Influence of Logistics Optimization on Performance of Agricultural Firms in Murang'a County, Kenya

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Purpose: The goal of this study was to explore the influence of logistics optimization on agricultural firm performance in Kenya's Murang'a County. The study focused on transportation management, inventory Management, information management and packaging management. It is anticipated that the findings of this study was useful to the government through the ministry of agriculture and county government in Kenya. Therefore, this research study was limited to the scope of the study, target population, specific objectives, theories under this study, and indicators of this study.

Keywords: transportation management, inventory Management, information management, packaging management and performance of agricultural firms.

Introduction:

A supply chain (SC) can be defined as an integrated system synchronizing a series of interrelated commercial processes in order to: acquire raw materials and parts, transform these raw materials and parts into finished products, and allocate these products to either retailers or customers. Supply chain is the integration and coordination of procurement, production, distribution and demand planning. These planning doings require taking strategical, tactical and operational decisions. And optimization models are being developed to operate these activities in the supply chain. Logistics management is a part of supply chain management which comprises the planning, control, as well as implementation of well-organized movement and storage of necessary information, goods, and services from point of origin to point of destination (Adulyasak, Cordeau & Jans, 2014). Therefore, logistics management plays a significant role in enhancing a firm's strategic edge in customer service and operational excellence (Achillas, Bochtis, Aidonis and Folinas (2018), pointed to the fact that logistics management is a growth-oriented corporate strategy and not a mere means for cost reduction. They noted that in an attempt to leverage and consolidate on the merit of logistics management, agricultural organizations are approval of the current logistics developments.

1.0 Statement of the Problem

There has been a problem**,** despite Kenya's agriculture sector growing by 3.6 percent in 2019, Coffee and wheat production in Kenya declined by 8.8% and 8.8%, respectively, in contrast to 2018. As a result, maize, tea, and sugarcane production decreased, owing to a variety of climate circumstances. Additionally, horticultural exports decreased the same period by 6% (Mutai & Osoro, 2021). This notwithstanding, most of the existing literature comes from the developed countries (Kioko, Olweny & Ochieng, 2019). Assessment of extant literature focusing on agricultural logistics has exposed several research streams, which can be sketchily classified by research methods adopted, products and geographical area to which the analyses pertain. According to Ongeri & Osoro (2021), these evidently demonstrates the need to conduct the study in the Kenyan environment in order to address the logistics optimization concerns. As a result, the study aims to fill this research gap by determining the influence of logistics optimization on the performance of agricultural firms in Murang'a County, Kenya.

1.1 Agency Theory

Agency theory is thought to be relevant for this study in order to understand the influence of transport management on performance of agriculture firms in Muranga County, Kenya, hence it gives a theoretical background for this study. Also according to Perea (2014), the agency theory can be used to describe transportation management variables in this study. Because of its sturdiness, the transportation function, which is a vital part of every business, necessitates a high degree of collaboration. Route planning, vehicle scheduling, and load planning are some of the essential elements in transportation management that necessitate collaboration among multiple stakeholders. This required collaboration demands the establishment of an agent-principal relationship between logistics managers and operational workers such as drivers (Kreps, 1972).

Agency theory, according to Pepper (2018), is consistent with the development of the principal-agent relationship, each party's rights and obligations, the agency problem, and how to reduce the problem by various corporate governance procedures and observations aimed at managing. The agent's goal is to assist a firm succeed by bringing all stakeholders' interests together. According to Perea (2014), literature does explain the dilemma of risk sharing that arises when working parties have diverse risk attitudes. When one party is characterized as the agent and acts for or on behalf of another party who is usually recognized as the principle, an agency relationship exists between the two or more parties (Kreps, 1972). Any fees connected with handling the demands of competing parties in the process of reviewing and resolving disputes are included in agency charges.

1.2 Resource Based View Theory

Resource Based View theory is thought to be relevant for this study in order to understand the influence of inventory management on performance of agriculture firms in Muranga County, Kenya, hence it gives a theoretical background for this study. The theory resonates well with inventory management variable which is concerned with organizations' most valuable resources; inventories. Inventory comprise of tangible resources of daily use whose proper management boost organizational performance. Agricultural firms need to keep inventories at optimal levels to avoid stock-outs as well as incurring inventory carrying costs as well. The Resource Based View (RBV) philosophy has its roots in strategic management. Santos (2005), the concept of RBV is that enterprises that can acquire uncommon, valuable, non-substitutable, and difficult-to-imitate resources and competencies will gain a competitive advantage over competitors. The apparent scarcity of a resource in markets is referred to as resource rarity. The degree to which resources are aligned with the external environment in order to take advantage of opportunities and mitigate hazards is referred to as value. The term "substitutability" refers to the ability of competitors to produce resources that are comparable to their own (Mallik, 2015). Resources are more appropriately described as "stocks of available components that the firm owns or controls," whereas capabilities "refer to a corporation's power to deploy resources, usually in combination, through organizational procedures, to achieve the intended objective" (Santos, 2005).
Manufacturing plants, raw materials, supply chains, and technology are examples of tangible resources. Private knowledge, relationships, client loyalty, business culture and philosophy, and supply chain competences are all examples of intangible resources and capabilities.The mere presence of resources is insufficient to ensure good company performance (Santos, 2005). Resources must also be controlled and exploited effectively. Using RBV as the theoretical foundation, a thorough review of empirical studies was conducted. Combinations of resources, according to Kreps (1972), are more likely to explain superior business performance than individual resources. In addition to the value provided by individual resources, combining resources that are dependent on other resources through causal links can create value for the organization. The key driver of organizational performance and competitive advantages, according to the RBV, is a firm's distinctive capability, which can be transferred from numerous tangible and intangible resources. Despite its explanatory capacity, the RBV is thought to be fundamentally static and unable to explain firms' competitive advantage in changing circumstances (Mallik, 2015).

1.3 Game Theory

Game theory is thought to be relevant for this study in order to understand the influence of information management on performance of agriculture firms in Muranga County, Kenya, hence it gives a theoretical background for this study. It is proved in the literatures that the proper information management through effective information flow, e-customer feedback systems and use of special technologies such as EDI and RFID contribute significantly to logistics costs management. Therefore, Game theory is linked to the information management variable. It is the official study of conflict and cooperation (Eisenhardt, 1989). Game theory is the formal study of decision-making where numerous individuals must make choices that may affect the interests of other players. When the behaviors of numerous agents are interdependent, game theoretic principles apply. Persons, groups, firms, or any combination of these can act as agents. Game theory concepts provide a framework for structuring, analyzing, and comprehending strategic dilemmas (Goldsmith & Yamane, 1968). According to Santos (2005), there are two types of game theory: non-cooperative and cooperative. When players can gain more by cooperating rather than competing alone, cooperative game theory can be employed. Because the topic of gain sharing has been extensively studied in cooperative game theory, we used cooperative-game-theoretic methodologies in developing our hypothesis on transportation management and company performance. Cooperation is becoming increasingly important in order to improve global logistics performance (Eisenhardt, 1989). Horizontal cooperation, as a complement to traditional vertical cooperation, has been shown to be effective in lowering worldwide costs and improving logistics service rates. The goal was to increase logistics efficiency, such as lowering logistics costs or lowering the environmental impact of transportation. The hypothesis emphasizes the significance of information technology and the role it plays in lowering logistics costs (Santos, 2005).

1.4 Transaction Cost Theory

Transaction Cost Theory is thought to be relevant for this study in order to understand the influence of packaging management on performance of agriculture firms in Muranga County, Kenya, hence it gives a theoretical background for this study. According to

Chen (2021), the theory has a direct relation with packaging management as a logistic management optimization objective of the study. This is particularly because apart from legislative and environmental requirements, packaging has a myriad of decisions to be arrived at most of which revolve around costs and whether to have packaging done in-house or by a contracted party. These decisions include; the choice of the type of packaging material and whether to outsource the function or conduct in-house packaging (Goldsmith & Yamane, 1968).Transactional cost analysis is critical when a company is deciding whether or not to engage in a certain activity. The theory divides transaction costs into production and coordinated costs and uses transactions as the unit of analysis (Kreps, 1972). Transaction costs, according to the notion, arise during contracting (drafting, negotiation, and guarding) or implementation. When deciding whether or not to carry out a task, a corporation must do a transactional cost analysis.

Transactions are used as the analytic unit, and operational expenses are divided into production and planning costs. Transaction costs are incurred, according to theory, while entering into a contract or presenting a new product. Decision makers must analyze and compare the costs of performing a transaction within their firms and contracting. TCE basically means that transaction costs associated with making or purchasing decisions influence the choice between the firm and the market. The analysis of transaction costs aids in deciding whether to execute operations in-house or outsource them to third parties (Delbufalo, 1956). According to the TCE, transaction frequency, property specificity, unpredictability, restricted rationality, and opportunistic behavior are the five predictors of operational costs (Goldsmith & Yamane, 1968). At its most basic level, Transaction Cost Economics (TCE) is a concept of how commercial transactions are arranged in challenging decision settings (Delbufalo, 1956). TCE focuses on intricate transactions since they are regular, unpredictable, and necessitate obligations that are impossible to cancel without incurring significant financial losses. The main purpose of TCE when it was first conceived was to consider the intricacies of a single agreement involving at least two trade partners and a transaction. Recognizing a dyadic transaction, on the other hand, allows any transaction to be understood, as well as, more profoundly, what a business is and how its size and reach are assessed (Goldsmith & Yamane, 1968).

2.0 Transport Management

When we experience disruptions in the supply chain whether it is caused by late deliveries, long lead times or poor quality, we look for the link in our supply chain that is causing the problem. Typically, we then try to work with that supplier to help them to improve whatever is creating the problem. Failing an adequate improvement, we look for a new supplier (David-West, 2020). This is “Supplier Development.” Supplier Development has been the traditional method used to improve supply chain performance. The suppliers causing the most problems in cost, delivery or quality are the recipients of our improvement efforts. The idea being that if I can just get this supplier to perform, all my supply chain problems will be solved. More often than not, once the supplier we help is brought up to the desired performance level, we discover that the flow of product hangs up at yet another node in the supply channel (Ongeri & Osoro, 2021). We then proceed through the supply chain in “Whack-A Mole” fashion “improving” each new supplier that emerges as “the problem.” We might also find that some suppliers just don’t have the capacity to provide product at the level of demand required or they may not have the ability to respond quickly to changes in demand. Critical Path Analysis helps us to determine the rate of demand required of each channel of our supply chain in order to meet our top tier strategy. The strategy we created earlier includes projected demand for near term, and long term. We can then look at the channel that composes the critical path and create an improvement plan that will bring the entire channel’s ability to a level that can meet the demand. The forecasted demand levels are shared with each of our supply chain partners and their capability to meet the capacity, quality and lead time requirements are assessed (Boyce, 2020).

There are a large number of optimization problems in organized systems, such as in industrial systems, business systems, transportation and logistics systems, where at strategic, tactical, and operational levels, planners, analysts, strategists, and engineers are confronted with uncertainty. Many optimization problems arising from these systems have deterministic (certain) parts along with uncertain components, which planners could disambiguated based on the predictable and probabilistic information. Along with the other various factors (David-West, 2020). pointed out the crucial issue of developing efficient methods of analyzing this information in order to understand the internal structure of the market and make effective strategic decisions for the successful operation of a business (Ongeri & Osoro, 2021). In addition, referring to the efficiency of the transportation infrastructure, expressed that planners and engineers need to forecast the demand of transportation to make informed transportation infrastructure planning decisions. Boyce (2020), stated for any engineering system that the uncertainties in system characteristics and demand prevent assurance from being given with absolute certainty. For supply chain systems, David-West (2020) emphasized that it is necessary to design systems that eliminate as much uncertainty as possible and it is necessary to deal effectively with the uncertainty that remains.

2.1 Inventory Management

The cost of buffer inventory is often absent from the traditional determination of cost. Costs involve not only the dollar value of the inventory itself, but also the financing cost of the investment and carrying costs related to storing excess inventory. The foremost goal of logistics is satisfying customers’ demands with effective cost (Arfin & Sonawane, 2018). This idea is supported by Michael Porter

who mentioned that a successful company needs to provide the various Pressure influencing logistics system. Increasing customer service requirements Regulator changes Changing materials handling and transport technologies Improved communications and information technology Need to redesign and improve efficiency of logistics system Competitive pressure Product proliferation shorter product life cycles Pressure for improved financial performance and inventory reduction Change in players & roles in distribution channels Pressures to develop supply chain vision and co-operation 14 products at a low price (Ongeri & Osoro, 2021). Previously, companies have tried to reduce cost by looking for cheaper supply while customer service level might be reduced. However, if the investment in logistics is increased without consideration of the proper customer service level strategy, the expected profit cannot be reached. Thus, new trend of logistics activity is traded-off on cost and customer service level, known as customer value. Waters et al describes that customer value is a ratio between perceived benefits and total cost of ownership of each customer. Inputs used to calculate customer value should be defined circumspectly because some costs such as opportunity cost and hardly tangible costs can be ignored easily (Hossain, 2016).

All in all, a company responding more rapidly to customer requirements at lower costs becomes a leader in the market. Some companies do not want to invest considerably in logistics assets which might have effect on company's core businesses, thus logistics outsourcing and third-party logistics are answers to overcome the logistics issues (Shenoy & Rosas, 2017). On one hand, single logistics activity, transport and warehousing, for examples, cannot cope with the overall logistics problems. Therefore, third-party logistics companies (TPLs) offer several kinds of logistics services which cover planning, controlling, and monitoring services. This allows the companies to manage the whole logistics activities. Advanced information technologies and logistics facilities are provided by TPLs to have higher level of agility in logistics as well as gaining economy of scale. The number of TPLs has grown rapidly though logistics outsourcing cost has greatly increased which is a consequence of their ability to provide value-added services such as custom clearance and brokerage, freight forwarding, cross-docking and shipment consolidation, order fulfillment, and distribution (Arfin & Sonawane, 2018).

2.2 Information management

In most of the surveys we see about supply chain challenges, supply chain visibility consistently ranks near the top of the list. Most organizations don't have visibility of key supply and demand data from more than one tier up or down from their own position. In the ideal world of a demand driven supply chain, flow of product to the end customer and from the furthest upstream supplier would be synchronized to provide a smooth and efficient flow of material that is also responsive to demand variation (Ittmann, 2018). The goal of supply chain visibility is to reduce business and supply chain risk, while improving lead times and performance, and identifying shortage and quality problems along the supply chain. So why is this ideal state so difficult to achieve? To understand the problem we need to first look at the real world as it exists today. To begin with, information in most organization exists in silos. The sales department has its projections and budget, production has its production schedules, buyers have supplier cost and delivery schedule data, etc. The focus of this fragmentation of data is designed to serve the purposes of the individual departments in the organization instead of that of the entire supply chain. In addition, each of the suppliers and customers has their own silos of information, not commonly shared with other supply chain partners (Jardini, El Kyal & Amri, 2016).

A major challenge in the sharing of information between tiers is the problem of passing data between disparate information systems. How do you connect a company with an enterprise-wide ERP system with a supplier who manages their business on a spreadsheet? Innovations such as cloud computing, and data collection and analysis software are now making supply chain control towers possible (Jayasuriya Daluwathumullagamge, 2019). Once a dataset is designed to give supply chain partners the information they need for sensing and shaping supply chain demand, the data can be communicated up and down the supply chain for analysis and planning (Ongeri & Osoro, 2021). A concept that has gained a lot of discussion lately is that of the supply chain control tower. The control tower makes key data available to the partners in a supply chain that facilitates coordination of customer demand with supplier response. For a supply chain control tower to transform available data into usable information development is required in three areas: The real time end-to-end data that the supply chain control tower provides enables companies to manage demand signals more accurately to reduce inventory levels, answer customers' requests faster and more accurately, and smooth the effects of demand variation (Jones, 2019).

2.3 Packaging Management

Agronomists and agricultural engineers typically conceptualize farming technologies as assemblies of consumables and equipment, or as packages of technical and managerial practices. Conceived in this way, the introduction of farming technologies to new settings, or their movement from one rural site to another, is seen as a matter of distributing artefacts accompanied by instructions and training. Technological change is seen as a simple, merely technical process, epitomized in conventional accounts of how innovations 'diffuse' and how technologies 'transfer' (Kabiru, Theuri & Misiko, 2018). This technicity conception of technology frames technical objects and their associated instructions as manifestations of objective scientific knowledge. As such, technologies are thought to have axed functional characteristics that produce predictable effects. In such accounts, non-technical and non-economic factors are considered externalities, and they are often blamed when the results of technology transfer fall short of expectations. Low levels of uptake or disappointing impacts are often attributed to factors such as an unfavourable institutional framework, a lack of leadership or political will, insufficient financial investments, and even the ignorance and backwardness of uncooperative farmers. These obstacles are often

targeted for correction through training and 'capacity building', while the design, delivery or performance of the technical intervention itself may go unquestioned (Kent, 2020).

To make agricultural technologies mobile, ready for transmission to farmers' fields, work is done to refine and standardize them into packages. This is an exercise in inscription. The recommended package of practices is not an exact copy of what has been developed and tested in an experimental setting, but a distillation and selection of practices, techniques and inputs deemed by technical and communications experts to be correct, coherent and appropriate (Kent, 2020). This intellectual and practical process involves simplifying the technology into a manageably small number of essential components, which are supposed to be widely applicable. These are inscribed in the form of guidelines, recommendations, schedules, checklists, equipment and kits. Through these inscriptions, the technology is detached conceptually and materially from the particular place and context where it was developed so that it may travel to new settings (Ongeri & Osoro, 2021). While it exists in this form the technology package may change further as it passes from one organization to another, upon translation into a new language, and/or through the design of new training modules and materials. The concept of accordance is key to understanding what happens when the technology package arrives in each new setting. The package is not simply 'adopted', that is, received and put to use. From the potential user's perspective we can think of the technology (inscription) at this stage as a kind of proposition comprised of a set of ideas and material components, in other words, an offer or invitation to which individuals, groups or communities have an opportunity to respond (Kruger, 2018).

The accordance of the technology package help to determine what may be done with it, or how potential users may respond to the proposition. A new socio-technical configuration might emerge from the encounter between the inscribed technology package and new actors and contexts, but if so it will not be a simple case of technology transfer but a site-specific, sui generis enactment. Because small-scale agriculture often involves collective action and coordination within households and even across communities, the enactment of farming technology in a new situation implies a redistribution of responsibilities and activities among individuals and groups (Kruger, 2018). As the introduced technical knowledge and techniques are interpreted, evaluated and integrated with existing local social and technical resources, local social and cultural structures and systems (such as those governing the coordination of labour) are also modified (Lai & Xiao, 2016). From this perspective, it is axiomatic that a technology is not the same wherever it travels; it will change wherever it 'touches the ground'. A similar package of tools and methods is likely to be deployed in a more or less different way in each place by different sets of actors. In other words, the material facts of rice physiology or hydraulics may be singular but those that are salient in one situation are liable to be different from those that matter in another (Ongeri & Osoro, 2021). The notion that technology is enacted through situated practice is a perspective that is difficult to reconcile with the placeless discourse of science, in which technologies represent applications of scientific knowledge that are robust and general, not particular to the actions or beliefs of individuals or groups. This discourse is often used by programme designers, policy makers, journalists and marketing professionals when they evoke the potential of agricultural technology to transform the livelihood opportunities of poor people, whereas the idea of enactment frames technologies as expressions of the capacity of people themselves, including poor people, to use tools, apply skills and organize themselves in order to solve problems and achieve goals (Kruger, 2018).

In general, food packaging must fulfil the following requirements: It must hold the contents and keep them secure without leakage or breakage until they are used, and enable the food to be handled conveniently. ? It must protect the food against a range of hazards during distribution and storage (PRachmat Hidayat, & Irsan Saleh. 2020). This includes serving as a barrier to dirt, microorganisms and other contaminants; protecting the food from damage caused by insects, birds and rodents; protecting it from crushing or other physical damage; and protecting it from the effects of heat and light that can cause rancidity, or moisture pickup or loss that can cause softening, wilting or other types of quality deterioration. ? It should be suitable for recycling or re-use, or be easily disposed of to prevent waste packaging from causing environmental pollution. The cost and availability of different packaging materials in a particular area also determine which packaging materials are used. The cost of a package should be considered in relation to the value of the food. For example, producers would incur serious financial losses if they used the wrong packaging materials for high-value foods that deteriorate without the correct packaging (cooking oils). These foods should therefore receive a higher level of investment in packaging than lower-value crops. This type of cost-benefit analysis should be carried out before selecting the best type of packaging for individual foods (Kruger, 2018).

2.4 Performance of Agricultural Firms

In order to monitor four aspects of transport performance, information which is an important input should be quantitative and comparative. Besides, the information used in the system should be accurate and timely in order to observe performance successfully. Performance monitoring is a cyclical activity starting with current stage study, after that identifying the distribution process objectives (Lialiuk, Kolosok, Skoruk, Hromko & Hrytsiuk, 2019). The next step is developing appropriate strategies to achieve plan objectives, followed by process control and comparing to the plan. As mentioned, the performance monitoring is a cyclical procedure; therefore, continual review and revision of plans must be progressive. Balanced scorecard Performance monitoring process is normally unplanned and unrefined which can create complexity and incompleteness of the process. In general, there are several ways to guide performance monitoring procedure such as the balanced scorecard. Kaplan and Norton introduced this method in 1996. Balanced scorecard is a tool to translate the strategic missions to measurable objectives by using Key Performance Index (KPI) [5]. There are four aspects to consider, which are financial perspective, customer perspective, internal perspective, and innovation and

learning. All KPIs of four perspectives should be set up to balance all aspects in order to achieve the business's goal (Neilson, Rossiter & Samaddar, 2018).

Financial leverage refers to the degree to which an agricultural firm uses debt and equity to finance its operations. It shows the extent of equity and debt used to finance the firm's assets. The financing decision is an important one for the management because it affects the shareholders' value of the company. According to Lialiuk et al. (2019), the proportion of debt to equity used affects the shareholders risk and returns on their investment in the firm. According to the Nairobi Securities Exchange annual report 2016, the NSE has a critical role in the economic growth and development of our country, since it facilitates a wide range of economic activities such as investment, trading, speculation and hedging 4 opportunities for both the local and foreign investors. It also provides an alternative and important platform through which institutions and the government can mobilize capital for investment, assess growth and stability (Ongeri & Osoro, 2021). Stocks in the agricultural sector are projected to continue lagging behind due to low trading at the NSE because potential investors prefer where there is a liquid market for ease of entry and exit at stable prices, whose operations are not affected by unmanageable factors such as climate (Neilson et al., 2018). The financial returns of agricultural firms are affected by several factors such as currency fluctuations, availability of export market, costly farm inputs and limited financing which in turn affects the amount paid out as dividends to the shareholders. Statistics from the Nairobi bourse shows that the shares of the agricultural segment have been falling behind compared to the other segments of the market this year whose prices have been steadily increasing (Lialiuk et al., 2019).

3.0 Research Design

The descriptive research design was employed in this study. The selection of this research strategy was made since descriptive research entails both qualitative and quantitative research, with the use of words and numbers occurring in a sequential manner, making it comprehensive (Łobaziewicz, 2017). It can also help researchers assess the degree and significance of the relationship so that subsequent research can narrow down the findings and, if possible, determine causation empirically. Study used the descriptive method of research that focuses on current occurrences of circumstances, beliefs, procedures, linkages, or trends (Blumberg, Cooper & Schindler, 2014). To collect the data, the study uses descriptive data, which is based on responses to a questionnaire. The current study used descriptive research to paint a picture of the impact of logistics optimization on agricultural firm performance in Murang'a County.

3.1 Performance of Agriculture Firms

According to the findings, the majority of agricultural enterprises in Murang'a County can maintain a short lead time with automated order processing, as evidenced by a mean of 3.72 and a standard deviation of.388. Furthermore, the study's findings revealed that the majority of agricultural enterprises in Murang'a County are dependable to their clients, as seen by a mean of 3.66 and a standard deviation of.526. Furthermore, according to the survey, the majority of agricultural enterprises in Murang'a County have kept inventory carrying costs to a bare minimum with proper projected inventory demand, as evidenced by a mean of 3.54 and a standard deviation of.463. Furthermore, the study's findings revealed that the majority of agricultural enterprises in Murang'a County reported a reasonable return on investment, as evidenced by a mean of 3.80 and a standard deviation of .544. Finally, the survey discovered that the majority of agricultural enterprises in Murang'a County have received repeat orders because clients are happy with our products, as evidenced by a mean of 3.77 and a standard deviation of.412. The findings implied that cost savings, high return on investment and high customer satisfaction in firms are reliable measures of performance of firms. These findings concur with the findings of Juma et al. (2018) who established that improved customer service translates to customer delight and loyalty that are essential for the performance of a firm.

Table 1.1: Performance of Agricultural Firms

Statement	Mean	Std. Deviation
With automatic order processing, we are able to keep a short lead time.	3.72	.388
We are reliable to our customers due to timely order processing.	3.66	.526
With proper forecast inventory demand, we have kept at bare minimum inventory carrying costs.	3.54	.463
We have been reporting satisfactory return on investment	3.80	.544
We receive repeated orders since customers are satisfied with our products	3.77	.412

3.2 Model Regression Summary Analysis

The multiple regression analysis showed a strong relationship, $R^2 = 0.632$ which showed that 63.2% of change in performance of agricultural firms can be explained by a change of one unit of all the predictor variables jointly, While 36.8% is the variation from other factors not inclusive in this study findings. This findings is in line with the findings of Ongeri and Osoro (2021)).Refer Table 1.2 below;

Table 1.2 Model Regression Overall Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.798[a]	.637	.632	.16532

a. Predictors: (Constant), Transport management, Inventory management, Information management, Packaging management
a. Dependent Variable: Firm Performance

This result indicated that predictor variables influence the performance of agricultural firms positively. Further test on ANOVA test showed that the significance of these F-statistic (24.007) is less than 0.05 since p value, ^{p}=0.00. This is displayed in Table 1.3 below;

Table 1.3 ANOVA[a] Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.197	1	5.549	24.007	.000[a]
	Residual	15.949	114	.231		
	Total	**38.146**	**115**			

a. Dependent Variable: Performance of Agricultural Firms
a. Predictors: (Constant), Transport management, Inventory management, Information management, Packaging management

Summary

The majority of agricultural enterprises in Murang'a County, according to the statistics, have a fleet management system. The majority of agricultural enterprises in Murang'a County, according to the statistics, have a fleet management system. the majority of agricultural enterprises in Murang'a County have an automated inventory recording system that allows them to track inventory level changes in real time and cycle counting as an inventory security strategy. The results revealed that the majority of agricultural enterprises in Murang'a County have a reliable order information flow, resulting in prompt order processing. Furthermore, the study found that the majority of agricultural businesses can track client order status. Where they have automated financial system to ensure that no payments are made twice. Furthermore, the study's findings demonstrated that the majority of agricultural enterprises in Murang'a County design packaging using ecologically friendly materials, even others cut corners on packing materials in order to keep costs down.

REFERENCES

1) Abdul Halim, Z. (2016). The moderating effect of supply chain role on the relationship between supply chain practices and performances. *SSRN Electronic Journal*.
2) Achillas, C., Bochtis, D. D., Aidonis, D., & Folinas, D. (2018). Green packaging. *Green Supply Chain Management*, 87-96.
3) Adulyasak, Y., Cordeau, J.-F., & Jans, R. (2014). Optimization-based adaptive large neighborhood search for the production routing problem. Transportation Science, 48 (1): 20-45.
4) Ali, A. H., Melkonyan, A., Noche, B., & Gruchmann, T. (2021). Developing a sustainable logistics service quality scale for logistics service providers in Egypt. *Logistics*, *5*(2), 21
5) Ali M. and Bilal, M., E., (2018). Determinants of financial performance in the industrial firms: Evidence from Jordan Asian Journal of Agriculture Extension, Economics and sociology ISSN; 2320-7027
6) Amanda, R. I. (2019). The impact of cash turnover, receivable turnover, inventory turnover, current ratio and debt to equity ratio on profitability. *Journal of Research in Management*, *2*(2).
7) Ambrosino, D., & Caballini, C. (2019). New solution approaches for the train load planning problem. *EURO Journal on Transportation and Logistics*, *8*(3), 299-325.
8) Amin, H. M., & Shahwan, T. M. (2020). Logistics management requirements and logistics performance efficiency: The role of logistics management practices – evidence from Egypt. *International Journal of Logistics Systems and Management*, *35*(1), 1.
9) Anand, E. (2018). Creative packaging as a tool of marketing. *South Asian Journal of Marketing & Management Research*, *8*(8), 16.
10) Ardalan, Z., Karimi, S., Naderi, B., & Khamseh, A. A. (2016). Supply chain networks design with multi-mode demand satisfaction policy. Computers & Industrial Engineering, 96:108-117.

11) Arfin, T., & Sonawane, K. (2018). Bio-based materials: Past to future. *Bio-based Materials for Food Packaging*, 1-32.
12) Aziidah, N. (2017). The Effect of Financial Leverage on the Financial Performance of Kenyan Energy and Petroleum Firms Listed on the NSE (Doctoral dissertation, United States International University-Africa).
13) Bajgiran, O. S., Zanjani, M. K., & Nourelfath, M. (2016). The value of integrated tactical planning optimization in the lumber supply chain. International Journal of Production Economics, 171(1): 22-33.
14) Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford university press.
15) Blumberg, B., Cooper, D., & Schindler, P. (2014). *EBOOK: Business Research Methods*. McGraw Hill.
16) Boyce, W. S. (2020). Supply chain relationships. *Supply Chain and Logistics Management*, 1695-1707.
17) Brahimia, N., & Aouamb, T. (2015). Multi-item production routing problem with backordering: a MILP approach. International Journal of Production Research, 54(4): 1076-1093.
18) Carvalho, D. M., & Nascimento, M. C. (2016). Lagrangian heuristics for the capacitated multi-plant lot sizing problem with multiple periods and items. Computers & Operations Research, 71: 137-148.
19) Chege, S. M., & Wang, D. (2020). The impact of technology transfers on agribusiness
20) performance in Kenya. *Technology Analysis & Strategic Management*, *32*(3), 332-348.
21) Chen, J. (2021). Cooperative game with agreements implemented by a third party. *International Game Theory Review*, 2050021.
22) Choudhary, D., & Shankar, R. (2014). A goal programming model for joint decision making of inventory lot-size, supplier selection and carrier selection. Computers & Industrial Engineering, 71: 1–9.
23) David-West, O. (2020). Information and communications technology (ICT) and the supply chain. *Supply Chain and Logistics Management*, 578-599.
24) Darvish, M., Larrain, H., & Coelho, L. C. (2016). A dynamic multi-plant lot-sizing and distribution problem. International Journal of Production Research, 1-12.
25) Delbufalo, E. (1956). Agency theory and supply chain management: A literature review. *Agency Theory and Sustainability in the Global Supply Chain*, 1-15.
26) Eriksson, P., & Kovalainen, A. (2015). *Qualitative methods in business research: A practical guide to social research*. Sage.
27) Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, *5*(6), 00149.
28) Eisenhardt (1989). Agency theory and financial planning practice. *Australian Economic Review*, *47*(3), 290-303.
29) Ghauri, P., Grønhaug, K., & Strange, R. (2020). *Research methods in business studies*.
30) Cambridge University Press.
31) Goldsmith, P. L., & Yamane, T. (1968). Elementary sampling theory. *Applied Statistics*, *17*(3), 296.
32) Hossain, M. F. (2016). World pineapple production: an overview. *African Journal of Food, Agriculture, Nutrition and Development*, *16*(4), 11443-11456.
33) Ittmann, H. W. (2018). Logistics performance in South Africa. *Journal of Transport and Supply Chain Management*, *12*.
34) Jardini, B., El Kyal, M., & Amri, M. (2016). The management of the supply chain by the JIT system (Just in time) and the EDI technology (Electronic data interchange). *2016 3rd International Conference on Logistics Operations Management (GOL)*.
35) Jayasuriya Daluwathumullagamge, D. (2019). A tale of two returns: Stock and investment returns with investment specific technology shocks. *SSRN Electronic Journal*.management. *Russian Journal of Logistics and Transport Management*, *2*(1), 3-10.
36) Jones, E. C. (2019). Inventory control. *Supply Chain Engineering and Logistics Handbook*, 141-150.
37) Juma, A. M., Odunga, R., Atheru, G. &Nzai, C. (2018). Financial Risks Analysis and Performance of Commercial Banks in Kenya, Journal of Finance and Accounting, 2(2), 76-95.
38) Kabiru, F. C., Theuri, M. M., & Misiko, A. J. (2018). The influence of planning on the organizational performance of agricultural state owned corporations in Kenya.
39) Kent, J. L. (2020). The role of car-sharing in sustainable transport systems. *Handbook of Sustainable Transport*, 190-198.
40) Kenyanya, P. N. &Ombok, O. B. (2018). Effect of Financial Leverage on Value-Added Financial Performance of Kenyan Listed Firms. IOSR Journal of Business and Management (IOSR-JBM), 20(6), 51-57.
41) Kioko, C. M., Olweny, T., &Ochieng, L. (2019) Effect of Financial Risk on the Financial Performance of Commercial Banks in Kenya listed on the Nairobi Stock Exchange. The strategic Business and Change Journal of Management. 6(2): 1936 -1952.
42) Kreps, D. M. (1972). Transaction cost economics and the firm. *A Course in Microeconomic Theory*, 743-770.
43) Kruger, S. (2018). Journal of transport and supply chain management ditorial. *Journal of Transport and Supply Chain Management*, *12*.
44) Lai, G., & Xiao, W. (2016). Supply chain information signaling and capital market. *Springer Series in Supply Chain Management*, 215-233.
45) Lai, G., & Xiao, W. (2016). Supply chain information signaling and capital market. *Springer Series in Supply Chain Management*, 215-233.

46) Lelgo, K. J. &Obwogi, J. (2018). Effect of financial risk on financial performance of micro finance institutions in Kenya. International Academic Journal of Economics and Finance, 3(2), 357-369.
47) Lialiuk, A., Kolosok, A., Skoruk, O., Hromko, L., & Hrytsiuk, N. (2019). Consumer packaging as a tool for social and ethical marketing. *Innovative Marketing*, *15*(1), 76-88.
48) Łobaziewicz, M. (2017). Communication model of measuring points using a RFID gate in production logistics. *Research in Logistics and Production*, *7*(4), 377-385.
49) Matayo, W. and Muturi, W. (2018). Effect of Financial Risk on Financial Performance of Large Scale Supermarkets in Nairobi County, Kenya. International Journal of Social Sciences and Information Technology, 6(5), 574-591.
50) Mallik, R. (2015). Being credit rationed: Delay and transaction cost. *International Game Theory Review*, *17*(02), 1540020.
51) Mudanya, L., E., and Muturi, W., (2018) Effects of Financial Risk on Profitability of Commercial Banks Listed in the Nairobi Securities Exchange. Int Journal of Social Sciences Management and Entrepreneurship. 2(1): 75 -93.
52) Mutai, V. K and Osoro, A.(2021) Strategic Engineering Management on Performance of all Commercial Banks in Nyeri County, Kenya. International Journal of Scientific and Research Publications, Volume 11, Issue 10, October 2021 530 ISSN 2250-3153.
53) Minner, S. (2018). Inbound logistics. *Operations, Logistics and Supply Chain Management*, 233-249.
54) Neilson, B., Rossiter, N., & Samaddar, R. (2018). Making logistical worlds. *Logistical Asia*, 1-20.
55) Nyoro, K. J., & Jayne, T. S. (2019). *Trends in regional agricultural productivity in Kenya*. Tegemeo Institute.
56)]. Okelo, C. A. (2015). Determinants of Financial Risk of Listed Companies on the Nairobi Securities Exchange in Kenya. Unpublished PhD thesis, Kenya-JKUAT.
57) Omulo, G., & Kumeh, E. M. (2020). Farmer-to-farmer digital network as a strategy to strengthen agricultural performance in Kenya: A research note on 'Wefarm'platform. *Technological Forecasting and Social Change*, *158*, 120120.
58) Ongeri, N.V. and Osoro, A. (2021) Effect of Warehouse Consolidation on Performance of Registered Distribution Firms in Nairobi City County, Kenya. The international journal of business & management Publications, Volume 9, Issue 10, October 2021 ISSN 2321–8916.
59) Oruko, F., Tibbs, C., & Maniagi, M. (2020) Influence of Financial Risk on Financial Performance of Agricultural Firms Listed on Nairobi Securities Exchange in Kenya. Journal of Economics and Finance (IOSR-JEF). 11(4), 05-12.
60) Pepper, A. (2018). Behavioural agency theory. *Agency Theory and Executive Pay*, 101-116.
61) Perea, A. (2014). From classical to epistemic game theory. *International Game Theory Review*, *16*(01), 1440001.
62) Phillipson, F., & E. de Koff, S. (2020). Immediate parcel to vehicle assignment for cross docking in city logistics: A dynamic assignment vehicle routing problem. *Proceedings of the 9th International Conference on Operations Research and Enterprise Systems*.
63) PRachmat Hidayat, & Irsan Saleh. (2020). The importance of inventory management in pharmaceutical practice. *Open Access Indonesia Journal of Social Sciences*, *3*(1), 1-9.
64) Regattieri, A., Santarelli, G., & Piana, F. (2018). Packaging logistics. *Operations, Logistics and Supply Chain Management*, 273-303.
65) Ristovska, N., Kozuharov, S., & Petkovski, V. (2017). The impact of logistics management practices on company's performance. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *7*(1), 245-252.
66) Santos, F.M., K.M. (2005). Organizational boundaries and theories of organization. *Organization Science*, *16*, 491–508.
67) Shenoy, D., & Rosas, R. (2017). Introduction to inventory management. *Problems & Solutions in Inventory Management*, 3-11.
68) Talley, W. K. (2019). Note: Determinants of cargo Port choices by cargo Port service providers. *Transportation Research Part E: Logistics and Transportation Review*, *132*, 48-50. The role of institutions in intermodal transport and logistics. (2016). *Institutional Challenges to Intermodal Transport and Logistics*, 63-73.
69) Weidner, T., Yang, A., & Hamm, M. W. (2019). Consolidating the current knowledge on urban agriculture in productive urban food systems: Learnings, gaps and outlook. *Journal of cleaner production*, *209*, 1637-1655.
70) Wild, T. (2017). Setting the right stock levels. *Best Practice in Inventory Management*, 113-127.