Organizations failing to learn: Roadblocks to the Implementation of Standardized Information Systems

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Abstract

Purpose: Implementing standard health indicators aims at harmonizing fragmented information systems. However, they have not always met this expectation. This article argues that standard information systems fail because organizations fail to learn effective ways of solving problems.

Design: Using an interpretive phenomenological approach, we draw examples from the implementation of standard health indicators in Cameroon to explore why organizations fail to learn. We collected data from April and September 2017 from 25 staff in healthcare facilities and district offices.

Findings: Staff at the peripheral level encountered multiple levels of organizational challenges. We argue that these challenges are deeply rooted in the organizational structure. Using organizational learning as a lens, we theorize the factors (i.e., a disincentive for learning, educational barriers, and organizational culture) that hinder learning. Then identify three beliefs (i.e., technological fix, silver bullet, and emperors of the same empire) embedded in organizational structure that hinder organizational learning. Finally, we propose practical measures to mitigate the challenges that impede the implementation of standard health indicators in Cameroon and beyond.

Conclusion: Organizations often misplace their attention on what and how they should learn. While they are fast to learn from external sources and are often eager to accommodate information systems, they fail to provide a conducive atmosphere where local experiences thrive, do not value learning from experiences, and adopt few processes to promote learning.

Originality: Linking the challenges encountered by staff at the peripheral level after implementing standard health indicators to poor organizational learning opportunities offers a novel perspective to conceptualize the challenges of implementing information systems in low and middle-income countries.

Keywords: Standard health indicators; Standardized Information Systems; Health Information System; Implementation of Health Information Systems; Organizational learning; Organizational culture; Cameroon; Centralized Decision-Making.

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1. Introduction

This article explores the challenges of implementing standard health indicators within a healthcare sector to strengthen to harmonize fragmented information systems. It uses an example of implementing national (standard) health indicators and standardized data collection tools to shed light on the challenges encountered by staff at the peripheral level of the healthcare sector in low- and middle-income countries (LMIC).

1.1 Background

In the Health Information systems (HIS) domain, standard health indicators are used to harmonize information systems (IS), hence improving the quality of the information available to policy and decision-makers at all levels of the health system [1; 2]. Decision-makers, including health professionals, rely on accurate information to monitor and evaluate the performance of health services [3]. However, the outcomes of implementing standardized information systems (SIS) have not met expectations. One would expect that the massive advances in computerization and information technologies to enable HIS [4] in today's world, would facilitate the implementation of SIS and that there would be fewer technical reasons for organizations to experience the same challenges that plagued IS implementation some 20 years ago [5]. The continuous use of HIS in this era would indicate successful implementation and better use of health indicators to support decision-making. However, in LMIC, the implementation of IS remains a challenge [6;7] and a significant number have failed or are unsuccessful [8]. An information system fails when it does not meet users' expectations [9] and the growing number of IS projects that have failed in LMIC is an indication that more than advances in technology is required to improve the rate of successful implementation. In this article, we argue that Cameroon's implementation of standard indicators failed because the IS department (the CIS) fail to learn effective means to solve problems. Consequently, ineffective practices have persisted within the organization, and the employees have become resistant to change.

In the healthcare sector, the implementation of SIS aims to harmonize a country's HIS. For this reason, in the following sections, we draw from the IS literature in general to describe our case. Although there are a plethora of studies on why IS implementation fails [8,10], there is little insight on how to overcome these challenges, particularly in public organizations. Our study was guided by the following research questions: "What issues did users experience after the implementation of health indicators?" "Which challenges did they confront during the implementation process and how can these be mitigated"

We hope that the study's results would help us understand, however, partly, why some IS projects in LMIC fall short of expectations.

The empirical basis for this study was the implementation of SIS in Cameroon's health sector. In Cameroon, SIS implementation is influenced by the prevailing decision-making style, which is hierarchical and centralized. This article contributes to the ongoing discussion on the implementation of SIS in LMIC by better conceptualizing the role of the peripheral level in the implementation process. We draw from the organizational learning literature to scrutinize the phenomenon of failing to learn.

The remainder of the article is structured as follows: Section 2 focuses on the related literature and theoretical framework; Section 3 describes the research setting and the approach and methods employed; Section 4 describes the data analysis; Section 5 presents the results; Section 6 presents the discussion and analysis, and Section 7 concludes the article.

2.   Related Literature And Theoretical Framework

2.1   Definition of Concepts

Indicator and health indicators

An indicator, which is the central concept in this article, is a pointer that shows something. It involves numbers and quantification and is 'seductive' as it can provide knowledge of a complex and murky world [11 p. 1]. In public health, an indicator is a measurement that reflects a given situation. In monitoring and evaluation, an indicator is a quantitative metric that provides information to monitor performance, measure achievement, and determine accountability [12]. Within the context of HIS, health indicators are core elements of the data analysis used to measure the performance of healthcare services [13]. Thus, while there are many meanings of the term indicator, for this article, an indicator is defined as:

> *"A named collection of rank-ordered data that purports to represent the past or projected performance*
> *of different units. The data are generated through a process that simplifies raw data about a complex*
> *social phenomenon. The data in this simplified and processed form are capable of being used to compare*
> *particular units of analysis such as countries, institutions, over time, and to evaluate their performance*
> *by reference to one or more standards* [14, p. 74].*"

This definition highlights some characteristics of indicators, including: (i) The name of an indicator is usually a simplification of what it intends to measure and changes over time. (ii) Indicators usually enable the comparison of different units. (iii) Indicators are often a numerical representation of complex phenomena intended to render them simpler (easy to understand and use) and compare with other phenomena that have been represented numerically. (iv) One of the characteristics that distinguish an indicator from other data is that it is based on its potential to evaluate performance.

Indicators are attractive to decision-makers and decision-making processes. In healthcare, they are the backbone of decision-making, and they act as standard-setting instruments which to measure performances [15]. Porter [16] explained that when decision-making processes include indicators, the result is considered efficient, consistent, transparent, and impartial. Similarly, Espeland et al. [17] noted that embedded within indicators is an ideology of how to achieve the best performance. The generation of indicators results in the production of specific goals and targets against which health performance, for example, is measured. The indicators of the Sustainable Development Goals, Universal Health Coverage, UNGASS on HIV/AIDS[1]And the Global Reference List of 100 core health indicators are examples of indicators used in the healthcare sector to measure health service delivery [12;11].

In IS, indicators are the primary tools used to manage health information and are the core elements of data analysis employed to measure different attributes and dimensions of health status. In designing a country's national healthcare system, it is imperative to develop a comprehensive list of core indicators that provide concise information on its health situation and trends. Health indicators are selected and produced at the central level, while data for the indicators are collected and analyzed at the peripheral level. The World Health Organization (WHO) notes that, once standard health indicators and standardized data collection tools have been developed, it is imperative to implement them throughout the health sector. [18].

2.2 Implementing standard health indicators in LMIC

Implementing an IS, particularly health indicators, is the process of putting a plan into effect. Klein & Sorra [19] explained that this process should ensure that systems are adapted and used routinely, particularly at the peripheral levels. Similarly, Jacucci et al. [20] and confirmed by Braa et al. [21] that implementing IS should guarantee the entire system's sustainability, and that depends on adapting the system to a given context. The reason is that a successful implementation relies on the availability of local capacity to understand, manage, and make sense of the data. Therefore, we argue that, in addition to installing hardware and software, IS implementation should build local capacity to make sense of the data at the peripheral level.

Research on LMIC reveals that while some countries have successfully implemented SIS, others have not. The factors identified as challenges that hinder the implementation of SIS in LMIC include the limited duration of donor support, inadequate focus on local expertise, and narrow conceptualization [22;

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[1] The United Nations General Assembly Special Session indicators on AIDS are the most widely used set of indicators for HIV. Their purpose is to measure progress toward implementing the Declaration of Commitment on HIV/AIDS adopted by 189 UN Members States in 2001.

23]. Avgerou et al. [24] observed that, generally, the implementation of IS in LMIC tends to be sensitive if the goal is to use the same indicators in many different contexts, then the challenge of implementing is twofold. In the first instance, there should be a consensus on the list of indicators at the national and international levels to attract funding and support. Secondly, the indicators need to be routinized and adopted at the peripheral level [20; 23]. In addition, achieving this balance is a source of tension between the national level and parallel health programs (PHP) [25], which is highly influenced by the organizational structure [6;26].

2.3   Organizational Learning

Organizational learning (OL) is part of a field of study, including organizational communication, creativity and innovation, individual accountability and motivation, management and leadership development, systems thinking, mental models, and organizational structure [27]. However, most OL concepts focus on establishing and maintaining a learning organization or overcoming barriers to learning. In contrast, our study aimed to understand why organizations fail to learn from their own experiences. To answer the question, we need to identify the factors that hinder learning.

In general, OL refers to the process of developing new knowledge and insights derived from the '*everyday experiences of people within the organization which has the potential to influence behaviors and improve the organization's capabilities*' [28, p. 409]. An organization is said to learn when it identifies and corrects its errors. Therefore, learning occurs when, on behalf of the organization, individuals gain new knowledge and insights and modify their behaviors and actions [27], resulting in action that influences individual and organizational behaviors. Given that our focus was on learning and inter-organizational learning, we relied on social learning approaches.

Social learning includes social interactions and engagement within a specific organizational context and should be an integrated component of the individual's everyday organizational life and work practice [29]. This approach to learning enables practitioners to form communities of practice (CoPs), which can be a source of collective learning and information sharing and can stimulate organizational change [30]. Bate & Robert (2002) in [31] added that social learning approaches are of particular relevance to public service organizations (the focus of this case) and are characterized by professional communities that span organizational boundaries. Within a CoP, collective learning enables practitioners to build professional judgment, make sense of their experiences at work, and increase intra- and inter-organizational collaboration (Knight and Pye 2005) in [31]. Thus, OL is learning, which involves social activities undertaken among staff within a specific work environment [30].

2.4   Barriers to Effective Learning within an Organization

The social approach to learning emphasizes the context where learning takes place [31]. Therefore, understanding the organizational context becomes relevant to the understanding of OL.

2.4.1 Organizational Structure

The organizational structure defines how activities such as task allocation, coordination, and supervision, are directed towards the achievement of organizational goals [32]. Chen & Huang [33] described it as the formal scheme of relationships, communication, and decision-making processes that influence the distribution and coordination of resources and social interaction among staff. Martinez-Leon [27] added that the structure of an organization could positively or negatively impact knowledge creation and information sharing [34]. While there are many different organizational structures, of interest, in this case, is the bureaucratic structure with centralized decision-making.

A bureaucratic structure has a centralized decision-making process and a high level of formalization. It has a hierarchical structure where managers at the highest level make all decisions. The highly specialized nature of these organizations impedes the creation of new competencies [28] and is counterproductive to creating new knowledge, thereby inhibiting staff's personal development [27]. Thus, it can be argued that bureaucratic structures, particularly public organizations, impede knowledge creation and learning, while the opposite is true for decentralized organizational structures (see Tsai 2002; Newell et al. 2003) in [31].

2.4.2 Social barriers

The social barriers to learning from failure are linked to the psychological reaction most people experience when they fail. Many people, especially those in positions of power, believe that revealing one's failure, particularly to one's circle of friends, could jeopardize one's status.   As a result, managers at higher levels of organizations tend to project an image of perfection by resorting to blanket excuses [35].

2.4.3 The vicious cycle

While there are numerous theoretical approaches to OL, in this case, there was little learning to explain. On the contrary, the dominant findings pointed to a lack of knowledge. Thus, we selected a theoretical approach, which explains why organizations fail to learn. As illustrated in Figure 1, Lyytinen and Robey [5 p. 91] summed up organizations' inability to learn as a vicious cycle. Failure to learn results from recurrent loss, which eventually becomes a typical situation when sustained over a long period. Thus, adherence to invalid theories leads to continued failures to learn because relevant information from experiences is filtered out.
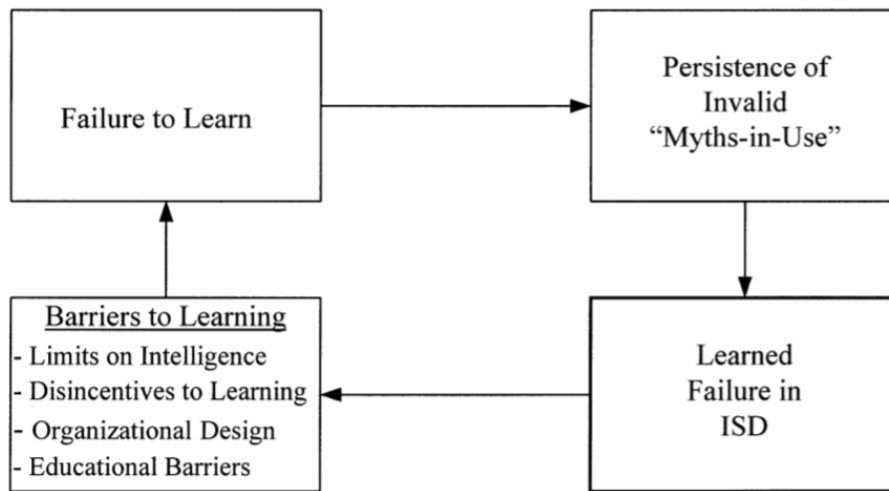
Figure (1) Model of learning failure in information system development. Adapted from [5].

Myths-in-use is beliefs embedded in organizational routines and IS practices that have assumed mythical status and are insulated from blame for IS failures. When organizations rely on myths-in-use, they learn to live with inadequate performance and attribute failure to external causes rather than processes. Challenges to standard development practices are received defensively rather than viewed as opportunities for organizational inquiry. For example, organizational myths place faith in the power of organizational designs to repair what is wrong. Organizations prefer to fix problems by reshuffling managers [5]. The barriers to learning (to be explained in section 6.1) and the organization's failure to learn from experiences reinforce beliefs in myths within the organization.

3. Research Setting, Approach, and Methods

3.1 Research Setting

The empirical setting for this research was Cameroon, a low-income Central African country with about 24 million in 2018. Cameroon has a youthful population, with more than 60% of its citizens under 25. Forty percent of the population lives below the poverty line, and human development indicators remain low [36]. Cameroon has a hierarchical organizational structure characterized by centralized decision-making, bureaucracy, and poor communication channels. The challenges confronting its citizens include stagnant per capita income, relatively inequitable distribution of income, and a lack of basic amenities such as potable water and sanitation, as well as a top-heavy civil service, endemic corruption, and a generally unfavorable business climate [37]. These characteristics are likely to have contributed to the country's poor priority health indicators. For example, Cameroon has achieved the slightest reduction in the under-five mortality rate in the region, and life expectancy has declined in the past two decades. The under-five mortality rate is 103 deaths per 1,000 live births, exceeding the average in sub-Saharan Africa

of 78 deaths per 1,000 live births. Pneumonia, Tuberculosis (TB), and HIV/AIDS remain persistent problems, while malaria is the central public health issue that is responsible for 22.4% of annual deaths [38; 39].

Cameroon's health system comprises the Ministry of Public Health (MoPH) and regional and district offices. The primary healthcare providers are government health facilities, public enterprise health clinics, faith-based, and private health facilities. Administratively, policies are developed at the national level, with regional structures tasked with implementing them, performing quality control, and coordinating and supporting health districts. The district level represents the operational unit for implementing primary healthcare services. The level is the hub and embraces all the facilities and individuals in the community involved in providing healthcare at various levels of intervention [40]. The district office is also responsible for providing data to the national level.

Health Information System

Before 1995, Cameroon did not have a national HIS; routine data was collected haphazardly, i.e., every health program had its information system [41]. Health information-related activities were spearheaded by the various international aid and donor agencies operating in the country. For example, the North-West and the South-West regions had two projects, SESA[2] and OCEAC[3]. Each health program has its own HIS tools to gathers its data [41].

From 1995 to 2013, the MoPH made an initial attempt to harmonize the HIS by creating a national Department of Health Information Systems [39], known by the French acronym CIS (Cellule d'Information Sanitaire). The CIS was charged with managing the production of health information throughout the country at national, provincial, and district levels, with a director appointed at head office. However, no funds were allocated to the department, rendering it unable to operate, and international aid agencies continued to create silo IS. In Cameroon, routine IS consists of formalized paper-based tools at health facilities and a computer-based system at the district level. However, many studies described the IS as dysfunctional [42;43] and fragmented [39].

The adoption of the Millennium Development Goals (MDGs) in 2014 and the need for comparable data led to the overhauling of Cameroon's national HIS. The MoPH received significant financial support from the Global Fund and the Center for Disease Control (CDC) to restructure the CIS and the national IS. For example, the platform for data management changed from a paper-based system to DHIS2 (District

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[2] Child Health in the South and Adamaoua
[3] Organization of Coordination for the Control of Endemic Diseases in Central Africa

Health Information Software version 2), an electronic medium for data analysis. With technical support from the WHO, the MoPH-CIS SIS (i.e., a list of standard indicators and redesigned the data collection tools) implemented them throughout the health sector. However, this has not solved the problem of fragmentation of IS and double data collection.

The flow of routine data

Routine data is generated at the periphery level comprising the integrated primary healthcare facilities and district hospitals. It is gathered from patients who seek care such as immunization, maternal, and childcare services at the lowest level reporting facilities. Patients' data is recorded on different program registers and forms. Depending on the program, data is compiled weekly, monthly, or quarterly, aggregated, and recorded in the Monthly Report Activity (MRA) booklet. The booklets are sent to the office of the district information officer, where they are validated by the district information team and captured electronically on DHIS2. Those with access to the platform can use the data. DHIS2 is a web-based platform where routine data is managed. Besides routine data reports, health facilities compile independent reports to each parallel health program (PHP).

3.2 Research Approach and Methods

The study adopted an interpretive phenomenological approach. Phenomenology aims to understand human experiences by providing a thick and rich description of lived experiences [44]. Acquiring knowledge ultimately depends on understanding the lived experience, which presupposes a focus on subjectivity [45]. Phenomenologists are thus concerned with understanding the phenomena from the perspective of those involved [46;47]. This approach best fits the study as it involves "exploring the lived experiences of the participants and understanding how they make sense of the social world" [48, p. 3]. The phenomenon in this study is the challenge. We sought to understand the challenges that staff at the peripheral level experienced following the implementation of standard health indicators. We also aimed to unveil the existential empirical meaning as they lived this experience [47]. The approach enables researchers to put themselves into the participants' shoes to understand their subjective experience [49] and to describe the phenomenon as accurately as possible, refraining from considering pre-given facts but remaining true to the facts. The interpretive stance assists in understanding the phenomenon through the meaning that staff ascribe to it. Moustakas [44] noted that phenomenological studies incorporate thick descriptions of people's interpretation of their lived experiences. To achieve this, we drew on interviews, participant observation, and a review of documents (strategic plans, project reports, quarterly reviews, and bulletins) to explain how staff at the peripheral level lived this experience. We used interview guides to conduct semi-structured interviews with open-ended questions to allow the participants to narrate their

accounts and interpretations of their experiences. Interviews were the primary source of data as they are the most direct approach to collect detailed data on a phenomenon [50] and allow the researcher to probe for more details. Collecting data from multiple sources increased the study's internal validity [51].

3.3 Data Collection

This research was conducted within the Global Health Information System Programme (HISP) framework, which involves many African countries (including Cameroon), Asia, and Europe. The first author, a Cameroonian, collected the empirical material as part of her Ph.D. research. The first author was invited to join the CIS as a facilitator during the implementation of the SIS. The CIS at the MoPH in Yaoundé was her first contact point, and the CIS director introduced her to CIS staff. Before the implementation started, the CIS team held a couple of meetings, mainly focused on logistical issues at the regional level. Before the implementation, the first author participated in the training workshops of program managers, district information officers, and facility information officers from three regions (Littoral, North, and South West) on the DHIS2 platform. At the facility level in the South West region, she assisted the district information officer in providing training on data collection and validation processes. Although she was introduced by the CIS director, before entering each region to collect data, the first author obtained permission from the regional director of public health and a gatekeeper's letter from the health facility director. She was accompanied by either the district or the facility information officer on her visits to health facilities.

Data collection took place between April and September 2017 and covered three district health offices, two regional and sub-district hospitals, and seven integrated health centers (IHC). These sites were selected as the researcher had easy access to them [52]. We used the maximum variation sampling technique to select 25 staff at various levels of the health sector and were later interviewed (see Table 1 below). This method was employed to ensure variation among the participants [49].

Table (1) List of health staff interviewed

Staff interviewed	Code	No.	Brief description of Tasks
District information officer	DIO	3	DIO manages information at the district level
Facility information officer	FIO	6	FIO manages information either at a General/regional hospital
Manager of IHC	M-IHC	7	M-IHC & MDH collect data at a health facility
Manager of District Hospital	M-DH	2	
Monitoring and evaluation officer	M&E O	4	Information manager from parallel programs
Program Manager	PM	3	

Phenomenologists approach interviews with a casual attitude with the researcher and the participant perceived as peers [44]. A semi-structured interview schedule was developed with broad and open-ended questions. Before starting each interview, the researcher dedicated some time to building trust and rapport, which helped set the tone for the discussion. The researcher read out the aim of the study, clarified the interviewee about their rights, and the interviewee's read and signed the informed consent form. For the researcher to understand their lived experience and to promote profound engagement, the participants were encouraged to talk freely [44]. Van Manen [47] noted that the participants are not simply informants in phenomenological research but become co-researchers. For example, program managers were asked to explain what it was like to be trained to capture data on DHIS2 instead of analyzing and using indicators. The district/facility information officers were asked to recount their experience of receiving support from CIS staff. These questions helped the researcher to understand how they experienced working with CIS staff. A specific question asked was how they experienced the implementation of health indicators, and the training received. The interviews were audiotaped, and notes were taken.

In terms of participant observation, the first author was invited to a quarterly review meeting with the DIOs and FIOs. The meeting addressed different data-management-related issues encountered by DIOs and FIOs, their impression about the new tools, training, support, and communication between the district and the CIS. This helped the researcher better understand what was happening on the ground and understand the impediments and challenges confronting staff. The first author also participated in a district workshop with managers of integrated health facilities and held informal discussions with IHC managers. In one instance, the FIO and were supposed to visit two IHCs on the city's outskirts. The visit was canceled due to rioting caused by the civil unrest in the two English-speaking regions of the country. Hence, instead of visiting rural health facilities, we visited one urban health facility where we examined the different data collection tools, i.e., from PHP, and interacted with M&E staff from the PHP collecting data at the facility. Observing nurses in their daily setting enabled the first author to get closer to the participants, and by participating in their worlds, she gained access to their experience [44]. The review of documents (both printed and electronic) provided contextual information on healthcare practices and procedures in Cameroon.

4. Data Analysis

Data analysis began during data collection. During qualitative research, it is almost inevitable that it is impossible not to start thinking about the data collected when one is collecting data.

Notes taken during the interviews were transcribed after each interview. Data analysis continued after fieldwork. The field notes and audio recordings were transcribed. The taped interviews and hand-written notes were secured to ensure confidentiality. The transcripts were read through to gain a broader sense of what was reported by the participants also to remove any sensitive information. The researcher employed Braun and Clarke's [53] thematic analysis. Data analysis was a back and forth process, from the text to the analysis and back to the text to refine the interpretations. Increasing familiarization with the text revealed its meaning through reflection. Where necessary, the researcher returned to the text for verification. As the researcher read through the text, she identified themes. Van Manen [47] explained that during data analysis, themes are not conceptual formulations; instead, they are "more like knots in the webs of our experiences around which certain lived experiences are spun and thus lived through as meaningful wholes" [p. 90]. As the researcher read through the text, she identified themes that described the lived experience. The themes identified and explored are not absolute, as another researcher may draw attention to different or additional themes.

The themes were further analyzed to generate similar text descriptions that would help answer the research questions. The text was examined for ways in which the challenges encountered by the staff were related to the management style of HIS and then linked to Cameroon's organizational culture. This constructionist approach in thematic analysis posits that events, meanings, and experiences result from a range of discourse within society [53]. The following themes, decision-making issues, infrastructural and communication issues, etc., were identified inductively from the text. The researcher continued to move back and forth between the transcribed text, the codes, and the themes to make sense of the text and create links. She then related these themes to the study's theoretical framework to uncover issues relating to centralized management of HIS and link the challenges staff encountered after implementing SIS as a result of poor learning opportunities.

5. Findings And Analyses

The following sections present and discuss the main themes that emerged from the narratives. The themes do not represent the participants' only truth; instead, they are possible interpretations emerging from the researcher's perspective. The findings relate to issues that end-users encountered after the implementation of standardized tools. The themes are grouped in the following categories: decision-making issues, infrastructural issues, and communication issues. In presenting the findings, where

appropriate, we have inserted verbatim quotations and photographs, while impressions during observations are shown in text boxes.

5.3.1 Decision-making Issues

Centralization of HIS management: The WHO recommends that developing and implementing standard health indicators be consultative [1], involving all partners and stakeholders. Cameroon's organizational structure is bureaucratic with centralized decision-making, as is the HIS management structure. Managers reported that decisions to select indicators and to design data collection tools were made centrally by the CIS, with little participation from lower-level staff:

> *...the CIS people sit in Yaoundé and design tools to be used by someone working in Limbe, for example, without knowing how the work is like on the ground... When it comes to information, the central level seems to impose tools. We on the ground using these booklets should at least have a say.*

In an organization where top managers make all decisions regarding data without involving staff at the peripheral level, there is likely to be little commitment to using the new IS at the local level [54]. Studies in Africa show that involving stakeholders at all levels during the implementation of SIS allows for discussion and interaction, opening avenues for partners to raise concerns and share experiences and resources. It also creates opportunities for inter-disciplinary and inter-organizational collaboration [29], which could lead to learning.

The tension between the CIS and Parallel Health Programs (PHP): The healthcare sector has multiple partners with different voices and information needs. The fact that decisions are made exclusively by the CIS creates tensions. The PHP managers reported that the list of indicators represents the information needs of managers at the central level only. They added that the HIS is rigid and does not allow them to either change or add new indicators, creating tensions between CIS and PHP indicators.
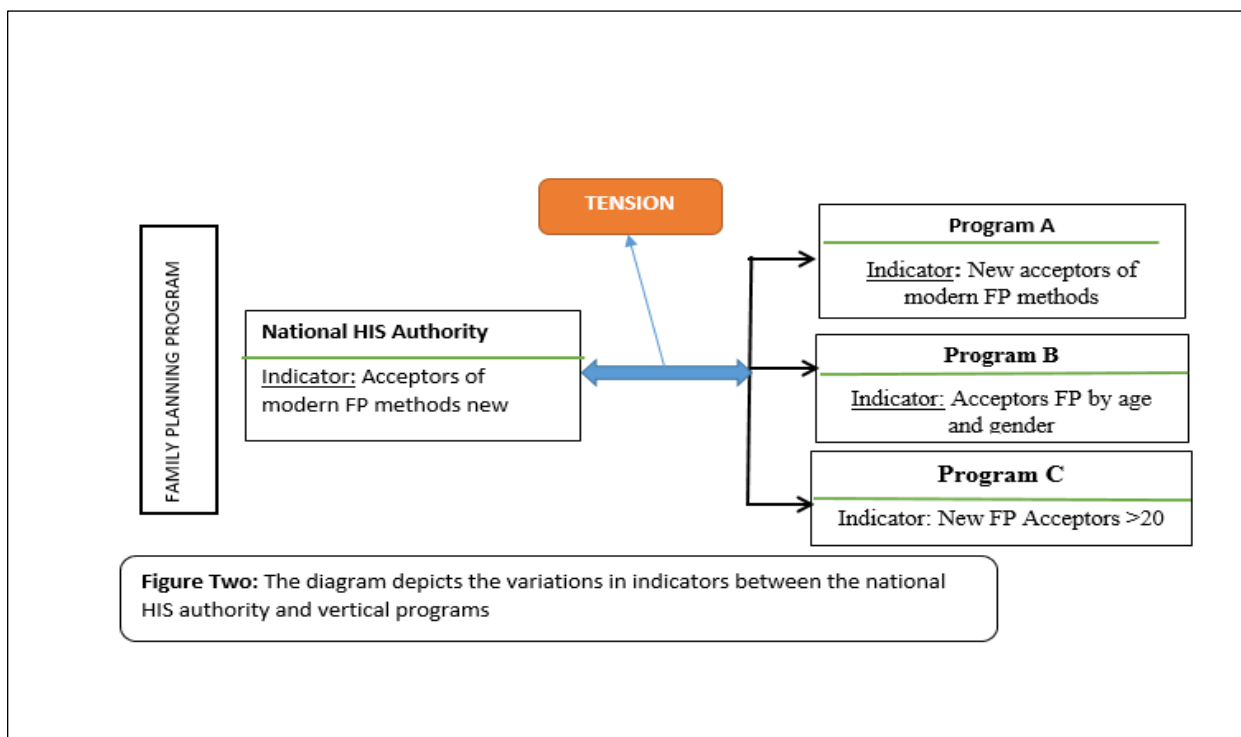
Figure 2 below illustrates an example of such tensions. The right side of the figure represents an example of national indicators, and the left is variations of indicators from PHP. Take, for example, the section on the Family Planning program. The MoPH wants to know "Acceptor of modern family planning (FP) methods new," while Program B[4] want to collect data on "Acceptor of modern FP of youths by age and gender," and Program C wants "New acceptor of FP less than 20 years", etc., which led to non-use of data collected via the MRA booklet. The situation has been exacerbated by the weak enforcement of data-use measures at the peripheral level. For example, there are no data validation meetings; as such, the quality of data becomes questionable. This led to PHP introducing new data collection forms at the

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[4]. We decide to name the programs, for example, Program A, Program B, etc., instead of using their names

peripheral level to collect their data, thus creating more fragmentation in the IS. Multiple data collection efforts also increase the burden of the already overloaded staff, risking the quality of both the data collected and the services provided.

Lack of human resources: The lack of knowledgeable personnel with capabilities to implement HIS is a critical challenge facing HIS in LMIC. The interviews revealed a shortage of skilled and trained staff with sound knowledge and competence in data collection, analysis, and use, particularly at the peripheral level. It is worth mentioning that the CIS had six staff, including the director, at the time of fieldwork. Of these, two held a basic degree in computer sciences and two in public health, while there was two administrative staff.

Figure Two: The diagram depicts the variations in indicators between the national HIS authority and vertical programs

The findings reveal that most DIOs are statisticians who do not have any background or computer training. For example, the head of the strategic planning unit, tasked with coordinating HIS activities in the region, explained that he is a medical doctor with no training in computing. In terms of data management, we observed a dire need for skilled staff with knowledge of public health, monitoring, and evaluation. The lack of experienced personnel in these areas could have contributed to the poor performance of HIS and the non-use of indicators.

The human resource challenge (particularly at the peripheral level) is deeply rooted in centralized decision-making. The data revealed, for example, that the district is headed by the District Medical Officer (DMO), supported by a Health Management Team (HMT), and is responsible for the planning and management of health services in the district. The DMO and the HMT report to the MoPH at the central level, where planning and allocation of funds occur. Another observation is that when the district wants to recruit new staff, it advertises the vacancy, shortlists applicants, and interviews those shortlisted. However, the final decision (i.e., who is recruited) is made at the central level, which takes a while.

Another issue is that HIS is perceived as a "technical craft." People believe that to undertake activities related to HIS, they need to learn new or additional technical skills. Such conceptualization discourages people from seeking employment in this domain. The low salaries in the public service have exacerbated the situation. The findings reveal that staff resigns from the ministry daily to work with non-governmental organizations (NGOs) who offer better salaries and working conditions.

Inadequate HIS training: Training is essential when implementing a new IS and is the most effective way to develop users' skills [55;56]. Training is even more crucial at the peripheral level due to the shortage of skills and competencies in data management. The analysis revealed that the two-day HISP workshop that was offered focused on operational aspects of the new IS (i.e., how to capture data, report generation on the DHIS2) and did not cover how to analyze and use information. These topics were not what program managers had requested. In addition, the respondents, particularly nurses at the health centre, reported that the training was too generic, short-term with limited follow-up. As a result, the skills acquired becomes redundant. Staff at the peripheral level require training that is focused on data use, learner-focused, and in-service [57]. The lack of adequate training could result in inadequate skills to analyze and use data. As illustrated in the excerpt below, managers' inability to calculate and analyze data implies that decisions concerning service delivery were based on raw data.

The excerpt illustrates how a facility manager makes decisions using raw data. It is clear that some facility managers do not know the difference between a data element and an indicator, lack population data, or lack the skills to analyze data. When indicators are not calculated correctly, as illustrated in figure 3, the result is a false representation of the facility's performance. It creates the impression that the health facility is performing well when in reality, it is not. Making decisions based on false representation (wrongly calculated indicators) could have devastating consequences for the community. For example, the use of inaccurate data could lead to an epidemic being discovered too late. Poor planning of the supply of essential drugs could endanger the lives of children or pregnant women.

Inconsistencies in defining indicators: Providing clear definitions of indicators promotes consistency in their collection, interpretation, and use [58]. The analysis revealed that some indicators were not clearly defined and, in some cases, they were not linked to program activity. A DIO reported that although data is collected and submitted monthly, most often, the data collected cannot be used to calculate priority health indicators such as measles, polio, and BCG coverage.

Researcher: Tell me more about the EPI data. Tell me more about these figures.

Manager: As you can see, the number of children immunized is increasing almost monthly.

Jan:	BCG dose	50 out of 50 = 100%
	Measles 1st dose under	1 yr 35 out of 50 = 70%
	PCV 3rd dose under	1 yr 40 out of 50 = 80%

Researcher: If 50 children had BCG, what happened that only 35 came for Measles 1st done?

Manager: This facility is in the city and has a midwife, and many mothers come from neighboring villages to deliver. After delivering, they return to their villages, and their children will continue taking their vaccines from health centers.

Researcher: What is your population of children under one year in your catchment?

Manager: In January, it was 50 and 65 in February.

Researcher: What do you do with this data?

Manager: At the end of the month, we compile and submit to the district office.

Researcher: Apart from sending data to the district office, what else do you use this information to do?

Manager: Not much, except when there is a problem, we shall be informed by various program managers.

Figure (3) Illustrations of how indicators are calculated

5.3.2 Infrastructural Issues

No platform to discuss data-related issues at the district level: Manual data collection has more potential for human error; therefore, data must be validated at the source before being captured on DHIS2. The district should have a platform to discuss data-related issues [59], instead of allowing the DIO to validate data alone. The findings show that routine data is not regularly validated either at the facility or at the district level. Data-related issues are not discussed at the district level; thus, the quality of the data becomes questionable. We observed that due to the quality of data, coordinators of some PHP send data

managers directly to the health centres to collect data instead of using the data collected by the DIO and published on the DHIS2 platform. Braa and others [59] argue that validating data is an essential process in data management. Only by validating and making sense of data can one provide feedback to data capturers on improving data quality. Similarly, Redman [60] added that the peripheral level should have a platform to validate data because if the quality is lacking at the point of collection, it is difficult and costly to fix the problem at a later stage.

Poor record keeping: Program registers and forms are the primary tools to collect routine data. These tools should be appropriately handled and maintained in good condition as good quality records are an essential component of safe and effective healthcare [61]. We observed the inferior status of the registers, with some pages torn. This increases the risks of collecting poor data quality.

Figure 4: Physical state of registers at a health facility

Researcher Observation: During our visits to the IHC, the pages of the registers were torn and twisted.

5.3.3 Lack of Resources

Lack of information-related resources: The study found that the state has not allocated sufficient funds to health facilities' data and information-related services. Furthermore, these facilities lack computers, printers, printing paper, and ink. At some health facilities, MRA booklets were scattered on the floor because there is no shelving. An FIO noted that:

... in my facility, there is no budget allocated to information services. The submission of data has become my responsibility as the facility information officer. I have to get paper for the photocopying machine to photocopy the MRA booklet and distribute it to nurses...

Lippeveld [62] also found that the lack of resources as factors hindering HIS implementation.

Information managers not valued: In today's world, information is no longer considered as a source of competitive advantage, but a competitive necessity [63]. Information is an integral part of all organizations and is the backbone of healthcare systems. Thus, it is not surprising that organizations now manage information in the same way they manage their staff [63]. Recognizing the importance and value of information lends credence to information and those involved in managing health data. It was observed from the MoPH, health facilities, district and sub-district hospitals, and IHC's organigrams that there was no designated post for information manager or data officer. Staff that occupies this position reported that, unlike in other professions, it is challenging to grow in this position:

As a statistician by profession, I was recruited by the Ministry of Public Services to work as a DIO. Here I am, my boss. I have been working as the DIO for the past six years without any promotion. Working as a DIO information manager is challenging to develop. For example, in nursing, one starts as a staff nurse and moves from a professional nurse to a chief professional nurse. In information management, it is not like that because the profession does not exist on the organigram.

There are no formal criteria to hire, appoint or recruit staff to work in the information management unit. The findings reveal that clinicians suffering from chronic illness are assigned to work in the information unit because working in the ward was too stressful. The results also show that being assigned to work in the "*statistics department*" is a form of punishment because staff in that department have little or no interaction with other staff. We argue that if data management and those involved in managing data are not respected, managers will attach little confidence to the data collected [42], affecting its quality and use.

> **Researcher Observation**: During fieldwork, it was observed that the area where the FIO office is located is deserted, with no movement or activity.

5.3.4 Communication Issues

Inadequate infrastructure such as electricity supply, telephone, internet access, and transportation significantly affected communication and submission of data. For example, poor Internet access and

constant power outages in the Northwest and Southwest regions hamper these activities. An FIO shared his experience:

...although hospitals have a generator, the issue is that the generator is connected to basic units only. Unfortunately, the statistics unit is not considered a basic unit, so I have to use my mobile phone to send data...

***Lack of communication*:** The analysis revealed a lack of communication between the different administrative structures. For example, the only time the FIO and DIOs communicate with CIS staff is when the CIS holds a workshop at the district level. As a MIHC explained, the same applied to communication between the DIO and the IHC:

...we send data to those at the district office monthly, and they will not call to acknowledge receipt or give us feedback except when data is submitted late.

Staff at the health centers have poor or limited access to information because the books are out of date. They have no access to journals and the Internet, and the available information is not appropriate to the local situation. The lack of communication and feedback also devalues the data collected, and consequently, data collection is perceived as a supplementary task in healthcare delivery [26]. Feedback is an essential process for identifying problems for resolution, for regulating and improving performance at individual and system levels, and for identifying opportunities for learning (see Knight 1995) in [64]. However, giving feedback remains inefficient in HIS in many LMIC (see Hozumi et al. 2002) [64]. According to Nutley [65], the lack of communication and support between those developing the system and those using it could negatively affect the information system itself.

6.   Discussion

The study aimed to identify the challenges encountered by users following the implementation of SIS in Cameroon. One would expect that the frequency of implementing and using HIS would reduce the challenges because IS experts should have learned from their mistakes. However, the empirical findings showed otherwise as staff at the peripheral level encountered multiple challenges. We argue that these challenges cannot only be attributed to a lack of adequate training, skills, and resources. Instead, they are deeply embedded in the existing organizational structure. When an organization fails to learn from its mistakes, its staff are unable to identify feasible alternatives. We drew on theories of organizational learning to understand why organizations fail to learn.

6.1 The Reasons Why Organizations Fail to Learn

Lyytinen & Robey [5] identified four barriers to learning in IS, of which three were relevant in this study. The three barriers are disincentives for learning, organizational culture, and educational barriers.

6.1.1 Disincentives for learning

The organizational culture and management's decision-making behavior are shared values and beliefs that govern how people behave in organizations. These shared values form the basis for communication and mutual understanding and affect how staff act and perform their jobs [66], which could either encourage or discourage innovative behaviors [67]. In Cameroon, the prevailing organizational culture is hierarchical with centralized decision-making. Centralization refers to how the locus of decision-making authority is concentrated at the organization [67]. It allows for tiny delegation of decision-making, creating a non-participatory environment and reducing communication, motivation, social interaction, and staff's involvement in tasks [68], which could impede workplace learning. In contrast, standard health indicators promote evidence-based decision-making and transparency [64]. However, these attributes are not encouraged in an organization where decisions are made at the central level [69; 70] and there are many red tapes. In terms of implementing health indicators, IS experts require sufficient autonomy and freedom to pursue solutions to new problems as they arise, reflect and exchange ideas; these activities stimulate creativity and learning. An environment where personal initiative or invention is not encouraged does not promote the production of new information and hence no learning and personal skill development [68]. Furthermore, since managers/heads of departments are political appointees and might lack subject matter expertise, they are likely to make poor decisions, negatively affect their subordinates' job performance [71]. The disincentives identified by Lyytinen & Robey [5] included punishment instead of trying to learn from experience, which could occur in a rigid hierarchy.

6.1.2 Organizational Culture

The complexity of the delivery of healthcare services calls for stakeholder collaboration. However, Cameroon's organizational structure hinders open communication and cooperation, undermining cooperation, especially with partners and staff at the peripheral level. A case in point is that the workshop's content during HIS implementation did not focus on users' information needs but on what the IS experts deemed necessary. This point aligns with Lyytinen & Robey's study, where both vertical and horizontal divisions exacerbate poor communication within the organization, which hinders information and knowledge sharing. The separation of doing at the operational level from possible learning at the central level implies that the organizational design is a barrier to change [5].

6.1.3 Educational barriers

The educational barrier identified by Lyytinen & Robey [5] was between computer scientists who held a technical view of IS and business people who did not understand the technical challenges. In Cameroon, a professional barrier was identified between CIS IT staff at the national level, familiar with healthcare providers, whose knowledge focused on patients and treatments, and less on data management, population, percentages, and indicators. In this study, we found that the two-day HIS training workshop offered during implementation was insufficient to transform healthcare providers into health managers who could act on indicator values. This is similar to Lyytinen & Robey's study [5], the myths of a technological fix. The silver bullet was found in this case, although in somewhat different forms.

6.2   Myths-in Use

Myths-in-use is beliefs embedded in organizational routines and IS practices that have assumed mythical status and are insulated from blame for IS failures. In this study, we identified three myths-in-use. They are technological fixes, silver bullet, and emperors of the same empire.

Technological fix – The CIS seemed to have limited the implementation of standard indicators to "providing computers and Internet dongle." For example, at the end of the two-day HIS training workshop, an FIO asked one of the directors, "what is the way forward" and the director responded:

> *"...you have computers, Internet dongle, and some copies of MRA. I do not want to hear any further complaints again. Go ahead and start sending data. We hope all your concerns have been attended to".*

Reducing the implementation of HIS to the installation of software and hardware and disregarding the context within which the system operates is an extremely narrow approach to SIS [24;72] that has been associated with the failure of many HIS initiatives.

The notion of a ***'silver bullet'*** is based on the belief that there is a single solution to resolve all information-related problems. In this case, we consider the '*silver bullet*' to be the new list of standard indicators developed and implemented. The use of the term '*silver bullet*' reveals a fascination with magical weapons possessed by heroes fighting the forces of evil. Although such an analogy may be considered a simple embellishment of language, in this case, it highlights an essential assumption about solutions to HIS problems. For example, given that the WHO recommended implementing SIS as a strategy to strengthen IS, the MoPH-CIS thought that it would solve all the data management-related challenges the staff was facing once that is done. Belief in a 'silver bullet' is an inaccurate reflection of reality and may prevent deeper examination of why the staff at the peripheral level still encounter numerous challenges following the implementation of SIS.

Emperors of the Same Empire: This is an additional (new) myth we found in this case, and it is relevant among CIS and donors. When more than one emperor rules the same empire, conflict is bound to occur. The term "emperors of the same empire" describes the tension between the MoPH-CIS and PHP, the main actor and partners involved in information management in Cameroon. These bodies need to identify an amicable way to discuss and resolve their differences and concerns as far as SIS uses concerned. They must be able to collaborate and work together, without which there is bound to be conflicts.

6.3 Strategies to overcome Learning Failure

Having described the barriers to effective learning and why the MoPH-CIS failed to learn, we propose approaches to overcome learning failure. There is no silver bullet. The proposed strategies are redesigning the structure, including institutionalizing systems, mobilizing resources, making the MoPH-CIS Inclusive, networking, and creating a community of practice (CoP).

6.3.1 Redesigning the MoPH-CIS

The challenges identified are attributed to the organizational structure and culture. Overcoming them would require a complete *makeover* of the entire health sector. Although it is a radical measure, it would lead to better management of the entire healthcare sector. However, such a measure is feasible in private organizations and beyond the scope of this article. However, a viable approach could be to create an independent body or committee, which would collaborate with the MoPH and other partners and stakeholders in the country. For example, the creation of a "National Health Information Committee for Cameroon" (NHICC). This committee should be located within the MoPH, perhaps in the planning or monitoring and evaluation department. The committee should be independent and apolitical, with representatives from all stakeholders. An independent body in charge of HIS development would create a platform for collaboration and enable the pooling of both human and financial resources [73]. This NHICC and the MoPH would work together to strengthen institutional structures, mobilize resources, and network.

Institutionalize Structures: Institutions are said to be cognitive, normative, and regulative structures and activities that provide stability and meanings to social behavior [74]. Organizations and the organizational fields such as the MoPH-CIS and its partners constitute an institutional life [74]. Institutions are, therefore, the regulative frameworks, managerial practices, and norms that enable organizations to function and endure [74]. Regarding MoPH-CIS and DHIS2 software, would rejuvenate the e-health policy that was introduced in 2008 but cannot be implemented due to poor coordination between the MoPH and Ministry of Post and Telecommunication (MINPOSTEL) [75]. They would ensure that the

policy is implemented and that all programs/projects in-country comply. The CIS would develop the Enterprise Architecture with e-health components that govern all its e-health projects.

At the operational level, it would support Standard Operating Procedures (SOP) for data management. The SOPs provide a formalized system for evaluating the technical adequacy of data management-related activities. These activities start before data collection, continue after analysis is complete, and require continuous coordination [76]. These documents outline how to keep records and obtain accurate, complete, and thorough documentation of all activities related to data management. They also specify the minimum data quality and the procedures used to analyze and report the indicators. The main objectives of the SOPs are to maintain a reliable data quality system for CIS, provide accurate data required by the service, donors, and other stakeholders. It also provides a record-keeping system that will help evaluate and monitor for effective resolution of concerns on ongoing programs [76]. Other institutional strengthening mechanisms are to institutionalize district and facility data review meetings. At all these meetings, presentations should be based on standard health indicators, which health facilities track monthly. In addition, these meetings should include discussions on the challenges (communication, on-site supervision/support) that facilities at the peripheral level encounter in managing and using standard indicators by strengthening institutional structures, hence, creating a conducive environment for information-related activities to thrive.

Mobilize Resource: This is at the heart of a successful implementation of IS is the availability of human and material resources. The provision of material resources is correlated to access to financial help [10]. Cameroon is a developing country and depends heavily on foreign grants and loans to implement national development initiatives, including health programs [41]. Pursuing a viable and efficient HIS has been a significant challenge concerning acquiring the necessary financial support for its implementation. Mobilizing resources through networking with health partners would secure additional finance to support CIS to implement the national health indicators.

Networking: In a resource-constrained context like Cameroon, its sustainability of HIS invariably depends on building networks both locally and internationally. Such networks could be used to create opportunities to strengthen the capacity of staff at MoPH-CIS [25;77]. Networking is based on the assumption that providing possibilities for the two-way flow of knowledge between nodes in the network would lead to sharing available resources for planning and implementing health projects [25]. The traditional alliance with health partners such as WHO, the United Nation Bodies, Global Fund, etc. have been providing financial support to programs in many developing countries. However, experience from

other countries, Tanzania, South Africa, Mozambique, etc., show that establishing a new partnership with HISP has opened new capacity-building opportunities in technical assistance (TA) through knowledge transfer and education.

In addition to providing TA for customizing the DHIS2 software for the countries using the software, the HISP group is also providing training on advanced features of the DHIS2 software through the HISP regional academics in West and South Africa. For sustainability and eventually becoming self-reliant and less dependent on HISP technically, the CIS can take the initiative by leveraging on the TA from HISP to build the skills of its core technical team. In addition, MoPH-CIS could extend the existing memorandum of understanding (MOU) with the University of Oslo to that of fellowship to provide higher education in information science and research [25]. It could be seen as a strategic plan to build the skills of Cameroonians.

Experience from other countries shows that networking with health partners could assist in refurbishing and replacing broken down ICT equipment, support end-user training, provision of logistics for monitoring and evaluation of activities, and payment of server hosting [78].

Making the MoPH-CIS Inclusive - The HIS profession is considered a technical craft for the "technically inclined." This narrow conception discourages prospective staff from joining the profession. The proposed national HIS committee should motivate the expansion of the CIS unit to include research and development, monitoring and evaluation, and public health. This could broaden HIS perspective and encourage more research, consequently attracting people with diverse professional and educational backgrounds to join the IS sector.

6.3.2 Cultivating Communities of Practice (CoPs)

Once the proposed committee has been stabilized at the central level, ensuring continuity in capacity building at the peripheral level and cultivating CoPs around data management activities could achieve this purpose.

A CoP is a group of people who share a concern or passion for something they do and learn how to do it better as they regularly interact [29; 30]. Cultivating CoPs, especially at the peripheral level, with assistance from the operation managers (health facility managers), could support and motivate their subordinates to work together [79]. If well supported, an operations manager would contextualize data management and integrate it into staff's work practices to become in-service training. A study conducted in a rural health facility in northern KwaZulu-Natal, South Africa, found that the creation of a CoP

stimulated discussion and interactions and consequently developed staff skills in data management-related activities [57].

Table (2) Strategies to improve learning

Reasons for the CIS learning failure	Strategies to overcome learning failure
• Organizational structure • Educational barriers • No platform to interact	• Redesign the MoPH-CIS, including institutionalizing structures, mobilizing resources, networking, making the MoPH-CIS Inclusive • Cultivating CoPs

In summary, the MoPH-CIS can learn from its mistakes by applying the proposed approaches discussed above and summarized in Table 2 that are in line with many calls for awareness of organizational issues in HIS [80]. According to [57], widespread awareness of these issues has failed to influence practice. However, the authors added that the difficulty would lie in implementing the proposed recommendations, which will influence course based on learning from experience, an apt illustration of the need for improved approaches to organizational learning. The challenge is to move beyond the habit *of accepting instructions* to the critical step of asking questions and getting more involved.

7. Conclusion

The study set out to understand the challenges encountered by users following SIS implementation and suggest ways to mitigate these challenges. Using the case of Cameroon, we found that, following the implementation of SIS, staff at the peripheral level encounter many challenges such as inconsistencies in the definition of indicators, a lack of resources, etc. We argued that these challenges are partly because the MoPH-CIS failed to learn from its experiences. As a result, HIS has remained susceptible to failure, and ineffective practices persist. These results concur with the findings of several previous studies [81]. Theorizing the reasons for learning failure, we concluded that the causes primarily stemmed from the MoPH-CIS organizational structure. Based on this, we proposed ways to overcome the learning failure. A study on why organizations fail identified three organizational myths [5], while those three myths Lyytinen & Robey [5] identified may be applicable in private organizations, in this study, we identified a new myth, "*Emperors of the Same Empire*," relevant in public organizations; among CIS with donors and partners.

The core contributions of this article lie in how the different concepts are theorized. Linking the challenges staff at the peripheral level encounter after the implementation of SIS to the failure to learn and the organizational structure makes the study unique. The MoPH-CIS structure in Cameroon is centralized, rendering it a significant barrier to successfully implementing an IS because centralized decision-making

does not support the principle of DHIS2 [26;43]. The article contributes to the literature on an organizational structure by demonstrating the consequences of centralized decision-making for the implementation of SIS. Linking the failure in IS implementation to the inability to learn contributes to the IS literature by illustrating the effects of a lack of learning. The recommendation to introduce CoPs emphasizes the need for continuity and more focused and integrated training, particularly for staff at the peripheral level. Implementing a new SIS should be considered an opportunity to review and modify the traditional way of doing things, influenced by bureaucratic and hierarchical structures. The article concludes that organizations often misplace their attention on what and how they should learn. As explained by Attewell [82], organizations are adept at learning from external sources and are often eager to accommodate new technologies but often fail to provide a conducive atmosphere where their own experience can thrive. Learning from experiences is not valued, while few processes and routines are in place to help the organization to promote learning. Finally, we argue that while the implementation of SIS is cardinal for coordinating between multiple partners, the organizational culture can hamper the implementation process.

This study had several limitations. Firstly, it focused on the two English-speaking regions (formerly known as Southern Cameroon). These regions have lower levels of socio-economic development than other regions in the country. Secondly, the fieldwork was conducted amidst political unrest in the English-speaking regions. Thirdly, we did not consider alternative conceptualizations of the theoretical linkage between the failure to learn and HIS implementation, choosing instead to employ the lens of organizational learning. While this is one possible approach to theorize the causes, further research is required on alternative paths.

8. Declarations

8.1. Author's Perspective:

FNA conducted the interviews, transcribed and analyzed the transcribes, and maintained a reflective diary throughout the process. FNA is a Cameroonian and a knowledge broker by profession. FNA has worked with healthcare providers at the peripheral level in many African countries. The impact of an existing professional relationship between the interviewer and interviewees was taken into account during data analysis through the researcher's reflexive diary. First, FNA and RS read and analyzed the text to identify codes. Later, FNA, JK, and PN discussed the themes. JK and PN provided critical input on the manuscript.

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8.3. Declaration of Conflicting Interests:

The authors declare no potential conflicts of interest.

8.4. Funding:

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8.5. Ethical approval and consent to participate:

This study was approved by the Norwegian Center for Research Data (Reference #: 45883). Ethical approval was sought from the Regional Delegations of Health from the three regions. All the participants signed individual consent forms.

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