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The Economic Role of the Accounting Information Systems in Optimizing Resource Management in Dental Clinics in Iraq

***Hussein Ali Saad Alsrai, **Thaer Najm Kadhim, #Eyad Abd Al-Sayed Aneen**
*Department of Persian Language, College of Arts, University of Wasit, Iraq
**College of Education for Pure Sciences, University of Wasit, Iraq
#Department of Physics, College of Education for Pure Sciences, University of Wasit, Iraq

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Abstract

The Cost and resource organization is one of the major problems of dentistry clinics in the 21st century. This article elaborates an economic link between Accounting Information Systems (AIS) and dental practice, with a particular focus on resource allocation dimension. Statistical analysis of 75 clinics was performed employing descriptive statistics and multiple linear regression models to understand which aspects might improve clinical macroeconomic performance. The bottom line is that clinic economic performance is largely determined by five determinants, the biggest of which were innovation and growth, resource allocation, economic productivity, financial sustainability, and economic efficiency. The amount of accounting information systems use and return on investment (ROI) would not have a direct and significant effect on the model, which means indirectly that the economics of Accounting Information Systems can be realized if the organizational and operational aspects are enhanced. This means spending on accounting information system must be implemented as part of an overall transformation plan covering process redesign and human resources training to be able to achieve sustainable efficiency and return gains from the investment.

Keywords: *resource management; accounting information system; dental clinics; economic performance*

1. The aim and purpose of the study

Although accounting information systems have a significant impact, there is a deficiency in the research literature on the economic effects of accounting information systems on resource management in dental clinics. Therefore, this study attempts to shed light into the economic implication of accounting information system in dental practice, particularly in the resource management dimension, and to contribute to the central research question associated with the economic impact of accounting information systems on resource management in dental practices.

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1. Introduction

In the modern economy, dentistry clinics face increasingly demanding healthcare requirements and severe cost management pressures. Clinics that fail to adapt their resource management to the changes or optimally manage their operational resources are at risk of falling behind or going out of business. Accounting information systems (AIS) are widely recognized as being beneficial for managing both financial resources like cash flow and cost, and non-financial resources like time, materials, and labor in many industry sectors, including across the health services sector. Such systems for the management of resources also have been shown to support management decision making in relation to the effectiveness and efficiency of operations, which can have important effects on the productivity, sustainability, and profitability of dental clinics. Clarifying the economic impacts of accounting information systems on dental practice and specifically their effects on resource management can help provide guidance on economic trends, investment priorities, and the selection of services and systems tailored to the specific situation and needs of individual clinics and improve the sustainability of the broader healthcare system [1 , 2] .

The present work aims to clarify the economic impact of accounting information systems on dental practices, with a specific focus on the resource management dimension. The scope of the study is motivated by a corresponding gap in the existing research literature concerning the economic effects of accounting information systems related to resource management in dental clinics, particularly considering the importance of both dental health and dental practices in general to public health and the economy. The key research question guiding the study, therefore, concerns the economic effects of accounting information systems on dental practices, and specifically on the management of resources within those practices [3].

2. Theoretical Framework

There have been visible significant changes in the socioeconomic environment of modern society, which in turn has a very significant impact on how healthcare services are rendered. Information systems continue to be a vital and essential tool to deeply transform and enhance such core services. Of all the systems, Accounting Information Systems (AIS) play a particularly important and paramount role in enabling large-scale, cost-effective, and rapid changes in order to reduce waste, improve efficiency, optimize resources, maintain financial stability, and elevate service quality at multiple points in the complex management cycle of the 21st century. And so, dental clinics are not immune as part of the healthcare system from such massive and far too timely changes. These information systems greatly affect many elements of the health care system: Accessibility, Affordability, Quality, and numerous other key policy components that determine the architecture and effectiveness of care delivery [2, 3]. The directly proportional demand for dental services in a fast-growing economy is extremely thrilling to the development of dental clinics, particularly privately owned ones. The trend reflects a significant change in the landscape of dental care, with an increasing number of people utilizing oral health services. Nonetheless, each of these daily transactions embeds multi-faceted and multi-process complexity into the clinic manager's capacity for effective monitoring and efficient decision-making [3]. So, the robustness of information and decision-making systems is a crucial factor for how the how-what-why-where-when information is accurate, transparent, and clear, and is an important area of the priority agenda for clinic administration in terms of information. Therefore, studies are carried out on how to set up a comprehensive accounting information system in dental clinics. While necessary to succeed, they are rarely mentioned in the healthcare literature of the country. These operations can be streamlined and management's access to critical information can be improved. The execution of this type of move is not only significant, but also very encouraging; with a proper feedback and improvement mechanism, this could serve as a pedagogical and enhancement improvement tool for other management practices in general. These systems are instrumental for dental clinics to not only survive, but also thrive as the competition intensifies, thus delivering better services and increasing client satisfaction overall [4].

3. Accounting Information Systems in Healthcare: A Resource Management Perspective

The economic literature on healthcare accounting information systems (AIS) is a fertile and varied area of inquiry, addressing not only two distinct but also overlapping domains: their broader impact on healthcare delivery and their significant role in shaping revenue cycle management. Many research studies have studied how healthcare professionals use smartphone innovations and advanced computerized scheduling systems for appointment management. For instance, it was shown that these technologies increase patient flow and improve resource utilization [5]. Further, extensive literature on the economics of health information technologies highlights the overall relationship between organisational capital and healthcare productivity. AIS, as in-house systems, play a vital role in the organization's processes and allow the organization to control its resources effectively, using various types of digital tools (e.g. more reliable analysis tools, integrated integration of data sources, etc.) Indeed, economic theory clearly asserts that healthcare treatment conducted in clinics and hospitals must in practice include sufficient (if not always the exclusive) financial or non-financial data at the outset, with the goal to obtain adequate data, which should help inform better decisions. The base of dental clinics economic activities is based on some typical features, including monitoring the full life cycle of economic activities implemented within such health structures[4,6]. This comprehensive approach ensures that all economic activities are accounted for and assessed in order to enhance operational efficiency and service delivery. [5] Increasingly, research at the nexus of healthcare and information systems recognizes that various organizational activities in the sector generate significant information. To utilize these data sources productively, regular resource management procedures participate in and retain ownership of information systems, even though these generate information via wholly and partially automated routes. General resource management, revenue cycle management, the processing and ascertainment of uncollected balances, item management, consumption, payments valuation, wage subsystem import, compensation calculation, overtime management, and relocation management constitute the major financial functionalities. For dentistry, fixed capital, residual expiry date, maintenance objective documentary management, asset displacement area analysis, amortization quotation, depreciation process command, and internal related functioning supervision hire/accounting road reside among the supplementary recognised typologies. The above AIS characteristics enhance dental clinic operations by providing facility for management of numerous resource types, in turn improving the overall economics of the undertaking [6].

4. Financial Control and Cost Transparency

4.1. Accounting Information Systems in Healthcare: A Resource Management Perspective

Within dental clinics, Accounting Information Systems (AIS) enhance operational efficiency and enable better resource management. The panoply of dental clinic functions can be grouped into five resource domains: financials, revenues, supplies, labour, and facilities. Each domain corresponds to a specific cluster of AIS capabilities that an organisation may wish to deploy. AIS capabilities for financial control enhance the ability to manage financial resources—long-exposed as vital for clinic profitability and viability [7]. Cost accounting informs about resource consumption incurred for the provision of services; surveying of costs periodically enables budget establishment for the future and appraisal of financial performance against plans. Activity-based costing allows for a more precise distribution of costs across diverse services while still reporting total costs by service. Besides, capability for real-time visibility over the cost absorbed by each service aids managerial decision-making on price tags, services to promote, or services to terminate. Such features assist with monitoring overdue confirmations, tracking patients opting for cheaper alternatives, and obtaining reports that render timely support for managerial choices. [8, 9].

AIS capabilities for revenue cycle management improve the ability to manage revenues—widely recognised as paramount for monthly cash flow and continuity. This process commences at patient intake and registration during the practice management module, wherein a patient file is made and relevant data are collected (Hay, 2015). The file continues to play a critical role during treatment, enabling the right coding of services performed for provision to the

clerk, and later to be manipulated (Khan et al., 2017). Billing completes the cycle and coverage designation takes into consideration the reimbursement wait that varies by insurer. Complete records maintenance is also in favour to the audit of claims [10, 11]. AIS capabilities for inventory management and supplies enable better management of stock levels and consumption metrics and improve control of the management of supplies, which are the governance of stock positions and consumption metrics. Depending on the types of supply involved, varying levels of monitoring might be utilized: for example, the fine-tuning of vendor agreements and careful determination of optimal packaging sizes, and the definition of minimum safety stock levels for essential everyday goods by sizing to the minimum required and setting security stock levels for them, may lead to a tightening of the procurement cycle. This in turn guarantees the available cash that can be used to finance the required amount of cash to keep the company out of trouble so as to meet the demands of long term without receiving any cash in the form of cash flows. And without stock alerts they can cause unwarranted interruptions in operations, waste valuable fresh resources, and adversely impact productivity. Through using sound inventory management, businesses can manage such risks and build a more resilient supply chain to reduce the vulnerability to risk [12]. Finally, AIS capabilities for workforce and scheduling analytics assist during decision-making about labour resources. Labour constitutes one of the key costs in clinics, which demand periodic evaluation of the workforce supply and suitability before capital investment. Key areas for analysis include the cost associated with consecutive daily shifts—fitting several employees with different coverage and skillsets may improve overall occupation rates; propensity of professionals to malfunction, their deviations from average chair time over the years, or the proportion of overdue appointments also remain useful insights.

4.2. Revenue Cycle Management in Dental Practice

A dental practice comprises a network of synchronized activities—the patient intake and treatment process plus the associated administrative tasks. These activities are often collectively called the revenue cycle, even though the front-end, core, and back-end tasks are distinct and occupy different time periods. The revenue cycle in a dental practice begins when a patient walks through the door for the first visit or an emergency treatment and ends when the practice collects any remaining account balances [12]. In many practices, it is common for patients to leave without making a final payment. The health insurance revenue cycle begins with the extraction of data from the clinical treatment record to generate a claim. A third party must approve the visit or treatment prior to actual payment. The length of time before collection starts is dependent on the contractual arrangements with the insurance company and the timeliness of filing the claim. Successful practices realize that the transport of patient information from the clinic to the billing department should take place quickly and should be electronically transmitted. They are increasingly studying this transportation of information as a discrete component of the revenue cycle, analyzing the flow of information independently from the cycle itself to standardize and thus expedite the entire revenue cycle [13].

4.3. Inventory and Supplies Management

During dental appointments, practitioners consume a range of materials and supplies, including disinfectants, an anesthetic gel, gauzes, gloves, masks, needles, and other items specific to each procedure [13]. Considerate the ingesting of these supplies can help practices study the cost of each procedure, assess contractor offers, recognize opportunities to negotiate better terms, implement just-in-time inventory practices, minimize waste, and estimate the quantities needed for future procurement cycles [14].

4.4. Workforce and Scheduling Analytics

The capability to display labor costs and workforce activity is vital to cost control [15]. Dental clinics often experience overstaffing or understaffing due to the uncertainty of patient demand. Poorly scheduled shifts lead to excessive overtime or the need to hire extra employees, which quickly raises labor costs. Greater productivity and efficiency can be achieved by measuring and tracking labor productivity through expenditure per billing patient and hours worked

per billing patient. The skill mix can be improved by reviewing the skills of clinicians and the distribution of billing patients. For scheduling labor, productivity metrics, skill mix, overtime hours, and the time to process clinical documents can be taken into account.

4.5. Economic Impacts of AIS Adoption in Dental Clinics

Dental clinics are service-based businesses that manage various resource categories: financial resources, revenue generation, consumable inventories, skill-dependent labor, and time allocation for activities. In today's information society, efficiently allocating scarce resources is critical for business sustainability 1. Accounting Information Systems (AIS) involving integration with the clinic's filing and scheduling systems and computer-aided design/computer-aided manufacturing remain greatly underutilised. Estimating economic impacts from AIS adoption requires an analysis of before-and-after scenarios [2]. Time factors and the level of resource availability determine optimum economic viability. New clinics with limited patient intake face major constraints and need to attain a basic level of economics to operate competitively, thus allowing partial assembly of an AIS package within a short time. Design and importance of various resource categories influence equipment acquisition priorities and expected service volume at different stages of development. Each category needs adequate follow-up to remain solvent and financially viable [9,13]. Increasing patient numbers enable partial upgrade of service to wider human resources (e.g., chair-time), refinement of already installed AIS sections, and installation of additional equipment to meet relevant capability thresholds, thus optimally servicing an emergent new resource area. As a rule, clinically oriented resource-processing clinics with labour-constrained treatment routes need to follow-up each area of an analogue or hybrid, econometrics-based, econometric-AIS, or digital-marketing-official-business-considerate-setup remain desirable. Such econometric models analysed whether processing-through schemes on a facility could provide clinic-option treatment guidance at periods of stagnation.

4.6. Cost-Benefit Considerations

Altogether, the investment in an Accounting Information System (AIS) generates substantial savings in resource costs and adds value by improving revenue collection and control [16]. The projected payback period is within the first year, and in some cases, less than six months [22]. Savings are primarily generated through the improvement of operational control, waste reduction, valuing missing revenues that had not been considered previously, and clarifying existing processes among multiple operatives to increase their current productivity, therefore reducing time wasted. Productivity, measured as chair throughput and payment per appointment, typically increases by 20% to 40%, although some large clinics experience a doubling of throughput.

4.7. Productivity and Throughput Effects

Prior to the introduction of an accounting information system (AIS), management of available chair time represented a major challenge for dentists. In terms of patient-flow analysis, it was unfortunately difficult to determine how many clients were seen in a given day, when those clients were seen, and whether they adhered to scheduled appointments. Queries about patient turnover were equally difficult to answer. For tracking where patients were "lost" in the system an open-ended, handwritten class was utilized to obtain greater detail regarding reasons for missed or cancelled appointments. After the deployment of the AIS, management of chair time became substantially easier. The time available chair time was an issue for which the management was a challenge prior to the introduction of an accounting information system (AIS). Patient-flow analysis showed that estimating the number of clients received daily, appointment compliance, and turnover was very challenging. An open-ended, handwritten class had to be used to gather further input on missed or canceled appointments. AIS enabled significant improvement in chair time management. Appointment notification and confirmation practices had not changed post the implementation of AIS. Appointment-reminder functionality was explored and it was found that the system had limited capability. It did

involve the recording of appointment confirmations pre- and post-appointment. A review of the recent database table which displays scheduled appointments which are cancelled, missed or completed, was helpful to understanding clients' problem areas. That analysis concluded that access remained a significant barrier to patients being able to follow through with scheduled appointments, though. The mean interval between first patient contact and initial appointment scheduling was unexpectedly longer than expected, leading to a review of the patient flow biases [17]. Comparing our total patient flow—new patients with returning patients—to the previous statistics showed fewer patients being seen per day. Clarifying the myths around appointments gave more clarity, knowing which patients showed up each day. Even as fewer patients were seen per week, the average hours worked remained stable, as did the number of patients accepted through a centralized system. An example is the fact that on Western holiday days 3-day weekends are held.

4.8. Capital Allocation and Return on Investment

Dental clinic resource management is an important yet complex process that needs management of the right investment to optimally develop into the desired level of return on investment over time. An important part of this process is embedding these objectives in the capital allocation process that effective accounting information systems should serve as an integral part of. Such systems not only enhance the ability to maintain accurate monitoring of financial data, but also support decision-making to maximize the use of resources. With those fundamental decisions in mind regarding the type of clinic, the geographic location and the particular dental practice the clinic will serve, dental entrepreneurs must design their respective initiatives on a basis of value-addiveness across a multitude of functions, investments and activities that create the highest return over time. For most dental practices, critical priorities for capital allocation entail effective appointment booking systems, efficient patient follow-up procedures, accurate invoicing mechanisms, and reliable material purchasing processes. Because these issues have significant effects on patients and also on the overall finances of the practice, these aspects of care are important. Moreover, practices that run in parallel and share unchanged financial structures can offer a fuller and more straightforward view of the revenue impacts associated with those choices. By understanding these forces, the practitioners can make the decision that will support their business operations and increase the profitability in the future in health care, and to build a sustainable growth within its competitive environment [18, 19, and 20]. The decision for investments in healthcare typically has to do with whether the firm will fund these investments from retained earnings, external sources of funding, or through personal investments—each of which comes with specific risks. Many practitioners establish mixed clinics or multi-clinic groups due to certain financial opportunities in the form of substantive investments and attainable fees—all things required for continued growth in the healthcare industry—but others operate separate, semi-independent single-service clinics, with only a robust system of accounting-information exchange being in place. The higher the risk entailed with each investment type, the greater the value that professional services can potentially provide and create. The relationship between risk and potential value is important for making informed investments in healthcare [21].

4.9. Data Governance, Security, and Compliance

Accounting Information Systems (AIS) utilizing cost, revenue, workforce, and supplies analytics provide an illustration of resource management in practice, given that critical AIS capabilities are interrelated to the clinical and administrative workflows of a practice within the dental environment. However, the level of influence from the impact of AISs on resource management can be variable depending on how AISs manage information flow between clinical and administrative data, how they respond to a practice's specific configuration and the type of change—incremental or transformational—and when it comes to change [22]. Such a system could make a contribution through providing instances of a system to an understanding of the significance of the system that is responsible for resource administration, the spatial and organizational structure of practices that supply an AIS resource, as well as the configuration of the AIS in terms of, for instance, equipment, inventory, billing and clinical modules related to different forms of resource management functions [23]. Because dental practices tend to articulate limited policies on the

acquisition of necessary equipment, vital supplies, and suitable workforce, they are often unable to analyze the underlying economic and organizational impacts of their resource allocation decisions to gain a full understanding of the relevant implications. But these practices are particularly aware of the complexities of the revenue cycle because they need to guarantee regular movement of capital to keep running. So, each type of expenditure can be finely tied to production levels, based on the historical activity levels of the practitioners[24,25]. With the application of an Accounting Information System (AIS), clinical resource management can be successfully improved in at least two fundamental ways. One, a system can bring about a necessary increase in the provision of suitable stock and personnel of the requisite equipment to facilitate effective clinical activities; and secondly an accounting system (AIS) can achieve this by adjusting billing systems, collections systems, all to make a methodical invoice management to bring suitable and timely cash inflows, thus supporting the business' financial vitality.

4.10. Implementation Challenges and Best Practices

Accounting information systems (AIS) serve as key computing tools that play an integral role in the management of financial information while strategically utilizing a wide range of enterprise resources. These systems work to enable the accounting function to process transactions and report to management on transactions via reliable traditional operating processes, including precise recording of receipts and payments. This process of moving away from a manual space to an entire integrated system, not only improves the operating capability of the solution, but also enables a dental clinic to keep a more dynamic operational environment under control in a highly effective and efficient way. It is this transition which is necessary for increasing productivity overall and ultimately financial accuracy in the organization. The economic impact of AIS cannot be over-emphasized in any industry, particularly the high-value sector of health care. The world's health care system in particular is facing a number of challenges posed by an ageing population on the rise, matched by increasing demands for quality care. The severity in health conditions like diabetes, obesity, hypertension, and high cholesterol levels severely affects the economy, as they directly contribute to ever-increasing medical bills incurred to treat these diseases. Healthcare service providers are severely affected when the service is performed manually, using low technology or operating in a blunt state, and that can limit efficiency and effectiveness. One particular challenge makes a small organization an frontline player in an industry where innovation and quality is key. And as dental practices are directly involved in the management and treatment of the described health problems, AIS can be a key enabler to generate considerable growth and prosperity in this industry, changing the delivery of services, as well as the efficiency of patient care [2, 26, 27].

5. Case Studies in Dental Clinics

Dental practices have various names and designs, e.g., single dentist, polyclinic, multi-specialty, group practice, and network with chain style. Clinics with multiple physicians provide wider alternatives for patients. Various approaches have been applied to enhance clinic efficiency, including computer-aided design and computer-aided manufacturing technology, tracer technique, guest and employee satisfaction surveys, and statistical and simulation techniques [28]. A preliminary model revealed a high degree of collaborative and interactive work among dentists and dental assistants. Dental clinic transactions are very complex and involve multiple items and conditions. A well-designed accounting information system may reduce unnecessary duplicated work, lead to time saving, assist call systems, and improve overall efficiency [29].

5.1. Small Independent Practices

Many small independent dental clinics do not use an accounting information system (AIS). Instead, they operate almost exclusively with manual records on paper. Each dentist therefore only sees a limited number of patients per unit of time. Expiry dates on medications and consumables are often overlooked, leading to waste. Holistic reporting of key performance indicators (KPIs) for actionable decision support is lacking. Small independent clinics oriented toward

quality can benefit from a solution that is easy to use, inexpensive, integrates with routine workflow, and helps to organize scattered papers [30]. Some small independent practices still follow a traditional approach where each dentist utilizes the data capture and office management tools familiar from their previous employment. Each dentist therefore only sees a limited number of patients per unit of time because no working documents are generated and office follow-up is weak. Examination costs are generally unitemized, and a formal negotiated payout with medical insurance is generally not requested. This untapped potential results in lost revenue. To reverse this trend, two types of simple software solutions are available at low cost: a spreadsheet-oriented multi-tabbed database or a pre-packaged software tool that interfaces easily with leading general management tools. Such software raises the level of controls on supplies. For each product group, the average monthly rate of consumption can also be tracked. If the trend rises above a certain threshold, an alert is generated [31]. Stock levels can be kept in view, and only the supplier offering the lowest price buys general supplies. A program is also available to scan the bar code of purchased products into a stock file to prefill invoicing upon entering the bar code of a sold product. Several dentists in a group practice are generally reluctant to adopt a formal multi-branch system since they remain attached to an informal approach where each office functions as an autonomous clinic without links to governing or costing data pertaining to the other branches [30]. Centralized staff and training are more readily available when AIS is shared across installations, and dependence on the proprietary format of a single software vendor is reduced. Staff and equipment are now more widely available, making the learning curve faster [32]. Given the need to follow-up billing and collection, a simplified AIS is introduced to realize gains on the audit trail of delivered services. Activity-based costing is also gradually adopted based on a limited number of activity-centers related to types of professional services provided. Delays in certain services extend the average time between visits and thereby can trigger loss of patients in the practice. Overall, revenue growth and cash flow stabilization fostered gradual investment in an enhanced decentralized stable multi-clinic accounting management [27].

5.2. Group Practices and Multi-Clinic Networks

Group dental practices and networks of clinics require specialized principles for their accounting information systems to optimize resource management, enable shared analytics, and facilitate uniform administration across sites. Clinics in a multi-site arrangement perform a subset of collaborative activities, including shared staff, similar workflows or activities, and centralized analytics to produce comprehensive, standardized performance reports [29]. Centralized decision support allows performance data to be evaluated and decisions made at the group level, provided the clinics involved adhere to sufficient commonality in operations. Multi-site systems for dental clinics must therefore be capable of centralizing information across multiple locations, where AIS measurements also tend to scale with the organization's broader footprint [2]. Grouping enables systems that cover multiple sites and enables centralized analytics at the group level. Enhanced dental clinic configurations enable group-level shared analysis to identify best practices and emerging concerns, and readily available consolidated accounting information facilitates resource allocation among locations. Specific opportunities to optimize and control resources at the group level encompass capital spending, asset and equipment purchases, supplier selections, personnel and labor management, and office-leasing decisions [24].

6. Methodological Approaches for Evaluating AIS Impact

The literature on econometric effects of accounting information systems (AIS) on resource management in dental clinics should be tested empirically to unravel the conflicting theoretical arguments and open up new horizons for the analysis. Several methodological avenues remain open, using tools for data collection and analytical framework use. Direct observation or a questionnaire-based survey provide different paths for documenting potential economic change in dental clinics [31 , 32].By conducting retrospective interviews with owners, managers, or accountants of dental practices precipitating an AIS implementation, scholars may compile statistics, economic records, and statements characterizing pre- and post-implementation adjustment. Alternatively, financial control and accounting-oriented functionality may stand out as significant accounting features of AIS [building on insights from]. Tuya & Fletcher

(2019) offer a pertinent study focusing on the implementation of accounting information systems as a formal remedy for regulatory compliance within an electrical contracting organization. An estimated implementation intention comprising the scope, timing, budget, features, and perceived importance underpinned an audit of assorted accounting features and their degree of formalization. On the organizational side, associated settings encompassed regulations—to comply with tax laws, workplace safety, money laundering, registration of tenders, and retention of records; previous environment (post-purchase decisions in minor transactions); and intuitive management perceptions. On the data-processing side, concern arose mainly over retrospective access, with issues surrounding discretion and guidance of preparatory templates [33]. The anticipated impact on receipt-writing formalization orientation remains highly uncertain, and the review abstains from a conclusion on the AIS-based proposal within the ample preparatory material indicative of doubt regarding its impropriety. Frameworks such as this approach the depiction of centre accounts and transferable account groups designated in transactions, while modelling structures for educational purposes may equivalently emerge. Examination of reflective and non-reflective impacts spurs interest, yet minimization of influence distortion via the adoption of approach-oriented foci prevails as the main objective in modelling [16].

7. Results

The objective of this study is to evaluate a certain amount of health clinics' economic and financial performance in combination with their operational characteristics and AIS use, by utilizing descriptive statistics and multiple linear regression models to identify the factors that contribute the most to the overall performance improvement. The results allow a quantitative characterization of the sample structure (type of clinic, location, size, staff experience) with various indicators of economic efficiency, innovation, and return on investment, and then deductively test how each one of these dimensions contributes to the interpretation of the clinic's "Macroeconomics class".

Table 1: The Descriptive statistics of variables of characteristics of clinics and economic performance (averages, standard deviations)

Variable	Mean	SD	Min	Max
Clinic_ID	38.00	21.79	1.00	75.00
Clinic Type	1.51	0.74	1.00	3.00
Location Type	2.12	0.85	1.00	3.00
Years of Experience	2.64	1.36	1.00	5.00
Employees	1.73	1.11	1.00	4.00
Patients per Month	40.60	12.28	16.00	60.00
AIS Usage Level	1.09	0.77	0.00	2.00
Resource Allocation	3.46	0.89	2.05	4.94
Economic Productivity	3.63	0.81	2.16	4.99
Financial Sustainability	3.42	0.89	2.04	4.99

Economic Efficiency	3.50	0.80	2.07	4.94
Innovation and Growth	3.51	0.89	2.01	4.99
Economic Barriers	3.62	0.81	2.01	4.99
ROI	23.99	11.37	5.50	43.40
Total Economic Score	3.52	0.36	2.34	4.21

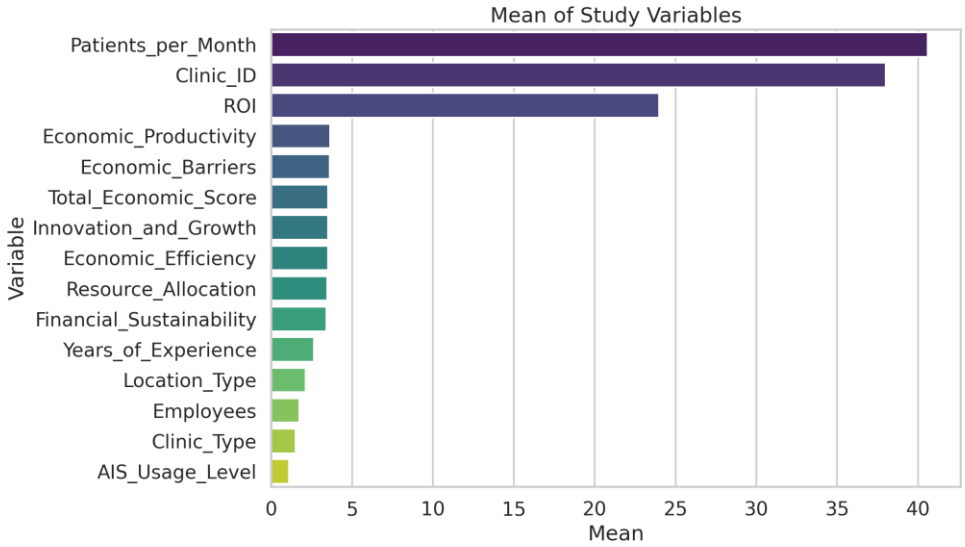

Figure 1: the Mean Values of Study Variables shooing in Horizontal Bar Chart

The descriptive statistics presented give an overview of a health clinic sample, where it can be noted that the average clinic identifier (Clinic_ID) is 38.00, its standard deviation is 21.79, its range of 1-75, which highlights the wide variety of clinics contained within the sample, it needs no explanation for the average clinic type which is 1.51, its deviation is 0.74 while its range of 1-3 suggests that most clinics own classifiers in general and basic specialty. Regarding the location type, it scores an average of 2.12 with a deviation of 0.85, indicating a clear focus on secondary sites (semi-urban or rural), followed by an average years of experience of 2.64 with a 1.36 deviation of 1-5, implying that the clinic has an increasing number of experienced and emerging clinics, where the average number of employees is 1.73 with a 1.11 deviation of 1-4, implying an organizational structure in general is smaller. The average patient month number (Patients per Month) is 40.60 with a deviation of 12.28 between 16 and 60, which indicates average workload from demand in both areas and also the level of AIs usage (AIS Usage Level) = 1.09 with a deviation of 0.77 from 0 to 2 indicates that depending on the patient (like ADS), AIS can be used. Regarding the economic indicators, resource Allocation (Resource Allocation) on average 3.46 (deviation 0.89 ranged from 2.05 to 4.94), Economic productivity (Economic Productivity) 3.63 (deviation 0.81), Financial sustainability (Financial Sustainability) 3.42 (deviation 0.89), Economic efficiency (Economic Efficiency) 3.50 (deviation 0.80), Innovation and Growth (Innovation and growth) 3.51 (deviation 0.89) and Economic barriers (Economic Barriers) 3.62 (deviation 0.81) - all on a scale of around 1-5 indicating moderate dispersion and thus a good economic performance for the region, which is a good enough development direction which can be improved upon in the future. Lastly, average ROI is 23.99%, with a deviation of

11.37 between 5.50 and 43.40%, and cumulatively the economic score (Total Economic Score) is 3.52 with a deviation of 0.36 from 2.34 to 4.21 and this composite indicator summarizes the overall performance of clinics, indicating room for improvement under the structure and economic heterogeneity in the sample.

Table 2: the Economic and Financial Performance that Indicators by a Clinic Type

Clinic Type	AIS Usage Level	Resource Allocation	Economic Productivity	Financial Sustainability	Economic Efficiency	Innovation And Growth	ROI	Total Economic Score
1	1.06	3.36	3.53	3.42	3.58	3.47	25.3	3.48
2	1.31	3.56	3.86	3.53	3.44	3.75	22.23	3.63
3	0.91	3.75	3.71	3.21	3.26	3.33	20.83	3.56

A comparative analysis of the three clinics is given based on their economic and other operational indicators, the first clinic indicates a low use of AIS (1.06) with strong resource allocation (3.36), high economic productivity (3.53), balanced financial sustainability (3.42), good economic efficiency (3.58), moderate innovation and growth (3.47), and high return on investment (25.3%) which leads to a comprehensive economic score of 3.48, indicating the high overall performance regarding digital efficiency and resources utilization to reach sustainable returns. The second clinic reveals a greater number of AIS (1.31) favoring a high resource allocation (3.56) and a high economic productivity score of 3.86 as a basis for its score as well as the factors of financial sustainability (3.53), efficiency (3.44) and innovation (3.75), with an overall score of 3.63 points despite the declining ROI of 22.23%, thus reflecting an approach of utilizing digital innovation for the gain of growth in the long run which does not generate immediate returns. The third clinic, however, has the lowest AIS utilization (0.91) and maximum resource allocation (3.75), but lower productivity (3.71), low financial sustainability (3.21), efficiency (3.26), innovation (3.33) and return (20.83%) that leads to total score of 3.56, indicating difficulty to convert high resources into economic efficiency, possibly resulting from poor digital integration or operational barriers. In summary, this comparison shows that there is a positive relationship between level of AIS use and innovation and efficiency indicators, with the second clinic obtaining the most overall points attributed to a balance of digitized and productive process, and the third clinic with sustainability pressure requiring technology improvement strategies to optimize returns and efficacy within the health industry.

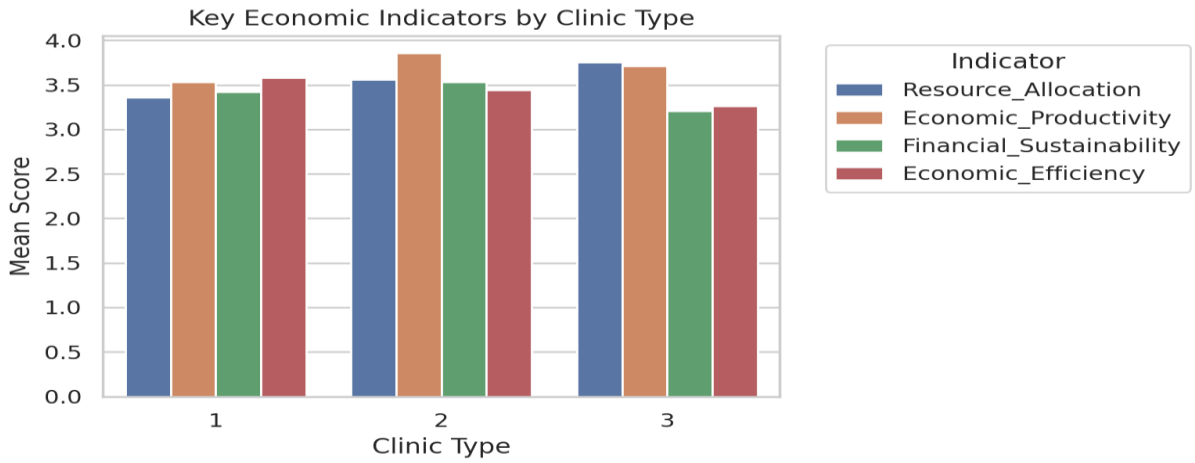

Figure 2: the Differences in the main economic indicators dependent on the type of clinic

Table 3: the Average of economic indicators by the level of use of the Accounting Information System AIS

AIS Usage Level	Resource Allocation	Economic Productivity	Financial Sustainability	Economic Efficiency	Innovation and Growth	ROI	Total Economic Score
0	3.33	3.77	3.67	3.73	3.67	24.21	3.6
1	3.53	3.55	3.38	3.51	3.37	26.54	3.51
2	3.48	3.63	3.28	3.33	3.55	20.9	3.48

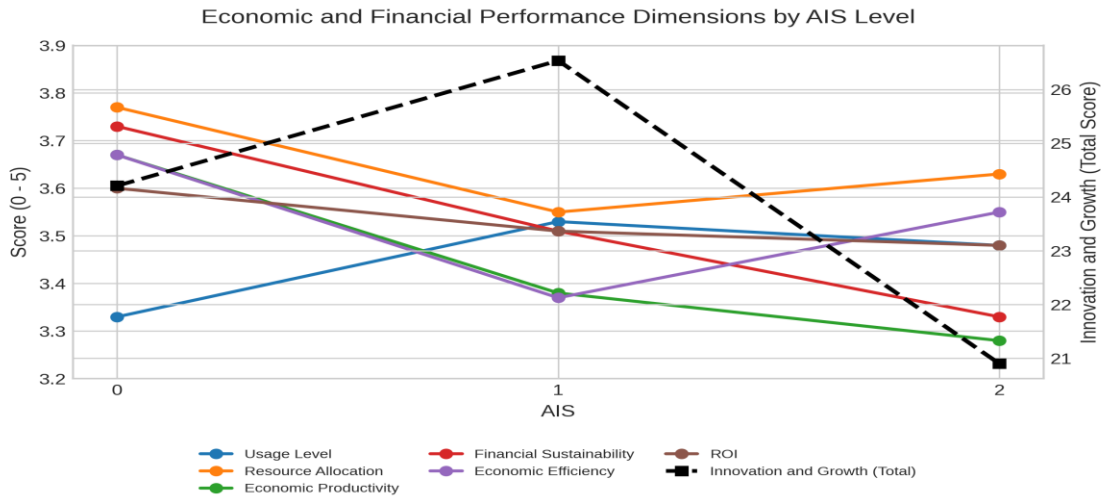

Figure 3: the Economic and financial performance dimensions by AIS level chart

It is observed that the extent of utilization of the AIS system is related to different economic and financial performance, while the non-usage level AIS=0 the average economic performance is 3.60 for all the AIS with 3.77 resource allocation, 3.67 economic productivity, 3.73 financial sustainability, 3.67 economic efficiency and 24.21 ROI which demonstrate stable performance and good return on investment with low dependence on the digital systems as the indicators. At the average level of use AIS=1 the level of innovation and overall growth increases to 26.54 with the slight increase of system utilization to 3.53, but the macroeconomic average drops to 3.51 with the decrease in resource allocation (3.55), productivity (3.38), financial sustainability (3.51) and efficiency (3.37), as that would mean that the implementation of the system at a transition stage might give rise to adaptive cost or implementation challenges, reducing short-term efficiency despite the enhanced innovation. As for the high level of use AIS=2 the average economic performance level is stable at 3.48 with 3.63 resources, 3.28 productivity, 3.33 sustainability and 3.55 efficiency and falls to 20.90 and the lowest level of innovation and growth as well as the lowest level of return on investment indicate that with a high level of economic uses, without appropriate organizational and financial alignment, it may result in investments with heavy burdens or increasing operational complexity that puts short-term pressure on profitability and innovative capacity. Taken together, these patterns reveal a non-linear relationship between the level of AIS use and economic indicators which non-use or transitional use provides adequate economic returns with a need for extensive operational design and financing model reorganization if sustainable gains in efficiency and return are to be achieved as a result of digital investments.

Table 4: the multiple linear regression model of determinants of macroeconomic performance of clinics

Predictor	**B**	**SE**	**t**	**p**	**Beta**
Intercept	0.572331	0.15831	3.615248	0.000576	
AIS_Usage_Level	0.004245	0.021564	0.19686	0.844533	0.009197
Resource_Allocation	0.173	0.018423	9.390493	7.68E-14	0.432636
Economic_Productivity	0.172591	0.020703	8.336363	5.96E-12	0.393505

Financial_Sustainability	0.153929	0.018712	8.226413	9.4E-12	0.38417
Economic_Efficiency	0.147901	0.021094	7.011631	1.44E-09	0.332472
Innovation_and_Growth	0.197821	0.018259	10.83437	2.22E-16	0.491199
ROI	-0.00069	0.001487	-0.46725	0.641838	-0.02209

This regression model shows that overall economic performance of the clinic is chiefly determined by five significant predictors: resource allocation, economic productivity, financial sustainability, economic efficiency, and especially innovation and growth, all of which have positive and statistically significant effects. AIS usage level and ROI, however, do not have a meaningful direct impact in this model because their effects are very small and not statistically significant, so they do not add much explanatory power once the key economic dimensions are included.

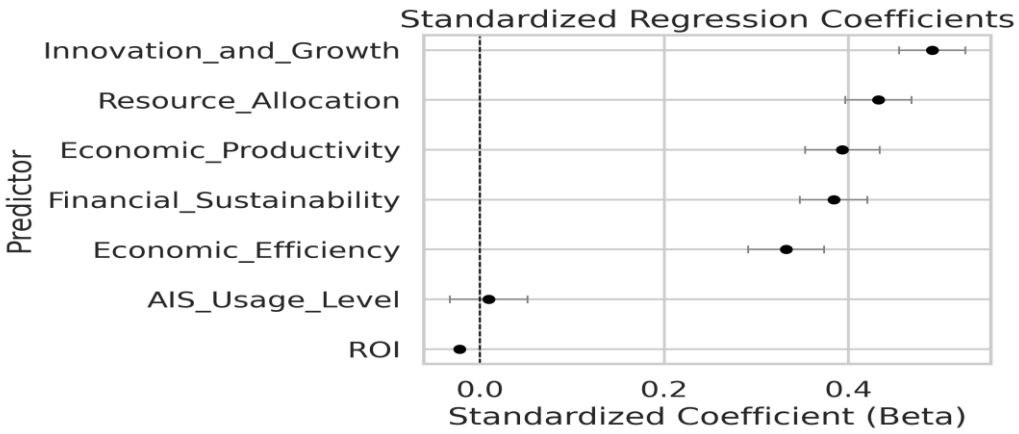

Figure 4: the standard regression coefficients of predictor variables in the interpretation of macroeconomic performance

The plot showing standardized regression coefficients (Beta) of the predictors is as follows: Innovation and Growth exerts the greatest positive influence with respect to the outcome, then we have Resource Allocation, Economic Productivity, Financial Sustainability and Economic Efficiency, each having quite large positive Beta. AIS Usage Level and ROI appear near zero on the horizontal axis, proving that they have small effects as compared to the other predictors and agree with their non-significant p-values.

Statistic	Value
R	0.931
R^2	0.866
Adjusted R^2	0.852
F(7, 67)	61.83
p	< 0.001

Table 5: the Measurements of the suitability of the multiple regression model for the macroeconomic presentation of clinics

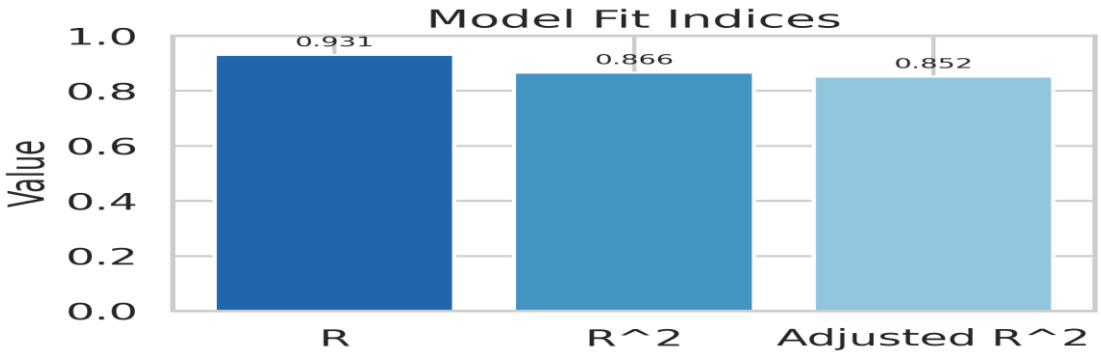

Figure 5: the Pointers suitability of the macro regression model for economic performance

The regression results show a strong linear relationship between the independent variables and the dependent variable; correlation coefficient R=0.931, indicating a high binding strength, while the coefficient of determination is R^2=0.866, showing that 86.6% of the variation in the dependent variable can be explained by the seven variables in the model, and the adjusted coefficient of determination indicates R adj^2=0.852, showing that the explanatory power remains high even after controlling for the number of variables and the sample size, which means that most included variables give their real part in the prediction, and the value of Fisher statistic F(7,67)=61.83 with significance p<0.001 shows that the model as a whole is statistically significant to a very high degree, i.e., there is a very low chance that these findings would be produced via chance in a society where there is no genuine relation between the independent variables and the dependent variable. Accordingly, the model can be argued as robust and academically appropriate in the analysis of the phenomenon being studied subject to fulfillment of the assumptions of multiple linear regression of linearity and independence of the residuals, homogeneity of variability and absence of any sharp multiple correlation of the independent variables.

8. Discussion

Descriptive statistics also reveal a clear gap among the types of clinics in terms of scale, experience and number of patients per month; however, medium–high economic efficiency, sustainability and innovation are observed, consistent

with the literature that suggests that small and medium-sized healthcare facilities can achieve good performance if they properly direct resources and organize internal processes, even in contexts of limited resources [34]. The gradation of scores of economic indicators (between approximately 3.4 and 3.6 on a 5-point scale) with moderate standard deviations indicates an entirely heterogeneous operational climate, but it is not chance; at least it is due to a common economic "business model", which the differences among clinics have to be based on, also emphasized by studies examining the efficiency of primary hospitals and primary care in developing environments [35]. The outcome of the regression analyses also proves that the total economic performance of the clinic is primarily determined by five related dimensions: resource allocation, economic productivity, financial sustainability, economic efficiency, innovation and growth; the typical regression coefficients of those five are very high, positive, statistically significant and operationally functional, which demonstrates that these are the principal "value drivers" in the health business model. It is closely in line with the theory of healthcare economics, that transformation of resources into health and financial outputs in healthcare depends on enterprise's ability to organize its operations, control costs, achieve a balance of quality, cost and long-term sustainability, rather than on one input in isolation[36].

In comparison, the model is found not to have a significantly increased direct impact of AIS use and ROI, since their coefficients are almost null and do not provide an indication to show that AIS and ROI have a direct impact following the core economic dimensions introduction; it passes through the upgrading of allocation mechanisms, productivity and innovation or through an indirect effect (passing from the level of overall degree). This is in line with other evidence of digital transformation in healthcare, where systems do not automatically lead to financial gains, unless the process redesign of technology and the establishment of a data-based culture are complemented within the organization and the structure; otherwise, it becomes a cost burden and an operational complexity in the short term[37]. The non-linear relationship of AIS usage and performance indicators (zero, medium, high) also provides an indication for an "optimal point" of Technology when excessive digital technology (as opposed to organizational and funding readiness) induces a short-term decline of efficiency and return, as has been described many times in the literature of the learning curve of electronic records and clinical information systems. Methodologically, the model's high fit values reflect (for example $R = 0.931$, $R^2 = 0.866$, and $R\ adj^2 = 0.852$) and test F significantly suggest that there is a high linear structure between the explanatory variables and the result: it confirms the validity of this analysis, allowing a model to account for differences between clinics in terms of the assumptions about linearity of the model, it also indicates the ability of the model to produce results. Despite this, these findings were limited by sample context and design; the lack of other structural variables (e.g., ownership type, funding decisions, and comprehensive clinical quality indicators) suggests that some of the unexplained variability might be attributed to institutional or organizational events not factored into the model and has been called for in the health performance assessment literature of longitudinal and multilevel follow-up studies [38].

9. Conclusion

The results showed that upgrading the economic performance of health clinics depends largely on the efficiency of resource allocation, raising productivity, enhancing financial sustainability, and fostering innovative capacities that structure and support work, rather than merely the level of using information systems or one's short-term financial return. These patterns also inform us that investing in AIS should be integrated into a broader transformation approach, where processes must be redesigned, human capital built which is capable of leveraging data to a greater degree, and financial and organizational governance processes need to ensure that digitization can be translated into longer-term increases in efficiency and returns, and not just an added cost or variance in performance. These patterns also give us insight that investment in AIS should be part of a more holistic transformation strategy.

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