, so delivery on time maintains or improves the quality"*.

#### **4.4.2 The effect of transportation on quality of fresh food supplies**

The first objective of the study was to examine how transportation affects the quality of fresh food supplies in Uganda Police Force at Kampala metropolitan police. In the study, transportation was conceptualized to include indicators of distribution channels, transportation vessels and timeliness measured using 8 items scored on 5-point Likert scale ranging from 5= strongly agree to 1 = strongly disagree. The percentage for agree is added to strongly agree to denote agreement with that particular item implying presence of transportation facilities in UPF while the percentage of disagree is added to strongly disagree to denote disagree or absence of transportation facilities in UPF. Descriptive statistics relating to transportation that's to say, percentages, mean and standard deviation were computed and the findings are displayed in the table below.

**Table 4. 3: Descriptive results for Transportation**

<b>Statement</b>	<b>SDA</b>	<b>DA</b>	<b>NS</b>	<b>A</b>	<b>SA</b>	<b>MEAN</b>	<b>S. D</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>		
1. Fresh food supplies always covered when transporting them	13.8	14.7	6.0	51.7	13.8	3.37	1.279
2. UPF uses cooling facilities in transporting fresh foods	36.2	37.1	14.7	9.5	2.6	2.05	1.060
3. All equipment used are regularly maintained	19.0	19.0	15.5	42.2	4.3	2.94	1.243
4. Containers used are adequately cleaned and disinfected	19.8	25.9	21.6	25.9	6.9	2.74	1.235
5. Containers have appropriate control devices for measuring temperatures	41.4	36.2	12.1	8.6	1.7	1.93	1.017
6. Containers are constantly cleaned to a void contamination	13.8	11.2	17.2	44.0	13.8	3.33	1.247
7. Vehicles used to transport fresh foods are weather resistant	26.7	25.0	20.7	22.4	5.2	2.54	1.244
8. Frozen fresh foods are transported in appropriate chilled or isolated conditions	33.6	31.0	17.2	14.7	3.4	2.23	1.165
<b>Grand Mean: 2.64</b>							

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*Source: Primary data*

As indicated in table 4.3 above, the findings reveal that respondents perceive indicators measuring transportation differently. For instance, in terms of fresh food supplies always covered when transporting them the score by the respondents was 65.5% were in agreement, 28.5% disagreed while 6% were not sure with mean of 3.37 and standard deviation of 1.279, in relation to all the other aspects of transportation this constituted the highest score followed by containers are constantly cleaned to avoid contamination were 57.8% of the respondents were in agreement, 25% disagreed and 17.2% were not sure with mean of 3.33 and standard deviation of 1.247, this was followed by all equipment used are regularly maintained where 46.5% agreed, 38.0% disagreed and 15.5% were not sure with a mean of 2.94 with a standard deviation of 1.243 and containers used are adequately cleaned and disinfected with 32.8% of the respondents being in agreement, 45.7% disagreed and 21.6% were not sure with a mean of 2.74 with a standard deviation of 1.235. All the four items were above the grand mean of 2.64 suggesting that UPF accords much importance to fresh food supplies being covered while in transportation, cleaning of containers and maintenance of equipment.

This was verified in the interview of which the one interviewee noted:

*“Fresh food supplies are covered while in transit.”*

Another interview from the undersecretary had this to say:

*“UPF does not have specialized containers or equipment used during the transportation of fresh food supplies, mainly we use buckets to distribute the food which are cleaned regularly.”*

The item of Vehicles used to transport fresh foods are weather resistant with 27.6% in agreement, 51.7% disagreed while 20.7% were not sure with a mean of 2.54 and standard deviation of 1.244, frozen fresh foods are transported in appropriate chilled or isolated conditions had 18.1% of the respondents being in agreement, 64.6% disagreed while 17.2% were not sure



with a mean of 2.23 and standard deviation of 1.165, UPF uses cooling facilities in transporting fresh foods were only 12.1% agreed, 73.3% disagreed while 14.7% were not sure with a mean of 2.05 and standard deviation of 1.060 and finally containers have appropriate control devices for measuring temperatures had 10.3% of the respondents agreeing, while 77.6% disagreed and 12.1% were not sure with a mean of 1.93 and standard deviation of 1.017 had least scores in relation to other item and they were also below the grand mean of 2.64 suggesting that UPF doesn't accord a lot of importance to these transportation indicators during distribution of fresh food supplies.

This was confirmed by the Director of Logistics and Engineering who mentioned that:

*“UPF doesn't have enough resources to invest in transportation equipment needed, we still need to improve in that area.”*

In an interview on the vehicles used in transportation whether they are weather resistant, one interviewee from the Stores had this to say:

*“We distribute the fresh food supplies on UPF pickups therefore during rainy days the supplies are hit by rain and during sunny days, we try and use polythene or paper to cover the food supplies”.*

Another respondent from the receiving end who is one of the constables noted:

*“There are times when we receive the fresh supplies when they are so hot and have lost their original taste”.*

The interview findings suggest a collection of strategies in form of setting aside some resources to acquire proper transportation equipment to reduce the loss of fresh food supplies and providing specialized conditions for the different supplies in order to improve quality.

#### **4.4.3 Correlation between transportation and quality of fresh food supplies**

The relationship between transportation and quality of fresh food supplies was tested using Pearson's coefficient statistics and are tabulated below.

**Table 4. 4: Correlation between transportation and quality of fresh food supplies**

**Correlations**

		Transportation	Quality of fresh food supplies
Transportation	Pearson Correlation	1	.491**
	Sig. (2-tailed)		.000
	N	232	232
Quality of fresh food supplies	Pearson Correlation	.491**	1
	Sig. (2-tailed)	.000	
	N	232	232

\*\* . Correlation is significant at the 0.01 level (2-tailed).

In table 4.4 above, results show that the Pearson’s correlation coefficient  $r = 0.491^{**}$  between transportation and quality of fresh food supplies suggesting that the two variables had a moderate and positive relationship. The results further revealed that this relationship was statistically significant at 0.000 level of significance since  $p\text{-value} < 0.01$ . Thus, transportation significantly affects quality of fresh food supplies in UPF especially focusing on the distribution channels, transport vessels and timeliness.

**4.4.4 The effect of storage on quality of fresh food supplies**

The second objective of the study was to examine how storage affects fresh food quality in Uganda Police Force at Kampala metropolitan police. In the study, storage was conceptualized to include indicators of physical handling and storage containers of quality of fresh food supplies measured using 8 items scored on 5-point Likert scale ranging from 5= strongly agree to 1 = strongly disagree. The percentage for agree is added to strongly agree to denote agreement with that particular item implying presence of storage facilities in UPF while the percentage of disagree is added to strongly disagree to denote disagree or absence of storage facilities in UPF.

Descriptive statistics relating to storage that's to say, percentages, mean and standard deviation were computed and the findings are displayed in the table below.

**Table 4. 5: Descriptive results for Storage**

Statement	SDA	DA	NS	A	SA	MEA	S. D	
	%	%	%	%	%	N		
1. There are storage facilities with special conditions to preserve fresh supplies against spoilage	31.0	33.6	13.8	21.6	0.0	2.26	1.118	
2. UPF takes into consideration temperature controls in preserving fresh foods	23.3	35.3	19.8	19.0	2.6	2.42	1.118	
3. There is proper packaging of fresh foods	21.6	22.4	19.0	30.2	6.9	2.78	1.274	
4. Guidance for the staff on how to reduce temperatures in storage spaces	25.0	30.2	8.6	28.4	7.8	2.64	1.332	
5. Storage facilities are well ventilated	16.4	25.0	13.8	32.8	12.1	2.99	1.313	
6. Fresh food supplies are stored in adequate packaging materials	20.7	28.4	17.2	26.7	6.9	2.71	1.255	
7. There is proper storage configuration to accommodate access requirement	28.4	27.6	18.1	20.7	5.2	2.47	1.244	
8. Fresh foods are stored in coolers at ambient temperatures	32.8	41.4	12.9	10.3	2.6	2.09	1.049	
<b>Grand Mean: 2.54</b>								

As indicated in table 4.5 above, the findings reveal that respondents perceive indicators measuring storage differently. For instance, in terms of storage facilities being well ventilated the score by the respondents was 44.9% were in agreement, 41.4% disagreed while 13.8% were not sure with mean of 2.99 and standard deviation of 1.313, in relation to all the other aspects of

storage this constituted the highest score followed by proper packaging of fresh foods were 37.1% of the respondents were in agreement, 44% disagreed and 19.0% were not sure with mean of 2.78 and standard deviation of 1.274, this was followed by fresh food supplies being stored in adequate packaging materials where 33.6% agreed, 49.1% disagreed and 17.2% were not sure with a mean of 2.71 and standard deviation of 1.255 and guidance for the staff on how to reduce temperatures in storage spaces with 36.2% of the respondents being in agreement, 55.2% disagreed and 8.6 % were not sure with a mean of 2.64 and standard deviation of 1.332. All the four items were above the grand mean of 2.54 suggesting that UPF practices these four items of storage while distributing fresh food supplies.

In interview, one quarter master interviewee noted:

*“The stores are well ventilated and this reduces the spoilage rates of the fresh food supplies”.*

When asked about how fresh food supplies are packed, an interviewee from stores noted:

*“Fresh food supplies are packed into boxes, containers and sometimes buckets and thereafter stored, we still don't have refrigerators to store supplies like meat, tomatoes, sweet bananas among others and this has resulted into losses as some supplies go bad before the usage time”.*

The second interviewee from Stores equally reported:

*“Our storage facilities are in poor state as some times when it rains the fresh foods are affected because the rooftops leak”.*

The item of proper storage configuration to accommodate access requirement with 25.9% in agreement, 56% disagreed while 18.1% were not sure with a mean of 2.47 and standard deviation of 1.244, UPF taking into consideration temperature controls in preserving fresh foods had 21.6% of the respondents being in agreement, 58.6% disagreed while 19.8 % were not sure with a mean of 2.42 and standard deviation of 1.118, presence of storage facilities with special conditions to preserve fresh supplies against spoilage where only 21.6% agreed, 64.6% disagreed while 13.8% were not sure with a mean of 2.26 and standard deviation of 1.118 and finally fresh

foods being stored in coolers at ambient temperatures had 12.9% of the respondents agreeing, while 74.2% disagreed and 12.9% were not sure with a mean of 2.09 and standard deviation of 1.049 had least scores in relation to other item and they were also below the grand mean of 2.54 suggesting that UPF doesn't practice these storage indicators during distribution of fresh food supplies.

During an interview held with deputy director logistics and engineering, noted that:  
*"UPF lacks proper storage facilities for fresh food supplies"*.

#### 4.4.5 Correlation between Storage and Quality of fresh food supplies

The relationship between Storage and quality of fresh food supplies was tested using Pearson's coefficient statistics and are tabulated below.

**Table 4. 6: Correlation between Storage and Quality of fresh food supplies**

##### Correlations

		Storage	Quality of fresh food supplies
Storage	Pearson Correlation	1	.478**
	Sig. (2-tailed)		.000
	N	232	232
Quality of fresh food supplies	Pearson Correlation	.478**	1
	Sig. (2-tailed)	.000	
	N	232	232

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 4.6 above, indicates the Pearson's correlation coefficient  $r = 0.478^{**}$  between storage and quality of fresh food supplies suggesting that the two variables had a moderate and positive relationship. The results further revealed that this relationship was statistically significant at 0.01

level of significance since the p-value (0.000) < 0.01. Thus, storage significantly affects quality of fresh food supplies in UPF especially focusing on the physical handling and storage container.

#### **4.4.6 The effect of information flow on quality of fresh food supplies**

The third objective of the study was to assess how information flow affects fresh food quality in Uganda Police Force at Kampala metropolitan police. In the study, Information flow was conceptualized to include indicators of outflow and inflow of information on quality of fresh food supplies measured using 8 items scored on 5-point Likert scale ranging from 5= strongly agree to 1 = strongly disagree. Descriptive statistics relating to information flow that's to say, percentages, mean and standard deviation were computed and the findings are displayed in the table below.

**Table 4. 7: Descriptive results for Information flow**

<b>Statement</b>	<b>SDA</b>	<b>DA</b>	<b>NS</b>	<b>A</b>	<b>SA</b>	<b>MEA</b>	<b>S.D</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>N</b>	
1. There is coordination among supply chain members to ensure quality of various fresh food supplies	11.2	14.7	17.2	44.8	12.1	3.32	1.196
2. There is timely flow of information about the exact quantities needed	10.3	19.8	13.8	42.2	13.8	3.29	1.228
3. UPF implements traceability systems to improve on fresh food quality	12.9	22.4	19.0	43.1	2.6	3.00	1.132
4. There is establishment of traceability system to control quality of fresh food supplies	10.3	31.9	16.4	34.5	6.9	2.96	1.165
5. There is use of EDI information platform to monitor the quality of fresh food	22.4	30.2	21.6	24.1	1.7	2.53	1.136
6. There is existence of up to date information about estimated time of arrival	10.3	31.0	18.1	31.0	9.5	2.98	1.191
7. There is regular updates on stock availability	6.0	15.5	13.8	40.5	24.1	3.61	1.183
8. There is sharing of necessary documents and procedures regarding fresh food supplies to the concerned staff in UPF	11.2	18.1	5.2	37.9	27.6	3.53	1.358
<b>Grand Mean</b>						<b>3.15</b>	

As indicated in table 4.7 above, the findings reveal that respondents perceive indicators measuring information flow differently. For instance, in terms of regular updates on stock availability the score by the respondents was 64.6% were in agreement, 21.5% disagreed while 13.8% were not sure with mean of 3.61 and standard deviation of 1.183, in relation to all the other aspects of information flow this constituted the highest score followed by sharing of

necessary documents and procedures regarding fresh food supplies to the concerned staff in UPF where 65.5% of the respondents were in agreement, 29.3% disagreed and 5.2% were not sure with mean of 3.53 and standard deviation of 1.358, this was followed by there is coordination among supply chain members to ensure quality of various fresh food supplies where 56.9% agreed, 25.9% disagreed and 17.2% were not sure with a mean of 3.32 and standard deviation of 1.196 and the timely flow of information about the exact quantities needed with 56% of the respondents being in agreement, 30.1% disagreed and 13.8 % were not sure with a mean of 3.29 and standard deviation of 1.228. All the four items were above the grand mean of 3.15 suggesting that UPF undertakes these four items of information flow while distributing fresh food supplies.

The item of UPF implementing traceability systems to improve on fresh food quality with 45.7% in agreement, 35.3% disagreed while 19.0% were not sure with a mean of 3.00 and standard deviation of 1.132, the existence of up to date information about estimated time of arrival had 40.5% of the respondents being in agreement, 41.3% disagreed while 18.1 % were not sure with a mean of 2.98 and standard deviation of 1.191, the establishment of traceability system to control quality of fresh food supplies where 41.4% agreed, 42.2% disagreed while 16.4% were not sure with a mean of 2.96 and standard deviation of 1.165 and the use of EDI information platform to monitor the quality of fresh food had 25.8% of the respondents agreeing, while 52.6% disagreed and 21.6% were not sure with a mean of 2.53 and standard deviation of 1.191 had least scores in relation to other item and they were also below the grand mean of 3.15 suggesting that UPF doesn't practice these information flow indicators during distribution of fresh food supplies.

Following the interviews conducted, the interviewees affirmed that:



*“There is information flow from the quarter masters as soon as the fresh food supplies are delivered for pick up however, sometimes there is inadequate airtime or delay in monthly loading of airtime which affects the flow of information and by the time they pick the fresh food supplies, some have gone bad “.*

The director Logistics and Engineering mentioned that:

*“There is no feedback got from the end users of the fresh food supplies in UPF which affects the quality of deliverables”.*

The interview findings suggest a collection of strategies in form of putting in place a well streamlined communication network that will enable all the concerned players to communicate urgently and receive feedback pertaining the quality of the delivered items.

#### **4.4.7 Correlation between Information flow and Quality of fresh food supplies**

The relationship between information flow and quality of fresh food supplies was tested using Pearson’s coefficient statistics and are tabulated below.

**Table 4. 8: Correlation between Information flow and Quality of fresh food supplies**

##### **Correlations**

	Information flow	Quality of fresh food supplies
Information flow Pearson Correlation	1	.517**
Sig. (2-tailed)		.000
N	232	232
Quality of fresh food supplies Pearson Correlation	.517**	1
Sig. (2-tailed)	.000	
N	232	232

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 4.8 above, shows the Pearson’s correlation coefficient  $r = 0.517^{**}$  between information flow and quality of fresh food supplies suggesting that the two variables had a moderate and positive relationship. The results further revealed that this relationship was statistically significant at 0.01 level of significance since the p-value (0.000) < 0.01. Thus, information flow

significantly affects quality of fresh food supplies in UPF especially focusing on the inflow and outflow information between the personnel responsible for the distribution of fresh food supplies and the end consumers.

#### 4.5 Regression Analysis

Regression analysis was carried out to determine the predictability potential of the independent variables on the dependent variable that's to say, to examine the effect of transportation, storage and information flow on quality of fresh food supplies. All the assumptions for regression analysis to be conducted were satisfied (normality and multi-collinearity tests) to ensure valid results. A multiple regression was performed, and the results below were obtained.

**Table 4. 9: Results for Model summary for the multiple regression analysis**

#### Model Summary

Model	Std. ErrorChange Statistics								
	R	Adjusted of	theR	Square	Sig.	F			
	R	Square	R Square	Estimate	Change	F Change	df1	df2	Change
1	.555 <sup>a</sup>	.308	.299	.90918	.308	33.841	3	228	.000

a. Predictors: (Constant), information, transportation, storage

Table 4.9 above, illustrates that the adjusted R<sup>2</sup> of the model is .299 approximately 30%. This implies that 30% of the variations in quality of fresh food supplies can be explained by transportation, storage and information flow leaving 70% to be explained by other factors like planning, funds allocated, human resources among others. Additionally, the table indicate that

the regression model was statistically significant with F value of 33.841 and P value of 0.000 which implies that the model was fit for the data.

**Table 4. 10: Results of the multiple regression coefficients**

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.447	.214		6.770	.000
	Transportation	.234	.106	.202	2.200	.029
	Storage	.120	.109	.105	1.103	.271
	Information flow	.354	.093	.307	3.805	.000

a. Predictors: (Constant), Transportation, Storage, Information Flow

b. Dependent Variable: Quality of fresh food supplies

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$P \leq 0.05$

*Source: Primary data 2020*

$$Y = 1.447 + 0.202X_1 + 0.105X_2 + 0.307X_3$$

Where;

Y= Quality of fresh food supplies

X<sub>1</sub>= Transportation

X<sub>2</sub>= Storage

X<sub>3</sub>= Information flow

As indicated in the table 4.10 above, the findings of the study revealed that transportation and information flow were strong predictors of quality of fresh food supplies in UPF with ( $P < .05$ ) however, storage was insignificant with p-value greater than 0.05.

Information flow emerged to be the strongest predictor of quality of fresh food supplies in UPF with the regression coefficient ( $\beta$ ) value of information flow was 0.307 with a t-test of 3.805 and significance level (p-value) of 0.000. This means that any efforts made by the management of UPF towards enhancing efficient communication both the inflow and outflow of information will result into 30.7% increase in the quality of fresh food supplies.

This was followed by transportation with the regression coefficient ( $\beta$ ) value of transportation was 0.202 with a t-test of 2.200 and significance level (p-value) of 0.029. This means that any strategies made by the management of UPF to improve transportation in terms of proper physical handling of distribution channels, transportation vessels and timelines results into 20.2% increase in the quality of fresh food supplies.

Lastly, storage emerged to be the least predictor of quality of fresh food supplies in UPF with the regression coefficient ( $\beta$ ) value of storage was 0.105 with a t-test of 1.103 and was not significant with p-value of 0.271. The justification was that irrespective of existence of a relationship between storage and quality of fresh food supplies, storage in terms of physical handling and storage containers has no significant contribution or effect on the quality of fresh food supplies. This implied that perhaps their other aspects of storage which were not studied that affect quality of fresh food supplies other than these studied. This means that storage conditions in terms of physical handling and storage containers in UPF are not accorded a lot of importance however, UPF continue to invest in the construction of modern storage facilities and

provide better methods of handling the food items which will eventually reduce on the spoilage rate in UPF.

## CHAPTER FIVE

### SUMMARY, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary of key findings and discussion of findings of the study in relation to the objectives with a view of reaching a comprehensive conclusion. The summary of key findings, discussion of the findings regarding the effect of transportation, storage and information flow on the quality of fresh food supplies are presented in the first two sections. This is followed by the conclusions and recommendations presented in the last two sections.

#### 5.2 Summary of key findings

The main purpose of the study was to examine the effect of distribution management on the quality of fresh food supplies in UPF. The study specifically aimed at analysing the effect of transportation, storage and information flow on the quality of fresh food supplies. The data for the study was collected from 232 respondents in Uganda Police Force.

Study findings revealed that most of the respondents in UPF disagreed the statements of distribution management in terms of transportation, storage and information flow as the findings revealed that appropriate transportation conditions, storage facilities are not in place to handle the fresh food supplies. Likewise, information flow in UPF is also still inadequate as there is still broken communication between the logistics officers and the quartermasters which causes delays in delivery yet the food supplies have a short lifespan hence increasing the spoilage rate.

In order to address the study objectives, a multiple regression analysis was conducted and the results revealed a significant effect of transportation on the quality of fresh food supplies in UPF (P-value= 0.029,  $(\beta) = 0.234$ ) at 95% level of significance The multiple regression shows that a

unit increase in transportation would on average lead to 0.234 (23.4%) increase in quality of fresh food supplies in UPF keeping other factors constant.

Furthermore, the results revealed an insignificant effect of storage on the quality of fresh food supplies in UPF (P-value= 0.271,  $\beta$  =0.120) at 95% level of significance. The multiple regression shows that a unit decrease in storage would on average lead to 0.120 (12.0%) decrease in quality of fresh food supplies in UPF keeping other factors constant implying that if UPF does not take into consideration improving the storage of fresh food supplies, the quality of fresh food supplies would reduce.

Lastly, the results also revealed a significant effect of information flow on the quality of fresh food supplies in UPF (P-value= 0.000,  $\beta$  =0.354) at 95% level of significance. The multiple regression shows that a unit increase in information flow would on average lead to 0.354 (35.4%) increase in quality of fresh food supplies in UPF keeping other factors constant. Therefore, UPF management should ensure that there is proper movement of information upwards and downwards among all players involved in the distribution of fresh food supplies in police to eliminate delays caused by inadequate information flow.

### **5.3 Discussion of the study findings**

#### **5.3.1 Transportation and quality of fresh food supplies in Uganda Police Force**

The study found a moderate and positive relationship between transportation and quality of fresh food supplies implying that transportation positively affects the quality of fresh food supplies in UPF. The finding of a significant relationship between transportation and quality of fresh food supplies in the UPF is not unique to it as previous studies such as Ajiboye and Afolayan (2009) who discusses about availability of transport facilitates in relation to food quality. The dual

underscore that, the availability of transport facilities are factors that stimulate economic growth through increased accessibility. This argument gains support from Federgruen, Prastacos and Zipkin (1984) who reports that distribution management and quality of fresh food can also be compromised by availability and in-availability of vehicles. To them if vehicles are available together with salesmen, then there is a likelihood of food to be distributed while in fresh condition.

In the same line, Njenga (2015) hinges on the cooling facilities in the transportation process of food products. According to the scholar, if fresh food is not put in the cooling facilities, the quality can be affected as a result of challenges and delays occasioned by poor roads, weather and poor coordination of transport operations.

### **5.3.2 Storage and quality of fresh food supplies in Uganda Police Force**

There was a moderate and positive relationship between storage and quality of fresh food supplies in UPF implying that storage positively affect the quality of fresh food supplies. These study findings are in line with the observation that planning for storage includes resources and procedures to ensure that all equipment and support items are preserved, packaged, packed, marked, handled and stored properly for short- and long-term requirements (Mittal, 2007). This was further emphasized by Stuart (2009) argues that suboptimal storage conditions often favour chemical and biochemical reactions that result in undesirable changes in color, flavour, texture and nutritional value.

### **5.3.3 Information flow and quality of fresh food supplies in Uganda Police Force**

The study found out positive and still a moderate relationship between information flow and quality of fresh food supplies. These study findings are supported by Bozarth and Handfield



(2015) who assert that telecommunications and computer technology allow all the actors in the distribution process to communicate among each other. The findings are also in agreement with the ideas of Trienekens and Zuurbier (2008) who stress that due to the importance of product quality in the food industry, quality assurance will dominate the process of distribution, and that the costs for quality assurance may evoke responses like technological innovation to create higher efficiency and reduce costs. New technological developments such as time-temperature integrators or indicators can be used to improve temperature monitoring throughout the distribution system (Koutsoumanis, Giannakourou and Taoukis, 2002). This also allows for improved shelf life estimation.

#### **5.4 Conclusions of the study**

This study sought to examine the effect of distribution management on the quality of fresh food supplies. Specific emphasis was on analyzing the effect of transportation, storage and information flow on the quality of fresh food supplies. The study adopted a case study research design to address those issues; primary data was utilized in obtaining evidence of the study from the selected respondents in Uganda Police Force.

The study utilized a multiple regression analysis conducted in SPSS 23.0. The overall pattern of the findings of the study revealed the following key insights; 30% of the variations in quality of fresh food supplies was explained by transportation, storage and information flow leaving 70% to be explained by other factors. Transportation and information flow were statistically significant however storage was insignificant.

Based on findings of the study, there are prospects that quality of fresh food supplies will be increased in UPF, if strategies on how transportation and storage of fresh food supplies will be

managed and also effective information flow in UPF will reduce losses in terms of food spoilage when information timely reaches all the players involved in the distribution of fresh food supplies.

## **5.5 Recommendations**

The study found out that although UPF is currently undertaking some aspects of transportation, storage and information flow there were still significant gaps in these three areas that measured distribution management that affected the quality of fresh food supplies. This major section presents, the action points that the management in UPF need to undertake and how best they could be implemented to enhance quality of fresh food supplies. These recommendations are based on primary data collected from the field

### **5.5.1 Transportation and quality of fresh food supplies**

With different kinds of food supplies, UPF should develop vehicles with different temperature-insulated containers or other climate control solutions which are required in the transportation of fresh food supplies.

UPF should take advantage of technology improvements in data capture and processing, product tracking and tracing, synchronized transport transit times for time compression along the supply chain.

### **5.5.2 Storage and quality of fresh food supplies**

To provide the safe and satisfactory fresh products, UPF should invest in fresh food cold chains. UPF should also adopt the FEFO ideology where the first expired should be the first to be issued out in order to reduce on the loss.

UPF should budget for the construction of modern and efficient storage facilities

### **5.5.3 Information flow and quality of fresh food supplies**

UPF should invest in technology, where appropriate, and become as efficient as possible in tracing and tracking the shelf life of these fresh food supplies.

UPF should draft a clear communication channel from the point of receipt by the quarter masters to the logistics personnel and also encourage constant feedback from the end consumers with the aim to reduce delays in deliveries and use feedback to improve on the quality of fresh food supplies.

### **5.4 Areas for further research**

This study focused on how transportation, storage and information flow affect the quality of fresh food supplies in UPF and the findings reveal that only 30% of the variation in quality of fresh food supplies is caused by the above three indicators therefore there is need to undertake a study to establish what could be the other factors or indicators under distribution that affect the quality of fresh food supplies. Recommendations are also made to study the entire chain of fresh food supplies in UPF and its impact on the quality.

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## **APPENDIX ONE: QUESTIONNAIRE ON DISTRIBUTION MANAGEMENT AND QUALITY OF FRESH FOOD SUPPLIES**

I am Natuhwera Gloria, a student of Masters of Science in Procurement and Supply Chain Management of Kyambogo University. My Research titles. Distribution management and quality of fresh food supplies at Uganda police Force. A case of Kampala metropolitan police

In this study, you have been chosen as a participant though this is strictly, for academic purposes therefore your participation will remain confidential. The findings from this study will support my academic work but other organizations can also use it as a tool for best practices and policies such as Uganda police force

### **PART A: GENERAL INFORMATION**

1. Gender of respondent Male  Female

2. Highest level of education: What is your highest level of education?

S.3 and below

O' Level

A' Level

Tertiary institutions

University Education

PhD

3. Period of service: How long have you worked at Uganda police force?

Less than 1 year

6-10 years

1-5 years

Over 10 years

## PART B: TRANSPORTATION

4. What is your level of agreement with the following statements that relate to issues of transportation of food at Uganda police force? Use a scale of 1-5 (1- Strongly Disagree; 2- Disagree; 3-Neutral; 4- Agree; 5- Strongly Agree)

Sub variables	SD	D	N	A	SA
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Fresh food supplies are always covered when transporting them	1	2	3	4	5
2. UPF follows the first expired, first out rule when planning deliveries to the different divisions and units within KMP	1	2	3	4	5
3. UPF uses cooling facilities in transporting of fresh foods	1	2	3	4	5
4. All equipment used in transportation of fresh supplies are regularly maintained	1	2	3	4	5
5. Containers used for transportation of food supplies are constructed in a way that ensures adequate cleaning and disinfection	1	2	3	4	5
High-risk <input type="checkbox"/> foods <input type="checkbox"/> across <input type="checkbox"/> all <input type="checkbox"/> modes <input type="checkbox"/> of transportation  High-risk <input type="checkbox"/> foods <input type="checkbox"/> across <input type="checkbox"/> all <input type="checkbox"/> modes <input type="checkbox"/> of transportation	1	2	3	4	5
6. Transportation containers have appropriate control devices for measuring temperatures and pressure	1	2	3	4	5
7. Foods are strictly transported in containers which are clearly labelled	1	2	3	4	5
8. The containers that transport fresh food supplies are constantly	1	2	3	4	5

cleaned to avoid contamination					
9. Vehicles used to transport food supplies are weather resistant	1	2	3	4	5
10. Frozen foods are transported in appropriate chilled or isolated conditions	1	2	3	4	5
11. When transporting different fresh supplies, the vehicles are divided up into multiple compartments with different temperature controls	1	2	3	4	5
12. UPF uses cooler trucks with isothermal equipment	1	2	3	4	5
13. All vehicles are equipped with special temperature gauges with the possibility of setting the appropriate temperature	1	2	3	4	5
14. There are emergency vehicles in place should there be break downs to ensure that fresh foods don't get spoilt	1	2	3	4	5
15. UPF has a fast delivery strategy which is flexible and respond to changes in demand	1	2	3	4	5
16. UPF staff follow proper handling and transport guidance	1	2	3	4	5

### **PART C. STORAGE**

5. What is your level of agreement with the following statements that relate to the impact of storage on quality of food distribution at Uganda police force? Use a scale of 1-5 (1- Strongly Disagree; 2-Disagree; 3-Neutral; 4- Agree; 5- Strongly Agree)

<b>Sub variables</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. There are storage facilities with special conditions to	1	2	3	4	5

preserve food supplies against spoilage					
2. Food supplies are stored in coolers at ambient temperatures	1	2	3	4	5
3. UPF ensure that there is minimal handling of fresh foods	1	2	3	4	5
4. UPF provides highly perishable produces that requires adequate storage facilities	1	2	3	4	5
5. UPF takes into consideration temperature controls in preserving fresh foods	1	2	3	4	5
6. Fresh food supplies are segregated by best before date	1	2	3	4	5
7. There is proper packaging of fresh foods	1	2	3	4	5
8. There is guidance for staff in place on how to reduce temperatures in storage spaces	1	2	3	4	5
9. The storage facilities have appropriate interior climate conditions that monitor and record temperatures during storage	1	2	3	4	5
10. UPF has enough storage space to store the fresh supplies	1	2	3	4	5
11. There storage facilities are well ventilated	1	2	3	4	5
12. There is monitoring of the temperatures in the cooling devices	1	2	3	4	5
13. Storage facilities ensure that sanitary technical and hygiene conditions are adhered to.	1	2	3	4	5
14. Food suppliers are storage in adequate packaging materials	1	2	3	4	5
15. There is use of refrigerators and humidifiers to make temperature low and humidity suitable for certain fruits	1	2	3	4	5

16. There is proper storage configuration to accommodate access requirements	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**PART D. INFORMATION FLOW**

6. What is your level of agreement with the following statements that relate to the information flow on the quality of food distribution at Uganda police force? Use a scale of 1-5 (1- Strongly Disagree; 2-Disagree; 3-Neutral; 4- Agree; 5- Strongly Agree)

<b>Sub variables</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. UPF has invested in the development of preservation technologies of food supplies	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
2. There is coordination among the supply chain members to ensure quality of various food supplies	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3. UPF implements traceability systems to improve on food quality	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
4. Internet based systems are designed to achieve food supply chain coordination	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
5. There is application of FEFO as a strategy to manage fresh supplies	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
6. There is timely flow of information about the exact quantities needed	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
7. There is establishment of traceability system to control quality of fresh food supplies	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

8. There is use of EDI information platform to monitor the quality of food	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
9. There is existence of up to date information about estimated time of arrival	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>10.</b> There is regular updates on stock availability	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
11. There is sharing of the necessary documents and procedures regarding fresh food supplies to the concerned staff in UPF	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>



## PART E. QUALITY OF FRESH FOOD SUPPLIES

7. What is your level of agreement with the following statements relates to quality fresh food supplies at Uganda police force? Use a scale of 1-5 (1- Strongly Disagree; 2-Disagree; 3-Neutral; 4- Agree; 5- Strongly Agree)

<b>Food safety</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Transport means for food supplies ensure adequate cleaning and disinfection	1	2	3	4	5
Proper storage leads to proper hygienic conditions of fresh supplies	1	2	3	4	5
Information flow in form of food supplies provides food contents of the food supplies	1	2	3	4	5
Food labelling also informs UPF on how to preserve the food supplies	1	2	3	4	5
<b>Sensory characteristics</b>					
Shorter delivery times help to maintain the freshness of fresh supplies	1	2	3	4	5
Use of specialised equipment like refrigerators and humidifiers provides good aroma of the fresh foods	1	2	3	4	5
Proper storage of fresh supplies maintains the original colour	1	2	3	4	5
Shelf life					
Traceability systems helps to avoid expiry	1	2	3	4	5
Information flow gives information on Product remaining shelf	1	2	3	4	5

lives					
Fresh supplies are stored in between 4-10C to avoid spoilage	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The adoption of various temperature control allows information to be gathered to optimise inventory decisions	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**Thanks for participating**

## **APPENDIX TWO: INTERVIEW GUIDE**

**Dear respondent,**

This is an academic study “*EXAMINING THE EFFECT OF DISTRIBUTION MANAGEMENT ON QUALITY OF FRESH FOOD SUPPLIES IN UPF*”. The study is conducted by school of management and entrepreneurship, Kyambogo University. Your responses shall be confidential and used only for academic purposes. Therefore, you are cordially requested to spare some time and share your responses.

**An interview guide schedule for the interviews with UPF key informants to obtain information about distribution management and quality of fresh food supplies.**

1. How do you manage the distribution of fresh food supplies in police?
2. How does UPF transport the fresh food supplies from the main stores to the units?
3. What transportation conditions or strategies have you put in place to ensure that quality of fresh food supplies is maintained while in transit?
4. Describe how the fresh food supplies are stored in UPF?
5. Are the storage facilities in place?
6. What type of fresh foods do you frequently store?
7. Describe the communication channel that is employed in UPF?
8. How does information flow from quarter masters to logistic officers?
9. How is feedback from end consumers utilised?
10. Does UPF have electronic modes of information transfer and tracing?

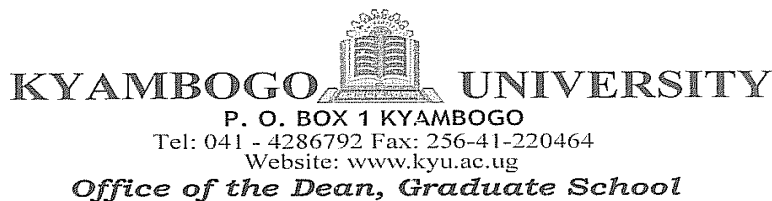
**APPENDIX THREE: DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	10000	384

Note: “N” is population size and “S” is sample size

Krejcie, Robert V., Morgan, Daryle W., “Determining Sample Size for Research Activities”, Educational and Psychological Measurement, 1970.

## APPENDIX FOUR: LETTER OF INTRODUCTION TO COLLECT DATA



15<sup>th</sup> July 2020

*To Whom It May Concern*

**RE: LETTER OF INTRODUCTION**

Dear Sir/Madam,

This is to introduce **Ms.Natuhwera Gloria** Registration Number **17/U/14788/GMSC/PE** who is a student of Kyambogo University pursuing a Masters Degree.

She intends to carry out research on “**Distribution Management and its effect on the quality of fresh food supplies in Uganda Police Force: A Case of Kampala Metropolitan Police**” as partial fulfillment of the requirements for the award of the Master of Science in Procurement and Supply Chain Management.

We therefore kindly request you to grant her permission to carry out this study in your institution.

Any assistance accorded to her will be highly appreciated.

Yours sincerely,

Assoc. Prof. Muhamud N. Wambede  
**DEAN, GRADUATE SCHOOL**

## APPENDIX FIVE: LETTER OF ACCEPTANCE TO COLLECT DATA

TELEGRAMS: "GENPOL"  
GENERAL : +256 (4 14) 231144  
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DIRECTORATE OF LOGISTICS & ENGINEERING  
P.O BOX 7262  
KAMPALA  
UGANDA

IN ANY CORRESPONDENCE ON **DLE/20/12**  
THIS SUBJECT PLEASE QUOTE NO.....

17<sup>th</sup> July 2020

Practicum Coordinator  
Department of Procurement and Marketing  
Kyambogo University  
P O Box 1  
KYAMBOGO

### **MASTERS INTERNSHIP PLACEMENT: M/S NATUHWERA GLORIA**

Reference is made to yours in connection to the above subject matter.

This is to confirm to you that the above mentioned student has been accepted to do her Masters Internship from the Uganda Police Force, Logistics & Engineering Department.

  
Edyegu Richard C.

**DIRECTOR LOGISTICS AND ENGINEERING**