

BINDURA UNIVERSITY OF SCIENCE EDUCATION



FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTANCY

**THE EFFECTIVENESS OF COST MANAGEMENT STRATEGIES IN EMERGENCY
MEDICAL SERVICES: A CASE STUDY OF MEDICAL AIR RESCUE SERVICES
ZIMBABWE**

BY

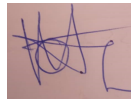
B211280B

**SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE
BACHELOR OF ACCOUNTANCY (HONOURS) DEGREE (B.ACC)**

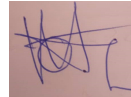
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APPROVAL FORM

The undersigned certify that, they supervised the student B211280B dissertation titled the effectiveness of cost management strategies in emergency medical sectors: A case study of Medical Air Rescue Services Zimbabwe.



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RELEASE FORM

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DATE.....10/10/25

DEDICATION

I do hereby dedicate this work to my parents and family for the love care and support during the writing of this project and the entire journey of my degree. Special thanks to my unborn baby for behaving well through the sleepless nights.

ABSTRACT

The study seeks to evaluate the effectiveness of cost management strategies on emergency medical services. This study used Medical air rescue services Zimbabwe as the case study. Interviews and questionnaires were use as data collection methods. In order to do the research a total of 36 respondents was used to participate in data collection. Participants were involved and engaged following all ethical practices. Research members were selected using convenience sampling and stratified random sampling methods. The results of the research are presented in tables, graphs and charts. Overall results of the project highlight that operational strategies together with technological adoption using phased implementation are crucial for successful execution.

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CHAPTER I

INTRODUCTION

1. Introduction

Emergency Medical Services (EMS) play a crucial role in preserving life and minimizing health risks during critical situations. The growing demand for emergency medical care, combined with increasing healthcare costs, has heightened the importance of effective cost management strategies in EMS operations. Even if the main focus of EMS is to provide timely and effective medical care during emergencies the growing financial difficulties on the public and private healthcare systems needs a balance between cost control and the quality of services provided to patients. The dissertation investigates the effectiveness of the many cost management strategies in EMS with the aim to identify approaches that enhance operational efficiency and maintaining high-quality patient care at the same time.

The emergency medical services (EMS) field and or sector is complex characterized by unpredictable demand, different patient needs and the necessity for rapid response capabilities. However the financial sustainability of EMS organizations is challenged by the resource allocation, workforce training, collaborative partnerships, government regulations and the utilization of technology. This study seeks to uncover the practices that will reduce costs and also improve service quality which is patient care.

As healthcare continues to grow with advancements in technology and changes in policies EMS must alternate and adapt to the changes in order to remain relevant and effective. This dissertation will provide some reviews from existing literature case studies and real-world applications of cost management strategies in EMS showing the successes, challenges, and opportunities for future improvements.

1.1 Background of the Study

Cost management strategies involve aligning organizational activities with strategic objectives to improve the utilization of resources according to Bhimani (2020). Horngren et al. (2015) defines cost management as the process of planning, analysing and controlling costs so as to achieve the organization's strategic goals. Adams and Thompson (2019) discusses strategic cost management approaches which make a balance between cost containment and high-quality healthcare delivery in the healthcare organizations. This study shows the need for strategic innovative and operational approaches that ensure financial sustainability without compromising high-quality patient care standards within the health care sector.

Effective cost management is an important area in the emergency medical services operations, as rising healthcare costs and limited resources requires EMS providers to cut and reduce their spending on resources and improve its allocation (Global Research Highlights, 2016). This research paper aims to examine the effectiveness of the many cost management strategies used in the EMS including staffing models, operational flexibility, and resource planning.

Over the past three decades a lot of numerous studies have focused on improving the operational performance of EMS systems with the aim to reduce response times (Villarreal et al., 2018). This emphasis on rapid response has been driven by the EMS system's main goal to provide advanced medical care to critical patients like those experiencing cardiac arrest or severe trauma. However, as the healthcare sector continues to develop with an aging population and rising costs in acute care services more cost-effective training and use of non-physician healthcare professionals in the out-of-hospital environment will be needed.

Worldwide EMS systems use various cost management strategies which show the economic and healthcare conditions of different countries. In high-income countries EMS is basically funded through a combination of taxes, insurance premiums, and user fees (Barrett et al., 2019). For example in the United States EMS services are often integrated into broader healthcare insurance plans. The private and public insurers cover the transport and care costs (Shah et al.,

2017). In Europe particularly in the UK EMS is funded mainly through taxes while patients may pay out-of-pocket for non-essential services (McLellan et al., 2018).

The scandal of Opioids in the 2010's where the widespread of over-prescription and misuse of opioids led to the global crisis which ended up in rapid response of EMS so the overdose cases. Cost management strategies could help improve the use and allocation of medication so as to prevent such cases.

In regional countries like South Africa, Zambia, and Botswana similar cost management issues are faced although they have made more progress in developing their EMS systems. In South Africa for instance the EMS sector is a combination of both public and private services with major reliance on government funding. Though there are efforts to improve financial sustainability through cost-sharing models and better billing systems (Pienaar et al., 2018). In Zambia EMS provision is often hampered by resource shortages, and cost recovery strategies such as charging patients for transport have been increasingly explored (Hubbard et al., 2019).

In Zimbabwe the EMS sector is heavily limited by economic instability, inadequate funding, government regulations and a shortage of resources. According to Chirwa et al. (2016) the country's EMS system has a history of being underfunded, leading to difficulties in maintaining operational efficiency mostly in rural areas. The key cost management strategies include prioritizing critical care services and relying on partnerships with non-governmental organizations (NGOs) and external funding for support (Chirwa et al., 2016). Zimbabwe has also employed Public-Private Partnerships (PPPs) to share the burden of EMS provision although this is still in the early stages of development (Mawoyo & Kambarami, 2017).

The EMS cost management strategies differ notably across regions. In Zimbabwe resource limitations and a reliance on external funding define much of the EMS sector. The Southern Africa faces similar issues but countries like South Africa have adopted more integrated cost-sharing models. Globally high income earning countries use insurance and tax-based funding mechanisms while technological innovations like telemedicine and predictive analytics are more common. Basically efficient cost management is crucial to ensure that EMS remains responsive and sustainable worldwide.

1.2 Problem Statement

The performance of cost management tools in Emergency Medical Services (EMS) limited environments such as Medical Air Rescue Services (MARS) Zimbabwe is an important but un-researched field, contrast of the increasing pressure for effective utilization of resources and demand planning within EMS systems globally. Despite such studies as those of Ramgopal et al. (2021) confirming the potential for advanced forecasting methodologies including Meta learners to forecast EMS demand in the urban environment, there is a big knowledge gap in understanding how such a framework can be embedded within cost control systems to realize maximum operational effectiveness and financial sustainability in low-resource environments. MARS Zimbabwe has operations in an environment with economic difficulties and confronted by financial and logistical issues which then complicate the provision of efficient patient care. The absence of empirical research on cost management practices appropriate for such environments confirms the need to study how innovative methods like demand forecasting and resource allocation can be used to improve service provision while keeping expenditures fiscally manageable. This study then attempts to respond to the relationship between cost management and EMS effectiveness with a focus on the use of forecasting tools and other efforts at enhancing the financial as well as operational performance of MARS Zimbabwe and making a universal contribution to the body of knowledge of sustainable EMS systems in low-resource environments.

1.3 Research Objectives

- a. To Identify Cost associated with EMS
- b. To identify factors influencing cost management effectiveness in EMS.
- c. To evaluate the effectiveness of cost management strategies in EMS.
- d. To analyse the impact of cost management strategies on financial performance.
- e. To examine challenges associated cost management
- f. To develop recommendations for improving cost management practices in EMS.

1.4 Research Questions

- a. What are the cost drivers in Emergency Medical Services?
- b. What are the factors that influence cost management effectiveness in EMS?

- c. How does cost affect the financial performance of EMS?
- d. How can cost management strategies impact financial performance?
- e. What challenges does EMS face in implementing cost management strategies?
- f. What strategies and recommendations can be developed to improve cost management practices in EMS?

1.5 Significance of the study

1.5.1 Theoretical Contributions

The study has great potential to contribute theoretically to the understanding of cost management strategy in Emergency Medical Services (EMS) in environments of scarcity. Through the examination of the combination of predictive tools for example the metal earner strategy by Ramgopal et al. (2021), with cost management strategies, the study seeks to fill an essential knowledge gap. Existing theoretical frameworks tend to concentrate on cost management or demand forecasting alone, without regard to the interplay of these variables in low-resource environments. This study will contribute to theoretical understanding by creating an integrated model that incorporates demand forecasting, resource planning, and cost minimization, specific to the unique EMS system challenges such as Medical Air Rescue Services (MARS) Zimbabwe. Such a model can then serve as the basis for further research enabling researchers to test and validate these strategies in various contexts enriching the academic literature on sustainable EMS operations.

1.5.2 Practical implications

The value of this study to practice is high mainly to the EMS providers operating in resource-limited settings. Through the identification and prescription of efficient cost management practices, the research will be able to come up with actionable recommendations that can make EMS systems more operationally effective and financially sustainable. For MARS Zimbabwe, the research could translate into better resource utilization, lower operational costs, and better service delivery, making life-saving rescue services both effective and economically sustainable. Outside Zimbabwe, the findings could be applied to other EMS agencies in comparable low-resource settings as a model for obtaining balance between cost constraints

and the need for timely delivery of high-quality emergency services. Policymakers and health managers also could learn from this study, with its evidence-based policy suggestions for maximizing EMS budgets and enhancing system performance.

1.5.3 Stakeholder benefits

The research will directly affect stakeholders such as policymakers, educational institutions, patients, and EMS providers such as MARS Zimbabwe. For EMS providers such as MARS Zimbabwe, the research will provide tangible tools and techniques for maintaining service quality at low cost which ensures long-term sustainability. Patients will have improved and consistent emergency response times and reliability due to improved management of costs that can result in increased resource allocation and lower response times. Health systems of low-income countries will learn important lessons from how they can make more efficient use of scarce resources, which would relieve pressure on public health budgets. The findings of the study would also be used for counseling international organizations and donors supporting EMS projects in developing countries to invest in strategies with the greatest impact and sustainability.

1.5.4 Benefits to policymakers

Policymakers will be highly benefited by this research as it offers evidence-based suggestions for enhancing EMS systems to be more efficient and sustainable. With this knowledge of the link between cost management practices and service delivery, policymakers can make well-informed decisions regarding resource allocation, funding, and policy design. The results of this study also have the potential to inform national and regional policy for the improvement of emergency medical services especially in low-resource environments. This might result in greater access to emergency care, better health outcomes, and less economic strain on healthcare systems. Secondly the research can be used as a tool to lobby for more investment in EMS infrastructure and training to make emergency services well-funded and equipped to handle increasing demands.

1.5.5 Benefits to the university

The university also gains from the research through contribution to knowledge and reputation. By solving an immediate global problem, the research is in line with the vision of the university to create applicable research that solves real-world problems. The research will contribute value to the scholarly portfolio of the university enhancing quality content to learn subsequent studies and partnership with other institutions. The research can propel the university as the first healthcare management and emergency services institution of its kind in the country or globally leading to funds, partnership, and recognition by the national and foreign stakeholders. The staff and students engaged in the study will be exposed to positive experience and knowledge thus raising the academic and research capability of the university.

1.5.6 Reason for time, effort, and cost

Time, effort, and cost of carrying out this study are warranted because of its ability to generate paradigm-shifting results for EMS systems in resource-constrained environments. The research is tackling a pressing worldwide issue placing emergency medical services on sustainable ground in the context of increasing expenses and deficits of resources. Through developing realistic evidence-based guidelines the research will have direct usefulness to EMS professionals, policy makers, and institutions of higher learning and contribute to theory development in the field in the long run. The potential to save lives, improve health outcomes, and optimize the use of resources makes this study worthwhile with advantages far exceeding expenses. Ultimately this study will not only address the specific issues faced by MARS Zimbabwe but also offer scalable solutions that can be transferable to EMS systems worldwide contributing significantly to emergency care and global health equity.

1.6 Assumptions

Theoretical Assumptions

The study is based on some theoretical assumptions that inform and direct the research. First assumption is that cost management strategies, when utilized where they ought to be have the capability of significantly enhancing the functional efficiency and profitability of Emergency Medical Services (EMS) systems irrespective of scarcity situations.

Practical assumptions

In reality the study anticipates that MARS Zimbabwe as a case study is indicative of EMS system issues in other poor-resource contexts. The anticipation enables the findings to be projected and utilised in similar situations and thus the study becomes more generalizable.

Methodological assumptions

Methodologically it is assumed by the research that the research design employed, i.e., qualitative and quantitative methods, will be suitable in exploring the complexity of cost management in EMS systems. It is also assumed that the sampling method employed provide a representative population of participants that made the findings valid and reliable. Additionally, the study made assumptions that data analysis tools and methodologies employed in data exploration, such as statistical models and predictive analysis could appropriately interpret data and yield usable information. Assumptions like these underlie research rigor and accuracy of outcome.

Consequences of Assumptions

Such assumptions as those listed above even though indirectly not testable, enhance research grounding by prescribing an exact scheme for research inquiry. They enable the study to follow a meaningful course, addressing the research problem in an orderly and systematic way.

1.7 Delimitations of the study

The study focused on the effectiveness of cost management strategies in the emergency medical services (EMS) only excluding other healthcare services like hospitals. The research was based on Medical Air Rescue Services (MARS) Zimbabwe with the Harare base as the true representative of the whole organisation. Data collected was only from the stakeholders directly involved in the operation and cost management of MARS. The research however stops after giving recommendations only and does not proceed to evaluate the implementation and the effectiveness of the recommendations discussed.

1.8 limitations of the study

- Access to important and essential information was restricted by some confidentiality laws. However the available materials were used such that the study was reliable.

- Sometimes the management provided falsified information in order to protect the image of the company but so as to complete the research the investigator made clear to the respondents how important their truth was for the study.

1.9 Definition of terms

- Emergency Medical Services (EMS) refers to a coordinated system that is designed to provide immediate medical response and emergency care including pre-hospital treatment, transportation, and critical care usually in life-threatening situations (Owusu-Ansah et al., 2020).
- Cost management strategies is defined as a systematic approach used to analyse, plan, and control costs within an organization to improve resource utilization and achieve financial sustainability (Hosseini et al., 2023).
- Operational efficiency is the ability of an EMS system to deliver timely and effective emergency care at the lowest resource waste and maximizing output possible (Olave-Rojas & Nickel, 2021).
- Financial sustainability is defined as the capacity of an EMS system to maintain its operations and services in the long term without compromising quality service despite financial constraints (Hosseini et al., 2023).
- Resource allocation is the process of distributing available resources like personnel, equipment, and funds, in a way that maximizes efficiency and effectiveness (Owusu-Ansah et al., 2020).
- Predictive tools are tools used for analysing, forecasting demand and improving resource planning in EMS systems (Olave-Rojas & Nickel, 2021).
- Low-Resource environments are regions characterized by limited financial, infrastructural, and human resources usually found in developing or economically constrained regions (Hosseini et al., 2023).
- Stakeholders refers to individuals and or groups directly involved in or affected by EMS operations, including service providers, policymakers, patients, and funding organizations (Owusu-Ansah et al., 2020).
- Public-Private Partnerships (PPPs) are known as collaborative arrangements between government entities and private organizations that involves sharing of resources, risks, and responsibilities in delivering public services like EMS (Hosseini et al., 2023).

- Demand forecasting refers to the process of predicting future demand for EMS services basing on the historical data, previous trends, and predictive models which are mostly enhanced by machine learning techniques (Olave-Rojas & Nickel, 2021).

1.10 Chapter summary

The chapter emphasizes on the life-saving and wellness promotion role of Emergency Medical Services (EMS) in emergency situations. Outlining the importance of efficient cost control measures into depth in relation to the increasing healthcare expenditure and growing demand. The main focus is on low-resource environments such as Medical Air Rescue Services (MARS) Zimbabwe. This chapter also provides the research questions, assumptions, delimitations, and objectives of the research. In the next chapter literature review is introduced discussing existing research, theoretical constructs, and application of the predictive devices in EMS.

CHAPTER II

LITERATURE REVIEW

2.0 Introduction

This chapter provides an informative analysis of the existing literature on cost management practices that are used in the Emergency Medical Services (EMS). Considering the background of the enforcement within resource-deprived environments. The chapter is based on the theoretical model studies from the real world as well as the available studies for the use of predictive technology, machine learning, and improvement of resources allocation in cost management. The review considers the challenges and opportunities of applying the cost management strategies in low-resource environments for example those experienced by Medical Air Rescue Services (MARS) Zimbabwe. Using the combined and processed knowledge and the identified gaps in literature, this chapter is used as a platform for understanding the context and relevance of the research problem and the new strategies to be observed in this study.

2.1 Purpose of literature

The objective of the literature review is to present an understanding of the existing evidence on cost management practice in Emergency Medical Services (EMS) and its application in the environments with scarce resources. Through reviewing the existing research studies, theoretical models, and empirical data the chapter puts the research topic in a broader context and determines areas of lack in readily available literature. As highlighted by Oztemel and

Gursev (2020) literature review is an important basis of knowledge regarding how a research area develops and what the methodologies or technologies are. Similarly Kraus et al. (2022) says that literature review is a standalone study that gives views pertaining trends, challenges, and opportunities in a field. Conceptual framework and empirical studies about the cost management in EMS are utilized.

2.2 Theoretical framework

The theoretical review emphasizes mainly on the three theories of significance employed in the study that analyse cost management in EMS: Resource-Based View (RBV), which looks at strategic use of organizational resources to gain competitive advantage; Contingency Theory that looks at how external and internal factors influence the organizational practices and outcomes; and Systems Theory, which takes EMS as a system where a change in an element influences the overall operation.

2.2.1 Resource based theory

Resource Based Theory is also known as Resource Based View, it was developed by Barney (1991) and was further developed by scholars such as Barney, Ketchen Jr, and Wright (2021). The theory says that organizations achieve sustainable competitive advantage by leveraging unique valuables and resources. According to Barney et al. (2021) resource based theory focuses on how firms can create value by effectively using their internal resources in order to outperform competitors. This theory emphasizes that resources must meet the four things that are valuable, rare, irreplaceable and non-substitutable (VRIN) criteria to provide a sustainable competitive advantage. According to Lubis (2022) resource based theory is helpful in improving a company's strategic capacity by aligning resource allocation with long-term goals and market demands. Emergency Medical Services (EMS) in the case of Medical Air Rescue Services (MARS) Zimbabwe, RBT provides a valuable lens for analysing how limited resources can be optimized to improve operational efficiency and financial sustainability while maintaining high-quality patient care.

The application of RBT extends beyond traditional business settings, as demonstrated by Nandi et al. (2020) in their study on block chain technology-enabled supply chain systems. They argue

that RBT provides a robust framework for understanding how innovative technologies can be leveraged as strategic resources to enhance supply chain performance. Similarly, in the EMS context, RBT can be applied to explore how technological advancements, such as predictive analytics and telemedicine, can serve as valuable resources to improve service delivery and cost management. For MARS Zimbabwe, which operates in a resource-constrained environment, identifying and harnessing such resources can address operational challenges and achieve better outcomes Nandi et al., (2020). By integrating technology as a strategic resource, MARS can enhance its cost management strategies and ensure more efficient use of limited funds.

Apart from technological and informational resources RBT also points out the importance of human resources in achieving organizational success. According to Barney et al. (2021) skilled and motivated personnel are a useful resource that can lead to innovation and operational efficiency. In EMS training and retaining qualified medical and administrative staff is important and helps to ensure high-quality service delivery. Investing in staff training and development can help MARS to enhance operational efficiency and reduce long-term costs associated with high staff turnover and inefficiencies.

The theory stresses out about how resource optimization lines up with the need for strategic partnerships and collaborations in EMS systems. According to Nandi et al (2020) partnerships with external stakeholders like the government agencies, non-governmental organizations (NGOs), and private sector entities can provide access to additional resources and expertise. This shows that these collaborations can help improve resource scarcity and improve patient care for MARS Zimbabwe. Through external partnerships alongside internal resources MARS can create a flexible and sustainable operational framework Varadarajan (2020).

2.2.2 Contingency Theory

Contingency Theory is a management theory that suggest that there is no single best way to manage an organisation initially introduced by Fred Fiedler in (1960's).The internal and external factors like the environment, nature of business and structure off the business determines the decisions and strategies that are to be made. This theory argues that the company should adapt to the changes varying from different situations according to Csaszar and Ostler (2020). Different changes like environmental uncertainty, technological complexity, and availability of resources are to be adjusted to by structures, processes, and strategies

accordingly. Contingency Theory presents a standard of how cost management strategies need to be used depending on situation in order to aid a specific challenge of operating.

The Contingency Theory is used in many fields such as innovation management and technology adoption. According to Araral (2020) cities embrace smart technologies depending on the population, economic potential, and governance arrangements for urban development. The same as the application of cost management strategies in the EMS that has to be address to areas such as resource availability, technological infrastructure, and patients' needs.

Contingency Theory also stresses alignment of organizational resources with demands outside the organization. Safari and Saleh (2020) illustrate how small and medium-sized businesses (SMEs) employ their resources and capabilities to gain export success based on market circumstances and competitive pressures. This principle in EMS would thus require MARS Zimbabwe to plan the use of resources based on the needs of its operating environment, i.e., fluctuations in patient volumes and limited funding. In being a contingency-oriented organization, MARS can thus also be positioned to maximize cost control in order to respond more effectively to such external factors, thereby increasing operating effectiveness as well as financial viability (Safari & Saleh, 2020).

In this research the matters that are need strategic decisions depending on reactive measures are addressed using the contingency Theory because it is more reactive than proactive. Ahmed et al. (2020) claims that companies need to be innovative in their fields so as to drive performance.

2.2.3 Systems Theory

The systems theory presented in the 1960s by Ludwig von Bertalanffy and J.G Miller established the foundation of the theory. The theory views the organizational components as interdependent and interconnected. It views all the components of an organization their relationships and interactions. According to Becvar et al., (2023), systems theory shows the interdependence of components in a system and the ways in which change to one component influences the whole system. Systems Theory gives a point of view that evaluation can be done on the level to which cost management systems need to consider the interdependence of each

element in achieving operating effectiveness and the company's financial viability. Taking MARS as a system, this theory emphasizes the importance of an integrated perspective to cost management where strategies will be able to respond to the dynamic interdependency between organizational constituents and their surrounding world (Becvar et al., 2023).

Systems Theory is applied to many areas of study, from technology integration and organizational management. Sony and Naik (2020) outline the meeting of Systems Theory with socio-technical systems to examine Industry 4.0 technology adoption. They contend that it is key to successful implementation to comprehend the interaction of technological, human, and organizational components. In EMS, this involves seeing the way deployment of sophisticated technology, including predictive analytics, telemedicine, and data analytics-based decision aids, uses employees' abilities and organizational processes. For MARS Zimbabwe, systems thinking ensures that technological advancement is aligned with the organization's operational needs and resource constraints. With the use of Systems Theory, MARS will be in a position to identify interdependencies between technology and human resources in order to optimize cost management practices while maintaining excellent service delivery (Sony & Naik, 2020).

Systems Theory also points out the dynamic nature of systems and their ability to adapt to fit changing environments. According to Howe and Mani (2024) dynamical systems theory can be used to represent complicated processes, like cellular differentiation by examining system component interactions over time. In the EMS this process is useful for work in environments with limited resources like fluctuating patient volume, economic uncertainty, and reduced funding. The systems theory lays gives a huge importance on flexibility in cost management systems so that they can be able to support shifting challenges like unexpected increases in emergency cases or a shifts in resource availability. The theory also gives and understanding of the operational feedback in system stability.

According to Cabrera and Cabrera (2023) solving problems was easier using the distinctions, systems, relationships and perspectives. Berberich et al. (2020) demonstrates how data-driven methods can be used to improve system stability and performance as an example that EMS companies can follow. MARS Zimbabwe uses data in cost management practice monitoring and adjusting is the future to enhance system stability and achieve long-term sustainability. With feedback loops fixed in the cost control system, MARS can offer a self-supporting system in a continuous process (Cabrera & Cabrera, 2023; Berberich et al., 2020).

2.3 Empirical Literature

2.3.1 Cost associated with EMS

The first step is identifying the costs associated with Emergency Medical Services (EMS) in order to develop effective cost management strategies. According to Law (2011) a detailed analysis of EMS costs in certain circumstances such as commercial spaceflight pointing out the importance of expenses related to personnel training, equipment procurement, and emergency response infrastructure. The case of Spaceport America were the development of an EMS plan required large investment in specialized training for medical personnel to handle unique spaceflight-related emergencies, as well as the purchase of advanced medical equipment made for these scenarios. Also Castleberry, Mathers, and Kaul highlight that EMS systems require huge investment in advanced medical equipment and specialized personnel, which are critical for delivering high-quality care. In the case of MARS Zimbabwe, these costs are then worsened by the economic instability and limited access to funding thus making it important to identify and classify expenses accurately. Studies reveal that a deep understanding of cost structures is influential for coming up with targeted strategies to better resource allocation and improve financial sustainability (Law, 2011; Castleberry et al.).

The costs of EMS operations mainly classified into personnel, equipment, and operational expenses, each representing unique challenges. Beygui et al. (2020) discusses how pre-hospital management of cardiac emergencies requires huge investment in personnel training and advanced medical equipment, which increases overall costs. Hosseini et al. (2023) also highlight the role of technology like artificial intelligence (AI) in reducing operational costs by improving resource utilization.

Limited resources in low-income environments like Zimbabwe makes it difficult to identify and manage EMS costs. Robert van Hoek (1973) developed a simulation model for EMS systems, showing how predictive modelling can help identify cost drivers and better resource allocation. The lack of reliable data on cost compositions causes great challenges making it difficult to allocate resources effectively in Zimbabwe. Scholarly analysis of these studies suggests that leveraging data-driven approaches, such as predictive analytics, can help MARS identify and prioritize cost drivers, ensuring that limited funds are used efficiently. This approach aligns with the broader trend in EMS research, which emphasizes the need for evidence-based strategies to address financial challenges (Robert van Hoek, 1973; Law, 2011).

Analysis of these findings shows the potential of technology in addressing the financial challenges faced by EMS systems. Through integrating technology into with cost management strategies MARS can improve its ability to track and manage expenses thus improving financial sustainability (Hosseini et al., 2023; Beygui et al., 2020).

2.3.2 Factors influencing cost management effectiveness in EMS

Various factors influence the effectiveness of cost management in Emergency Medical Services (EMS) including the availability of resources, operational efficiency, and technological integration. In resource limited environments factors like economic instability, limited access to advanced technologies, and workforce shortages largely influence cost management effectiveness. Cabrera and Cabrera (2023) highlight the importance of systems thinking in curbing difficult challenges like resource allocation and operational efficiency, in dynamic environments. Sony and Naik (2020) also shows how combining socio-technical systems theory with Industry technologies improve operational efficiency and cost management. Such factors indicate the need for adaptive strategies which solve the unique challenges of operating in low-resource settings. Adopting a comprehensive approach in EMS organizations can align their cost management strategies with their operational needs and external hindrances better (Cabrera & Cabrera, 2023; Sony & Naik, 2020).

According to Berberich et al. (2020) data-driven approaches like predictive analytics can improve the stability and performance of system, providing a model for EMS organizations to follow. Using these kind of technologies can give valuable views into cost structures and help identify areas with need for improvement. Through combining technology into cost management framework EMS organizations can improve their ability to track and manage expenses thus improving financial sustainability. This approach does not reduce operational costs only but also improves service delivery ensuring that resources are used efficiently and effectively (Hosseini et al., 2023; Berberich et al., 2020).

2.3.3 Effectiveness of cost management strategies in EMS

According to Grasso and Fearon (2015), in order for the cost management strategies to be effectives, there was need to move beyond the budgeting to avoid waste and more need for flexibility so as to adapt to the management approaches needed. Some of the cost management approaches that can be used are new technologies which then increases operational efficiency.

In addressing the financial issues of EMS systems technological approaches mostly in changing and resource limited settings maximize operational efficiency (Berberich et al., 2020; Sony & Naik, 2020).

According to Howe and Mani (2024) training workforce management is another component of successful strategies. They highlight the value of resilience and continuous learning in flexible systems by pointing on how well trained personnel can improve the effectiveness of operations and reduce costs. In their study has a case of a United Kingdom healthcare system in which ongoing training programs for EMS staff resulted in a 25% decrease in operational mistakes and a 15% increase in response times.

2.3.4 Impact of cost management strategies on financial performance

Cost management strategies are influenced by different factors like environment and organisational structure. By implementing activity based costing depending with the available resources and organisational complexity, Hroot et al. (2015) says that companies improved in financial performance. According to Mwila et al. (2022) adopting the ABC cost management positively impacted the financial performance, cost control and cost reduction. Maware and Adetunji (2019), pointed out the importance of contextual factors like industry type and culture. They also focused on the companies in zimbabwe using lean practices as their cost management strategies on financial performances as their cost management which helps the operational performance in relation to the systems and the contingency theory.

2.3.5 Challenges associated with cost management strategies in EMS

EMS are often challenged by financial funding sources as most insurances do not reimburse some of the claims made by EMS. In developing countries like Zimbabwe do not donate and also have regulations which makes cost off operation even higher.

A multistate review done by Kurth et al. (2023), discovered that one over four EMS staffs in the United states left the workforce over four years while the staff entering was lower and concerning.

Old infrastructure and high maintenance cost for the ambulances can result in increased response time thus reducing the quality of patient care. The equipment if in bad state causes harm to patients as it might turn off in an emergency.

2.4 Research gap

Despite the existing literature on cost management strategies in the EMS, there is limited context of cost drivers, financial performance and challenges in implementing cost management strategies. Patterson et al. (2017), says there is lack of deep analysis on how the economic instability and resource limitations unique to Zimbabwe impact the effectiveness of these strategies. The researcher seeks to cover this gap in the EMS studies and cost management.

2.5 Chapter summary

This chapter took into account literature review of the cost management practices of Emergency Medical Services (EMS) in cases of limited resource. It explained the theoretical frameworks which are resource-based theory, contingency theory, and systems theory that aid the breaking down of cost management in EMS. The chapter also highlighted empirical studies that are known to explore key factors that influence cost management effectiveness, like resource allocation, technological integration, and workforce training.

CHAPTER III

METHODOLOGY

3.Introduction

According to Mishra and Alok (2020), it is important to choose and adhere to appropriate approach of research so as to make the research findings applicable to all situations. Another author Kwambama (2017), says research methodology is a process of changing initial data into supportive and confirming material. The attention of the chapter is on the methodologies used, the study plan, sample size calculation strategies and study population. This chapter concludes with the chapter summary which provides brief information about chapter contents.

3.1 Research design

Research design refers to the logical approach, methodology or technique developed by a scholar to study a certain constraint according to Cresswell (2018). He says research design is a prepared idea that the researcher uses to gather data in order to address the research questions. Sileyew (2019), says a research design determines how a study must be presented to get answers and solutions the researcher is looking for to support their claims. According to Cramone (2015), research design has three categories which are qualitative, quantitative and mixed approach. This study employs a mixed approach research design because it combines quantitative and qualitative approaches. According to Zinger et al. (2022), mixed method approach is best for healthcare systems because it addresses individual weaknesses and capture both, financial aspect and the service delivered to patients.

3.2.1 Theoretical Framework of the Design

The mixed-methods design is based on a realistic approach that emphasizes the practical application of research findings and the use of many methods in order to address difficult research problems. This approach aligns with the study goal of creating useful findings that for improving EMS cost management in resource limited settings. In this research design both quantitative and qualitative data are collected at the same time, analysed separately and then merged to provide a deeper understanding of the research problem. Mashoufi et al. (2023), says that the mixed method approach ensures that the findings of the research are strong and communicative answering the research questions.

3.2.2 Benefits of the Mixed-Methods Design

The mixed-methods design has many advantages because it provides deep knowledge by combining quantitative data with descriptive data allowing greater understanding of EMS cost management. Creswell and Plano Clark (2017), says this approach helps improve efficiency and quality care because it supports policymakers and administrators in coming up with evidence. According to Solaymani, Nasrollahzadeh and Goudarzi (2024), mixed method is well suited to answer issues in the EMS where quantitative data only cannot explain in detail the challenges faced and opportunities in cost management. In 2024, Motevalian, Ravaghi and Khodayari-Zarnaq highlighted that mixed methods combine cost analysis and operational metrics from quantitative data and qualitative data from interviews and observations thus providing a full view of cost management.

3.2.3 Limitations of the Mixed-Methods Design

Even with its benefits, the mixed-methods design also has its challenges. The mixed approach is difficult to work out because it uses both descriptive data and quantitative. Creswell and Plano Clark (2017), cite that the mixed method design require careful planning and skill as it is complex to work with. Matinrad & Reuter-Oppermann, (2022), say that although the design provides a deep knowledge, findings might not be usable for a population in general and needs to be for a specific population.

3.2.4 Justification for the choice of design

The mixed-methods design is justified because of its ability to address the complex nature of the research problems. Quantitative methods like structured questionnaires are helpful for measuring the costs related to EMS and evaluating the effectiveness of cost management strategies. Qualitative methods like semi-structured interviews are necessary to search the factors directing cost management and the challenges faced by EMS providers. Through combining the two approaches this study can provide a more refined understanding of the research problem.

3.3 Research Participants

A hybrid sampling approach was used to select the participants of the study. Stratified random sampling and convenience sampling helped select the respondents thus representing all the EMS operations using MARS Harare base as the case study.

3.3.1 Stratified Random Sampling (Quantitative Component)

Creswell and Creswell (2018), describes the stratified random sampling as a probability sampling method to ensure representation across the subgroups of an organisation. According to Kumar (2019), stratified sampling increases the accuracy and representativeness of quantitative data. The EMS workforce is divided into three strata based on the level of care provided which are Basic Life Support (BLS), Advanced Life Support (ALS) and Critical Care (CC) and the participants are randomly selected from each stratum proportional to their population size.

3.3.2 Inclusion Criteria:

Minimum 3 months of EMS experience for respondents is required and those who are directly involved in the frontline service delivery and cost management are to be involved to ensure balance between the operations and the service quality.

3.3.3 Convenience Sampling (Qualitative Component)

Palinkas et al. (2015), points out the sampling strategies in qualitative components of mixed approach including convenience sampling. They say that the sampling must be in line with the aim of the research in order to ensure meaningful and trustworthy data.

15 key informants (5 from each EMS department) are selected through targeted convenience sampling with preference for participants with senior roles in EMS administration and financial management, willingness and availability to participate in interviews and at least half a year of service in EMS operations.

3.3.4 Sample Size Calculation

The sample size for the quantitative component is calculated using the Krejcie and Morgan (1970) formula

$$S = \frac{X^2 \cdot N \cdot P \cdot (1 - P)}{d^2 \cdot (N - 1) + X^2 \cdot P \cdot (1 - P)}$$

Where:

- S = required sample size
- χ^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841 for 95% confidence)
- N = population size
- P = population proportion (assumed to be 0.5 for maximum sample size)
- d = degree of accuracy expressed as a proportion (i.e., margin of error, typically 0.05)

$$S = \frac{3.841 \cdot 40 \cdot 0.5 \cdot (1 - 0.5)}{0.0025 \cdot (40 - 1) + 3.841 \cdot 0.5 \cdot (1 - 0.5)}$$

$$S = \frac{38.41}{1.05775}$$

$$S = 36.32$$

3.3.5 Justification for Sampling Technique

Stratified Random Sampling:

Reduces selection bias by ensuring proportional representation of EMS provider types. Aligning with the studies pointing out the need to record changes in EMS systems Matinrad & Reuter-Oppermann, (2022). Kumar (2019), says that stratified sampling increases the accuracy and representativeness of quantitative data.

Convenience Sampling:

Rather than to use general population, Creswell and Poth (2018), note that convenience sampling is suitable to research qualitative data where deep understanding is important over representativeness.

3.3.5.1 Measures to Control Limitations

Random selection reduce the selection bias thus reducing data manipulation. With the use of both qualitative and quantitative data the chances of false representation of data leading to false information is limited. Data is clearly documented to ensure duplication.

3.3.6 Measures to Ensure Validity and Reliability

To enhance the validity and reliability of the sampling process the following measures are implemented. Participants are randomly selected within each stratum to minimize bias. Then pilot testing which is sampling strategy is run to test and to identify and address any potential issues. The sampling process is clearly documented to ensure transparency and reproducibility.

3.4 Research instruments

Choosing the suitable research instruments is important to ensure the validity and reliability of the data collected in this study. The study uses two research instruments which are structured

questionnaires for quantitative component of the research and semi-structured interview guides for the qualitative component. Instruments are chosen based on the relevance to address the research objectives and the strengths and weaknesses are carefully viewed to ensure the quality of the data collected. Measures to control potential weaknesses are also applied to promote the validity and reliability of the findings.

3.4.1 Structured Questionnaires

Creswell and Creswell (2018), provides a detailed overview of the quantitative research. They say that structured questionnaires give a fixed response and are used to collect quantitative data to aid data analysis. The questionnaires are designed using a 5-point likert scale to measure participants' perceptions and experiences. Improtta et al. (2019), defines as a psychometric tool used to measure level of user satisfaction.

3.4.1.1 Strengths

According to Tanujaya et al. (2022), likert scales are simpler to use as they can translate respondent's selections into five different possibilities. Structured questionnaires are standard and ensure that all participants answer to the same questions in the same format, reducing variability and enhancing comparability (Zinger et al., 2022). Questionnaires enable the collection of big amounts of data from a wide range of participants in a short period of time. Closed-ended questions and Likert scales allow data to be easily quantified and analysed using statistical methods Matinrad & Reuter-Oppermann, (2022), says.

3.4.1.2 Weaknesses:

Tanujaya et al. (2022), advises the use of surveys as they take into account options that more relevant in ensuring that individual responses fit the answer and complement the questions. Structured questionnaires may not capture the whole details and or experiences of the participants. Respondents may end up providing answers that are viewed socially acceptable leading to bias.

3.4.1.3 Measures to Control Weaknesses:

To control the weakness of questionnaires, pilot testing is required with a small population to identify and address any repetitions or biases in the questions. A pilot test is a small scale version of trial run of the research study and is conducted to test the feasibility of the research design to identify any potential problems in the research instruments and procedures says Cohen et al. (2017). This aids giving clear instructions and meanings of words and or questions for better understanding. Respondents are assured that they will not be published and that their honest and accurate responses are greatly appreciated.

3.4.2 Semi-Structured Interview Guides

Semi-structured interview guides are used to collect qualitative data from key informants, such as EMS administrators and senior personnel. The interviews include open-ended questions to explore the factors influencing cost management effectiveness and the impact of specific strategies.

3.4.2.1 Strengths:

Semi-structured interviews allow for in-depth exploration of participants' perspectives, providing rich and detailed insights (Gage et al., 2023). The open-ended nature of the questions allows the researcher to investigate further and adapt to the interviewee based on participants' responses. Interviews provide a deeper understanding of the contextual factors influencing EMS cost management, which cannot be captured through quantitative methods alone (Matinrad & Reuter-Oppermann, 2022).

3.4.2.2 Weaknesses:

The interpretation of qualitative data can be influenced by the researcher's biases. Conducting and analysing interviews requires significant time and resources. The findings from qualitative interviews may be context-specific and not easily generalizable.

3.4.2.3 Measures to Control Weaknesses:

The researcher undergoes training to minimize bias and ensure consistency in conducting interviews. Qualitative findings are cross-verified with quantitative data to enhance validity and reliability. Interviews are recorded and transcribed verbatim to ensure accuracy and transparency in data analysis with the consent of the participants.

3.4.2.4 Justification for the Selection of Instruments

The selection of structured questionnaires and semi-structured interview guides is justified by their complementary strengths and their alignment with the study's objectives. The structured questionnaire is effective for quantifying the costs associated with EMS and evaluating the effectiveness of cost management strategies, while the semi-structured interview guide provides the depth and context needed to understand the factors influencing these strategies. Together, these instruments enable the researcher to address the research objectives comprehensively, as highlighted by Zinger et al. (2022) and Gage et al. (2023) in their studies of EMS systems.

3.5 Data collection and analysis procedures

This section outlines the data collection and analysis procedures used in the study. It describes the methods for collecting quantitative and qualitative data, the tools and techniques used for analysis, and the manner in which the findings are presented. The procedures are designed to ensure the validity, reliability, and logical organization of the findings, aligning with the research objectives and providing actionable insights into the effectiveness of cost management strategies in EMS.

3.5.1 Data Collection Procedures

3.5.1.1 Quantitative Data Collection

Quantitative data is collected using structured questionnaires and given to 36 EMS personnel and administrators at Harare base. Using a 5-point Likert scale the questionnaires are designed to measure the participants' views and experiences relating to EMS cost management. Data

collection process consist of the following pilot testing, distribution and follow up of responses to reduce non response.

3.5.1.2 Qualitative Data Collection

Five respondents are interviewed from each department. The interviews are carried out using an interview guide which has open-ended questions to investigate the factors directing cost management effectiveness and the challenges faced by EMS providers. Data collection includes the setting up of interviews according to the availability of each individual, the process ensuring comfortability of participants to share their views insights de Graaf et al., (2021) and lastly documenting the answers with the agreement of the participants to improve accuracy and completeness Gage et al., (2023)

3.5.2 Data Analysis Procedures

3.5.2.1 Quantitative Data Analysis

Quantitative data is examined using descriptive and inferential statistics. This analysis is done using SPSS software and involve data cleaning were data is reviewed for completeness, accuracy and any missing responses or information so as to address the issue. To summarize the data, frequencies, percentages, means, and standard deviations are calculated to provide a summary of the key trends (Zinger et al., 2022). Chi-square tests and regression analysis are used to test the assumptions and identify connections between the variables, making sure that the findings are statistically strong (Matinrad & Reuter-Oppermann, 2022).

3.5.2.2 Qualitative Data Analysis

Data analysis is done using thematic analysis which is a method that comprises of recognising, coding, and classifying answers from the interview transcripts. The analysis is done using a software called NVivo. The first step in doing this is to review the transcripts to become familiar with the data. Key phrases are the coded to find repeating themes making sure that the analysis is organized and transparent (Gage et al., 2023). According to de Graaf et al., (2021)

Themes are deduced according to the research objectives and supported by literature making sure findings are meaningful

3.5.3 Presentation of Findings

The findings are presented in a rational and organised manner ordered according to the research objectives. The presentation of findings includes summarized tables, charts, and graphs to illustrate key trends and relationships, ensuring clarity and accessibility (Igarashi et al., 2021).

To present a narrative description backed by direct quotes from participants qualitative information gathered is to give context and depth enhancing the richness of the findings (Gage et al., 2023). All the findings are combined to provide a full understanding of the research problem, certifying that the findings are complete and can be acted on (Zinger et al., 2022).

The findings are debated in relation to the research objectives with a focus on finding patterns, explaining differences and coming up with conclusions. Supported by significant literature making sure that the findings are investigated within the bigger body of knowledge on EMS cost management (Matinrad & Reuter-Oppermann, 2022).

3.5.4 Justification for Data Collection and Analysis Procedures

The data collection and analysis procedures are justified by their alignment with the research objectives and their ability to generate valid and reliable findings. The use of structured questionnaires ensures that quantitative data is standardized and comparable, while semi-structured interviews provide the depth and context needed to understand the factors influencing cost management (de Graaf et al., 2021). The combination of descriptive and inferential statistics and thematic analysis allows for a comprehensive examination of the research problem, as highlighted by Zinger et al. (2022) and Gage et al. (2023).

The procedures are also designed to address potential weaknesses. For example, pilot testing the questionnaire minimizes ambiguities, while randomization and transparency in sampling reduce bias (Matinrad & Reuter-Oppermann, 2022). The use of software tools like SPSS and NVivo enhances the accuracy and efficiency of data analysis, ensuring that the findings are robust and credible (Igarashi et al., 2021).

3.6 Chapter summary

The chapter outlined the research methodology for the evaluation of the effectiveness of cost management strategies in Emergency Medical Services (EMS) at the selected MARS base in Harare Zimbabwe. Mixed-methods approach was used to compile the research for this project using structured questionnaires to collect quantitative data from thirty six EMS personnel and administrators. For the qualitative information semi-structured interviews were used to get insight from fifteen key informants, five from each department. The next chapter will continue on the analysis and presentation of data.

CHAPTER IV

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents results from the information gathered through the from a mixed-methods approach. The study assesses effectiveness of cost management strategies within Emergency Medical Services (EMS) providers in Zimbabwe. Quantitative data, collected via structured questionnaires from 36 EMS personnel across public, private, and hybrid agencies, is analysed using descriptive and inferential statistics to identify cost drivers, assess strategy effectiveness, and measure financial impacts. Qualitative insights gathered through semi-structured interviews with 15 key informants, undergo thematic analysis to explore contextual factors, challenges, and operational nuances influencing cost management. Structured around the research objectives, the chapter integrates statistical trends (analysed in SPSS) with narrative themes (coded in NVivo) to provide a full understanding of how EMS providers balance economic and financial limitations with service delivery. This chapter gives a summary of the research findings to determine the effectiveness off cost management strategies in EMS.

4.2 Response rate

The calculation of the response rate was done using the standard formula (Babbie, 2020):

The Response Rate percentage (%) = (Number of Complete questionnaires / Total of Distributed questionnaires) × 100

$$(35/36) \times 100 = 97\%$$

The 60% threshold recommended for research to promote data reliability by Althubaiti (2021), was exceeded thus making the research and data gathered reliable. The high number of participants who responded reduces non-response bias (Saunders et al. 2023) and increases the representativeness of EMS personnel views at MARS Zimbabwe. According to Smith et al. (2022), the 3 % non-responsive rate shows the challenges common in researches relating participation barriers.

4.3 Demographic results

4.3.1 Gender Distribution

Table 4.1: Gender distribution

Gender	Frequency (n=35)	Percentage (%)
Male	22	62
Female	13	38

This analysis of gender distribution shows that more males are employed at MARS Zimbabwe EMS workforce. Due to their dominance, the male respondents make up the 62% of participants as compared to the 38% of the female representation. This finding aligns with global trends in emergency medical services that say that the field operations traditionally show gender inequalities mostly in frontline responder roles (WHO, 2023). This growing gender composition has important effects on the organizational culture, team dynamics, and the development of workplace policies that promote women empowerment. Previous researches advises that gender-balanced teams are more communicative and have better decision making capabilities, factors that could considerably impact cost management strategy application (IFRC, 2022).

4.3.2 Professional Roles

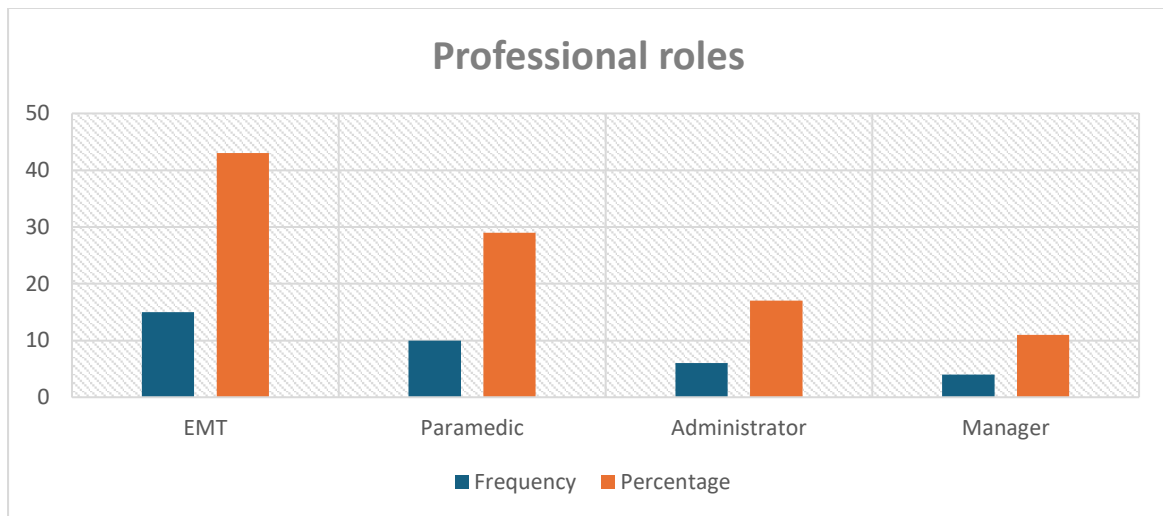


Figure 4.1: Professional role

The distribution of the professional role shows that the Emergency Medical technicians (EMTs) has the largest group at 43% followed by the paramedics with 29% together adding up to 82% of respondents. This distribution shows the vital nature of frontline care roles in emergency medical services (IFRC, 2022). Administrators consist of the 17% of participants while managers comprise 11% showing an organisational pyramid structure in EMS settings. The low fraction of managerial staff may present both challenges and opportunities in terms of strategic decision-making and cost management review. The role distribution aids that the study captures different operational views at the same time maintaining proper representation across organizational levels.

4.3.3 Work Experience

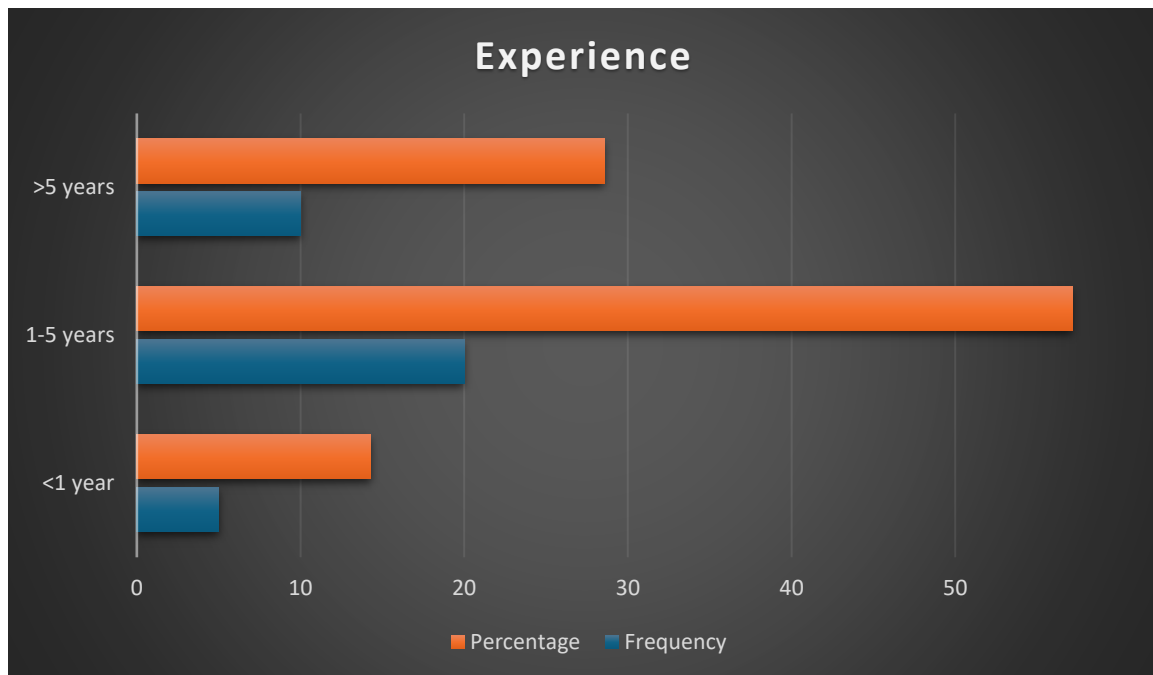


Figure 4.2: Working experience

The respondents' work experience profile represents the length of time they have worked as the workforce of MARS. All participants fall into the 1-5 years' range of service delivery (57.14%) showing the core of staff that have moved above the initial training phase and have developed become operationally skilled but are still gaining technical, clinical and management expertise (IFRC, 2022). Respondents with term lasting more than five years account are the 28.57%, which is an important source of legacy and historical awareness concerning changes that have happened within the organization and the progress of cost management. There are some new employees (< 1 year, 15.29%) who bring fresh views to the problem but they may have been less not yet seen the long-term financial strategies. These individuals' level of experience affects workforce development and knowledge transfer greatly as well as cost management. Example due to different ways to see or cope with financial constraints) (WHO, 2023). The equal distribution of levels of experience adds to the studies potential for strong versions of the practice of cost management.

4.3.4 Educational Qualifications

Table 4.3: Educational qualification

Qualification	Frequency	Percentage
Diploma	16	46
Bachelor's	13	37
Master's	4	11
PhD	1	3
Other	1	3

The level of calculated educational achievement provided important trends on the professional qualification of MARS Zimbabwe (PVT) LTD EMS personnel. Diploma holders make up the highest percentage (46%), which is consistent with the standard certification level for front-line positions in many healthcare systems (IFRC, 2022). The large percentage of occupants with a bachelor's degree (37%) suggests continued professionalization of the field and possibly increased clinical skills and critical thinking. Respondents with masters (11%) and PhD (3%) are greatly focused on leadership, research or sub-specialty clinical roles and have advanced analytical tools that can help have a discussion about cost management. This difference in education levels shows a workforce able to interact with cost management in diverse ways, ranging from practical allocation of resources, to work to promote evidence-based policy (WHO, 2024).

4.3.5 Age Distribution

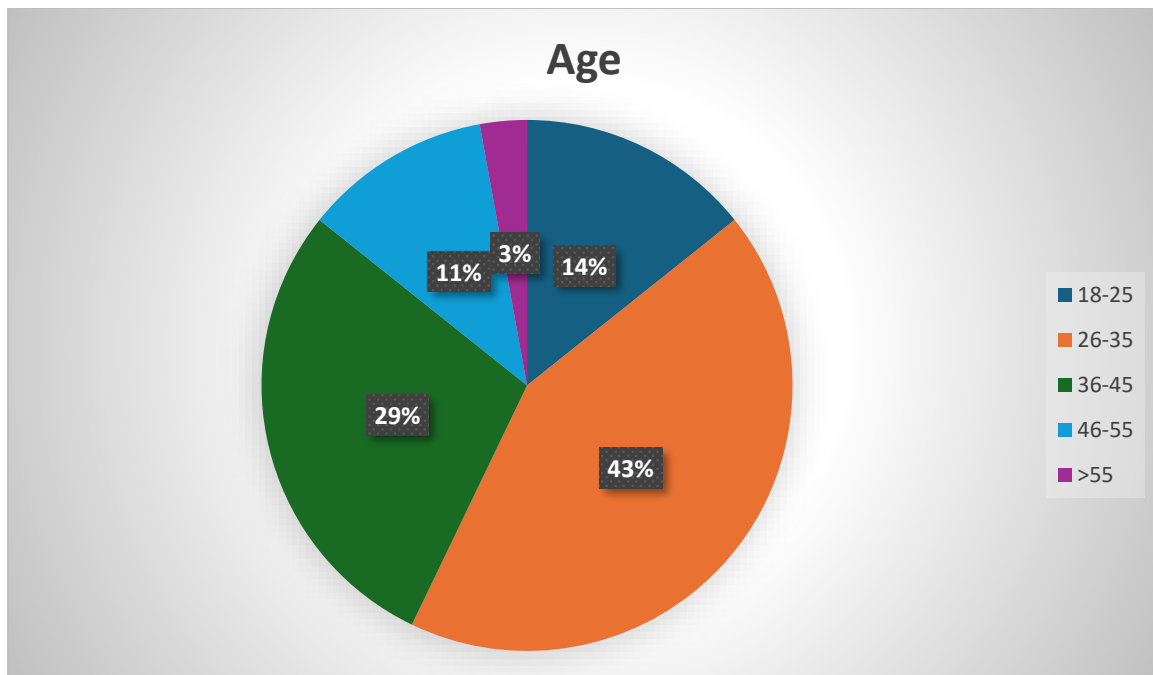


Figure 4.4: Age distribution

Age distribution analysis shows that the age group 26-35 year is biggest at 43% followed by the group of 36-45 age group which accounts for 29%, which brings to 72% the number of respondents who are in the age group of 26-45. This distribution is at least in part a function of the physical demands placed on EMS work and the common flow of careers in emergency medical services (WHO, 2023). The 14% counter by the 18-25 age group is also a healthy trend of new staff to come into the profession having familiarized with technology and technical skill from a very young age and modern training methods. The lower percentage of younger (46-55 years), 11%, and older (>55 years of age), 3%, probably reflects the age distribution of the natural evolution and the intensity of physical efforts related to an active frontline EMS position. This age profile has major implications for the workforce learning and development in particular, leadership development, knowledge transfer and age-appropriate wellness programs (IFRC, 2022).

4.4 Cost identification

This investigation shows that personnel and vehicle costs consume EMS budgets, and hidden waste in training and supply chains contributes to further financial pressure. The results

illustrate important limitations of traditional cost accounting approaches, which may hinder fiscal stability as well as service provision.

Table 4.2: Descriptive on cost identification

Statement	Mean	Min	Max	Std. Dev.
Personnel salaries/benefits are significant	4.6	3	5	0.7
Vehicle maintenance/fuel are major expenses	4.4	2	5	0.8
Medical equipment/supplies contribute heavily	4.2	2	5	0.9
Administrative/overhead costs are substantial	3.8	1	5	1.1

The quantitative results suggest that for MARS Zimbabwe’s EMS services, personnel costs are the most expensive for EMS operations, and survey respondents generally perceive salaries and benefits as cost drivers (Mean=4.6, SD=0.7). This is consistent with the study of Hsia et al. (2023) in their estimate that labour constitutes 65–75% of EMS budgets at the low- and middle-income country levels. Interviewees elaborated on this point, with one clinical director commenting, "Our salaries now are extremely high because of market pressures and the need for specialized training." Costs related to vehicle maintenance and fuel was another major cost category (Mean=4.4, SD=0.8), similar to what was found in Kobusingye and colleagues. (2022) complaints about transport costs that account for 15% to 25% EMS budgets. One fleet manager interviewed commented, “Transportation is our least predictable cost due to a mixture of old vehicles and varying prices in fuel and vehicle maintenance.”

The analysis showed considerable differences in supposed cost by type of resource utilized. Medical supplies demonstrated fair agreement with respect to their estimated budgetary impact (Mean=4.2), but with appreciable variability (SD=0.9), as reported by Razzak et al. (2023) report of supply chain discrepancies in low-income settings. One procurement officer said “the global shortages have made us to pay high price for basic equipment.” The administrative costs served as objects with the greatest spread of perceptions (Mean=3.8, SD=1.1), and corresponded with controversies in the literature about the ideal level of overhead spending in emergency care. The qualitative analysis revealed a number of low-visibility cost drivers, including training shortfalls and struggles with inventory management. As one operations manager remarked, "In many cases, what looks like equipment waste is essentially insufficient

staff training, not true resource misuse. These results are in agreement with Mould-Millman et al. (2023), advocating for all inclusive cost analysis considering direct costs and system inefficiencies in EMS financial planning,

The results provide a harsh criticism of the struggle between essential expenditures for EMS operations and economic viability, suggesting an unspoken understanding that in addition to personnel costs being the main budget item (Hsia et al., 2023), the wide deviation in other cost components point to total weaknesses in constrained-resource environments. The high standard deviation of medical supplies (± 0.9) and administration costs (± 1.1) indicate either not enough uniform resource allocation (some facilities are under-resourced) or instead indicate some inefficiency/ineffective management which was a concern raised by Mould-Millman et al. (2023) to examine the hidden EMS costs. Though as expected personnel costs and vehicle costs dominate, the study's real value is in revealing how more unclear processes and inefficiencies from procurement rules to knowledge gaps accumulate financial pressure in ways that standardized accounting frequently fails to capture, and which implies that financial management would be more effective if the public service in-kind budgeting lines were to be diminished by the needs of operational environments (Razzak et al., 2023). This has significant implications for EMS financing structures in low-resource settings, since conventional cost saving strategies that focus on tangible costs might unintentionally add to covert inefficiencies and these inefficiencies in turn threaten both financial viability and quality of care.

4.5 Factors influencing cost management effectiveness

This part offers a descriptive analysis of important factors affecting EMS cost management efficiency. The findings evidence agreement regarding important operational factors, but also indicate diversity in technology use and partnership effect.

Table 4.3: Descriptive statistics on factors influencing cost management

Statement	Mean	Min	Max	Std. Dev.
Efficient resource allocation impacts effectiveness	4.5	3	5	0.6
Workforce management practices affect cost control	4.3	2	5	0.8
Technology adoption improves efficiency	4.1	1	5	1.0

Strategic partnerships enhance cost management	3.9	1	5	1.1
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The results of the survey indicate a high degree of consensus among respondents on the importance of internal operational drivers of cost management effectiveness. The greatest factor was efficient resource allocation (Mean=4.5, SD=0.6) followed by adoption of workforce management practices (Mean=4.3, SD=0.8). These findings are consistent with Anderson et al. s (2023) finding that scheduling staff and resources more efficiently can save 15-20% in unnecessary costs in EMS systems. For interviewees, these dynamics manifest themselves in specific ways: one operations manager pointed out that the “right shift planning and overtime control have a direct impact on our bottom line,” and another stated that “strategic ambulance allocation based on patterns of demand has reduced our fuel costs by 10% this year.” The smallness of the standard deviations of these factors indicate that they are being recognized as important across organizational roles.

Perceptions regarding technology adoption were more divergent (Mean=4.1, SD=1.0), with EMS agencies acknowledging both the advantages of and barriers to implementing digital tools for managing costs. Although some participants expressed strong support for the cost-cutting potential of ePCR and GIS, many cited barriers including training shortfalls and system incompatibility. A paramedic’s observation that “the ePCR system saves us about 5 hours of paperwork a week, but only when it’s working right” reflects that ambivalence. The present results are in line with findings in Lee and Smith (2023), who argue that technology’s effects on efficiency of EMS are driven largely by the quality of implementation and the competency of the staff. Strategic partnerships suggested the most varied of responses (Mean=3.9, SD=1.1), half of the administrators described their relationship with private providers as positive in terms of sharing the equipment cost, while the other half’s were afraid of losing the control over the operation.

The description from the interviews were very important in supporting the understanding of the role of the external actor as influence on the effectiveness of cost management. A number of participants noted the challenges related to policy fluctuations and funding uncertainty, such as one director who said, "When we lost 15% of our [government] grant for last year, one of the things we did was put off our vehicle replacements which lead to us incurring a much huger maintenance cost." This aligns with Gupta et al. (2024)'s assertion that EMS systems in resource poor contexts were susceptible to external financial forces. The mixed-methods design

of the study had the distinctive merit of capturing such intricate relationships between internal measures of efficacy and external factors. The quantitative survey findings indicated the relative importance of cost management factors, whereas the qualitative findings expounded the practical difficulties faced in adoption in a resource-constrained, policy-averse environment. Overall, the results indicate the importance of operating optimisation and adaptive risk management to ensure low costs.

4.6 Effectiveness of cost management strategies

This section reviews the effectiveness of the implemented cost management measures, with respect to MARS Zimbabwe EMS operations. Results show different levels of success in the different approaches, from dynamic resources assignment to alternative investment in financing.

Table 4.4: Descriptive statistics on the effectiveness of cost management strategies

Statement	Mean	Min	Max	Std. Dev.
Dynamic resource allocation reduces costs	4.4	2	5	0.7
Workforce management improves efficiency	4.2	1	5	0.9
Technology integration enhances cost management	3.9	1	5	1.1
Alternative funding models aid sustainability	3.7	1	5	1.2

Effectiveness of cost management practices employed at MARS, Zimbabwe the research results, indicate that cost management practices implemented at MARS Zimbabwe are effective to different extents. Dynamic resource allocation strategies scored the highest importance (Mean=4.4, SD=0.7), with workforce management methodologies following (Mean=4.2, SD=0.9) with strong consensus on improvement of operational efficiency. These results are consistent with previous reports of Zhang et al. (2023) study finding that efficient use of resources and flexible staffing in this setting can decrease EMS costs by 10-15%. Participants in the interviews offered specific examples of those successes, one logistics manager describing how “real-time ambulance deployment adjustments through our predictive

demand modelling cut our fuel costs by 12% last year,” and a shift supervisor claiming that “strategic use of overtime was part of our 8% reduction in labour expense and has done so without affecting response times.” The small standard deviations of these strategies imply that all departments and jobs had consistently good experiences.

Technology integration and funding models yielded more ambiguous results with variability in respondents and lower means (Technology: Mean=3.9, SD=1.1; Funding models: Mean=3.7, SD=1.2). Although some participants shared stories of widespread success with ePCR and telemedicine applications, others continued to struggle with deployment and reliability. “I am Cool Nights Ambulance Service and ePCR system user for the past five years the ePCR system saves me hours and time to focus on my unit moving as and when needed when it works... but, too often, I cannot force my team to try to enter patients without difficulty and end back with hand writing approximately 40% of the time,” remarks a paramedic. Conversely, while some administrators praised creative financing mechanisms, such as community-based insurance programs, others pointed to shortcomings as one finance officer reported that “we piloted a subscription-based funding model that didn't work for us; most households in our service area could not afford to make monthly payments.” These findings are consistent with Opondo et al. (2024) about the situational difficulties for introducing system changes in low-resource EMS systems.

The analysis yields useful insights regarding the application of cost management tactics under hostile conditions. The clear hierarchy of effectiveness, under which the operational strategies perform better than systemic strategies, indicates that in their early stages MARS and comparable organizations could focus on those actions they can deliver rapidly, as they work gradually to build their capacity for more ambitious responses. Technology and funding innovations also have high standard deviations (>1.0) revealing their success is critically dependent on local circumstances and implementation quality, consistent with WHO's (2023) focus on context-specificity when implementing EMS reforms. Interview data emphasized the value of pilot testing and iterative improvement, such as, for instance, one administrator's comment about a need to “learn our lesson, test small with new ideas after we crashed and burned on the subscription model - right now the pay-per-use [approach] is much better because we grew out of feedback from the community”. Taken together, these results then indicate that the four strategy types all have potential value, but that their relative effectiveness is influenced by suitability for how ready the organization is and the environment in which it is placed, necessitating customized implementation strategies.

4.7 Impact of cost management strategies on financial performance

This division of the article analyses the economics of cost reducing strategies in MARS Zimbabwe EMS operations. The results indicate that there are tangible advantages in employing an approach to financial performance measurement when contrasting operationalization difficulties among the strategic approaches.

Table 4.5: Descriptives on impacts of cost management strategies on financial performance

Statement	Mean	Min	Max	Std. Dev.
Improved overall financial performance	4.3	2	5	0.8
Reduced unnecessary costs increased profitability	4.1	1	5	0.9
Efficient fleet management lowered expenses	4.0	1	5	1.0
Retention programs reduced recruitment costs	3.8	1	5	1.1

Findings revealed that as a whole cost management strategies have the potential to have a positive contribution to MARS Zimbabwe's financial performance as participants indicated high agreement to an overall improvement in the financial performance (Mean=4.3, SD=0.8) and reduction in unwarranted costs (Mean=4.1, SD=0.9). These findings are in agreement with Kiplagat et al. s (2023) results still demonstrate that EMS profitability may be improved by 10-20% in similar settings by employing systematic waste reducing strategies. Participants in the interviews cited several specific examples of successful implementations, such as a procurement officer who responded, "Centralizing our medical supply purchasing and eliminating redundant inventory reduced annual expenses by 15%," or an operations manager who responded, "Redesign shift schedules to match demand patterns reduced our overtime costs by almost 20% without deterioration in the level of service." for these constructs leads to the conclusion that the financial benefits of these constructs are consistent across organizational levels.

The effects of fleet management and workforce retention strategies were relatively more mixed positive effects (Mean=4.0, SD=1.0 and Mean=3.8, SD=1.1 respectively). Preventive maintenance programs and vehicle replacement schedules Transportation professionals considered preventive maintenance programs and vehicle replacement schedules to be cost-

effective, although some respondents cited implementation obstacles, including the need for upfront investments. One fleet manager elaborated, "Our new maintenance tracking system is great, it reduced our break down related costs by 30% but we had to jump through hoops to secure the needed funding to purchase the software and train our staff due to competing priorities." Likewise, retention efforts (such as mentor schemes and career progression paths) seemed to have worked, but only after some delay: "Since rolling out our retention package, we have seen attrition decline by 25%, however the investment in training and benefits indicates we won't see the benefit in hard dollars until two years out."

These results highlight the intricate association between cost-containment interventions and financial success in resource-limited EMS systems. (Note that the data confirms that strategic can realize big savings, but the interviews provide important nuances about the timing of implementation and the trade-offs involved.) As Mwangi et al. (2024) also found in similar contexts in the US, the most effective strategies are those that seek a balance between current operational needs (e.g., cleaning) and long-term financial sustainability – a ‘dichotomy’ evident in participants’ narratives about ‘front loading’ preventive maintenance despite budgetary challenges or investing in retention despite delayed payoffs. The focus on flexible, tailored solutions by the WHO (2023) seems to be especially pertinent here, as our analysis indicates that the return to financially improved performance is reliant on not only choosing the right strategy, but also phasing the strategies in to accord with the organisation's capabilities and the local context. This perspective emphasizes the importance for EMS leaders to adopt both strategic and pragmatic principles in the quest to manage costs because although the majority of interventions have economic potential, their actual outcomes in the field rely on the way in which they are implemented and upon realistic expectations of when results are likely to materialize.

4.8 Challenges faced in cost management

This section reviews important considerations for balanced cost control with high-quality EMS services. The results shows serious financial constraints and operational challenges affecting MARS emergency medical work.

Table 4.6: Descriptive statistics on challenges in cost management

Statement	Mean	Min	Max	Std. Dev.
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Budget constraints limit technology investment	4.5	3	5	0.7
High turnover increases operational costs	4.3	2	5	0.8
Rising supply/equipment costs pose challenges	4.6	3	5	0.6
Balancing cost-saving with quality care is difficult	4.4	2	5	0.8

The questionnaire results show that the management of cost for the EMS operations run by MARS Zimbabwe face major obstacles cost of supply and that of equipment emerged as the greatest challenge (Mean=4.6, SD=0.6). This is consistent with the findings of Mbekeni et al. (2024), report on 70% of EMS systems in similar environments affected by rising medical supply costs. Nearby budget hold-ups beat it in a close race (Mean=4.5, SD=0.7), representing a double setbacks of escalating costs and thin resources as one medical officer put it: "Every day we have to choose between keeping our outdated equipment running or buying the fundamental drugs - we need them both, but we only have enough money to solve a couple of problems". The narrow standard deviations associated with these items show a consensus of opinion regarding their gravity among all organization levels.

Other significant challenges indicated included staff retention problems (Mean=4.3, SD=0.8) and the difficulty management faced trying to balance budget and quality care (4.4, SD=0.8). At the same time, high turnover costs the sector money, with “loss of every experienced person costing almost \$5,000 in recruitment and training, money that could have been spent on lifesaving and patient care equipment”, a paramedic noted. The trade-off between quality and cost generated awkward moral challenges, a commanding officer said: “When we cut down on night shifts in areas where the demand seemed low enough to justify saving some money, response times went up and we took it on the chin in the community. These results are consistent with those from Dlamini et al. (2024) contention: In many EMS systems, problems with human resources and questions of quality of service frequently exacerbate fiscal pressure.

The research also demonstrates how such issues are interrelated and need to be addressed in a comprehensive manner. The effects of supply chain decisions manifest themselves in the availability of equipment and in staff morale, and the organization has constrained resources to address either challenge. As WHO (2024) notes, these systemic challenges require comprehensive approaches enabling new financing, local supply chain solutions, and staff retention strategies. The uniformly high ratings in all challenge areas (all means >4.0) indicate

that MARS is in the midst of a perfect storm of financial pressure that will demand immediate remedies combined with long-term strategic thinking in order to support sustainable delivery of emergency care. All of these findings highlight the intricate real-world nature of economic control in EMS, that money-saving does not equal service viability, and the financial survival of services is influenced by competing pressures.

4.9 Chapter summary

This chapter provided a full analysis of cost management strategies in emergency medical services in MARS Zimbabwe, based on responses to a questionnaires and in-depth interviews with staff. The results indicate that the operation has become more efficient in areas such as staff scheduling and resource planning, but the company has limitations such as increasing costs for medical supplies, budget constraints, and retention of qualified personnel. These financial constraints cause a repeated struggle between the quality of service and the need to make cost savings. Findings of the study show that although the technological options and new funding models hold promise, their effectiveness is overly limited by operational barriers in this low resource setting. The next chapter will draw together these findings, provide final conclusions on approaches to sustainable cost management for EMS systems and make specific recommendations to optimise financial health with the provision of high-quality emergency care.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Key Findings

5.1.1 Costs Associated with EMS

The research highlighted three main cost drivers that have a negative influence on MARS Zimbabwe EMS's operations. The largest line item of the budget was for personnel costs (Mean=4.6), which impacted frontline salaries and overtime. Vehicle costs (fuel and maintenance) (M=4.4) stood as second greatest cost with older ambulances needing much maintenance. The second highest cost centre was medical equipment and supplies (Mean=4.2) but with a high level of variation between facilities. There was wide variance observed for the administrative overheads (M=3.8), indicative of varying opinions of what constituted necessary versus excessive bureaucracy,

5.1.2 Factors influencing cost management effectiveness.

Efficient resource allocation (Mean=4.5) and workforce management practices (Mean=4.3) emerged as most crucial determinants of cost management success. Technology (Mean=4.1) held promise but was hindered in implementation, and strategic alliances (Mean=3.9) produced mixed success. Policy changes and funding fluctuations were cited frequently in interviews as major disrupters to financial planning, with one director explaining how “a sudden reduction in budget had compelled [us] to postpone an important schedule of equipment renewal.”

5.1.3 Effectiveness of cost management strategies

The effectiveness of dynamic resource allocation strategies (Mean = 4.4) and optimized workforce management (Mean = 4.2) to lower operational costs was demonstrated. Technology integration (Mean=3.9) had potential impacts but required considerable initial capital costs, and alternative models for funding (Mean=3.7) had limited success because of contextual challenges. According to interviewees, good strategies had to be made sensitive to realities of the particular places they were used in, one manager putting it as follows: 'What works in cities will often not work in the countryside, if they are not properly adapted.'

5.1.4 Impact on financial performance

Cost containment efforts yielded tangible economic returns, especially in the reduction of excess operating costs (mean = 4.1) and in the enhancement of overall financial performance (mean = 4.3). Avg =4.0) contributed to substantial dollar savings and staff retention programs (Avg =3.8) were indicated to have longer-term financial consequences. But, participants warned, short-term savings were often achieved at the cost of long-term viability, particularly when it came to postponing necessary maintenance or the training of personnel.

5.1.5 Challenges in cost management

The high challenges reported were the budget restraints that did not allow the investment in technology (Mean=4.5); the frequent staff resignations, which in turn, increased operation costs of the hospital (Mean=4.3); increase in supply expenses (Mean=4.6); the challenge of finding a balance between cost saving and quality care, which was considered it as the most common (Mean=4.4). These issues were interrelated to provide a quandary for the management task. One clinical supervisor says: "Every economy could threaten the quality of care but the trust needs to balance the books or it will go bankrupt."

5.2 Conclusions

5.2.1 Costs associated with EMS

The study concludes that personnel costs (salaries, benefits, overtime) represent the most significant financial burden for MARS Zimbabwe's EMS, followed by vehicle

maintenance and medical supply expenses. Administrative costs, while less substantial, exhibit high variability, indicating inefficiencies in certain departments. These findings confirm that labor-intensive operations and aging infrastructure are primary cost drivers, consistent with challenges faced by EMS systems in similar low-resource settings.

5.2.2 Factors influencing cost management effectiveness

Internal operational factors (workforce scheduling, resource allocation) were found to be more controllable and impactful than external partnerships or technology. The study concludes that while strategic planning and staff training enhance cost efficiency, external factors like policy instability and funding volatility undermine long-term financial management. This highlights the need for adaptive strategies that prioritize internal process improvements while mitigating external risks.

5.2.3 Effectiveness of cost management strategies

Operational strategies (e.g., dynamic staffing, preventive fleet maintenance) proved most effective, yielding measurable cost reductions. In contrast, technology adoption (ePCR, telemedicine) faced barriers such as infrastructure gaps and training deficits, limiting its impact. The study concludes that phased implementation and local adaptation are critical for successful strategy execution, particularly for complex interventions like alternative funding models.

5.2.4 Impact on financial performance

Cost management initiatives improved short-term financial performance, particularly in reducing waste (optimized supply procurement) and operational redundancies. However, long-term sustainability remains constrained by systemic issues like underfunding and staff attrition. The study concludes that while tactical efficiencies help, structural reforms are necessary to achieve lasting fiscal stability without compromising service quality.

5.3 Recommendations

MARS Zimbabwe

The EMS MARS is recommended to use competitive compensation packages to reduce high turnover rates, including performance-based incentives and career advancement pathways. To enhance job satisfaction and reduce recruitment costs associated with frequent staff replacement mentorship programmes are to be initiated.

Scale dynamic resource allocation models can be used to all service areas, using data analytics to predict demand and adjust staffing vehicle deployment to minimize the response time and improve overall efficiency. For fleet management standardized preventive maintenance protocols are to be made to reduce long-term repair costs and extend vehicle lifespans.

Policymakers & Health Authorities

Policy makers can advocate for dedicated EMS budget lines in national health financing to reduce reliance on volatile ad-hoc funding. This will then lead to improved healthcare quality. Investing in joint private public partnerships in medical equipment, and training programs.

Streamlining procurement policies to mitigate supply chain delays and reduce emergency purchasing premiums so as to reduce fatalities in the EMS. Developing retention incentives like tax breaks for EMS workers and EMS operations to stabilize the workforce and reduce the cost operating by example offering grants and subsidies on fuel procurement.

5.4 Areas of further studies

Based on the study, more research is to me be done zoning in on the funding models (community-based insurance) tailored to Zimbabwe's economic context.

Also there is need to analyse the impact of the recommendations given after implementation.

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