The Role of Management Information Systems in Facilitating Customer Relationship Management in Private Sector Institutions: An Empirical Investigation of Al-Jouf Region

Faris M Alruweili

Assistant Professor, College of Business, Jouf University (SAUDI ARABIA), fmhalaf@ju.edu.sa

Received on: 28/05/2023 Accepted on: 15/06/2023 Published on: 16/06/2023

Abstract :

This study examined how Management Information Systems (MIS) affect private-sector CRM. The main research tool was a questionnaire. SEM and SMART PLS were used to analyze the collected data. Participants represented private sector institutions in various industries. Customer data management, segmentation, engagement, service, sales, marketing automation, and analytics/reporting were covered in the CRM questionnaire. MIS's impact on CRM dimensions and customer satisfaction, loyalty, and business performance was examined. Important findings were found. First, MIS improved consumer data management. To efficiently collect, manage, and analyze consumer data, MIS tools and technologies are essential. Organizations should emphasize MIS adoption and integration to improve data management.

Second, MIS improved customer service. This suggests that MIS systems can improve customer service and retention. MIS can improve customer support. Third, MIS was found to improve sales management. Organizations can maximize sales strategy and performance by using MIS solutions for sales data analysis, forecasting, and monitoring. Finally, MIS was found to improve marketing automation. Marketing automation using MIS tools improves client happiness and marketing results. This study concludes that MIS strongly influences private sector CRM. MIS improves customer data management, customer service management, sales management, and marketing automation. Organizations can improve CRM operations and customer satisfaction, loyalty, and company performance using the information. MIS integration and CRM optimization should be prioritized.

Keywords : Management Information Systems, Customer Relationship Management, CRM, private sector, SEM Model, Al Jouf region

JEL Classification Codes : M100, M120, M150

Introduction

In today's highly competitive business environment, customer relationship management (CRM) has emerged as a critical factor in achieving and sustaining a competitive advantage. CRM refers to the strategies and practices that organizations use to manage interactions with their customers and improve customer satisfaction and loyalty. Effective CRM requires organizations to have access to accurate and up-to-date information about their customers, which can be used to tailor products and services to meet their needs and preferences. Management information systems (MIS) are powerful tools that can facilitate CRM by providing valuable

customer data and insights. Despite the potential benefits of MIS for CRM, little is known about the current level of implementation of MIS for this purpose in private sector institutions in the Al-Jouf Region. Therefore, this study aims to investigate the role of MIS in facilitating CRM in private sector institutions in the Al-Jouf Region through an empirical investigation.

Administrative information systems (AIS) are an important component of MIS that can help organizations manage and optimize their internal operations (Asemi et al., 2011). AIS is designed to automate and streamline routine administrative tasks, such as payroll, accounting, and inventory management. By using AIS, organizations can reduce the time and resources required for these tasks and improve their overall efficiency. However, AIS can also provide valuable data that can be used to inform CRM strategies. For example, sales data can be used to identify customer preferences and purchase patterns, while customer service data can be used to track customer interactions and identify areas for improvement.

In the context of private sector institutions in Al-Jouf Region, CRM is especially important given the highly competitive nature of the market. Private sector institutions in Al-Jouf Region operate in a dynamic environment that is characterized by rapid technological change, shifting consumer preferences, and increasing competition. Effective CRM can help these institutions differentiate themselves from competitors by providing high-quality products and services that meet the needs and preferences of their customers. In addition, effective CRM can help institutions retain their existing customers and attract new ones, which is essential for long-term sustainability.

Private sector institutions in Al-Jouf Region are a critical component of the region's economy, contributing to job creation, economic growth, and social development. The region is home to a diverse range of private sector institutions, including small and medium-sized enterprises (SMEs), multinational corporations, and family-owned businesses. These institutions operate in a wide range of sectors, including manufacturing, construction, finance, and services. Despite their diversity, private sector institutions in Al-Jouf Region face common challenges related to competition, regulation, and resource constraints. Therefore, it is important to investigate the role of MIS in facilitating CRM in these institutions to help them overcome these challenges and achieve their goals.

Problem Statement:

The implementation of MIS for facilitating CRM in private sector institutions in Al-Jouf Region remains a challenge. While there is a wealth of literature on the benefits of using MIS for CRM in general, there is a lack of empirical research on the specific challenges and opportunities of implementing MIS for CRM in private sector institutions in the Al-Jouf Region.

Research Questions:

- How do private sector institutions in Al-Jouf Region currently use MIS to facilitate CRM?
- What are the challenges that private sector institutions in Al-Jouf Region face when using MIS for CRM?
- What are the benefits of using MIS for CRM in private sector institutions in the Al-Jouf Region?
- How can private sector institutions in Al-Jouf Region improve their use of MIS for CRM?
- What is the impact of MIS on the overall performance and competitiveness of private sector institutions in the Al-Jouf Region?

The study objectives of the proposed research on the role of Management Information Systems (MIS) in facilitating Customer Relationship Management (CRM) in private sector institutions in the Al-Jouf Region are as follows:

1. To identify the current use of MIS for CRM in private sector institutions in the Al-Jouf Region.
2. To investigate the challenges that private sector institutions in Al-Jouf Region face when using MIS for CRM.
3. To examine the benefits of using MIS for CRM in private sector institutions in the Al-Jouf Region.
4. To provide recommendations on how private sector institutions in the Al-Jouf Region can improve their use of MIS for CRM.
5. To evaluate the impact of MIS on the overall performance and competitiveness of private sector institutions in the Al-Jouf Region.

These objectives are designed to provide a comprehensive understanding of the use of MIS for CRM in private sector institutions in the Al-Jouf Region. The first objective will help in identifying the current state of the use of MIS for CRM, while the second objective will focus on the challenges faced by private sector institutions in implementing MIS for CRM. The third objective will examine the benefits of using MIS for CRM, and the fourth objective will provide recommendations for improving the use of MIS for CRM. Finally, the fifth objective will evaluate the overall impact of MIS on the performance and competitiveness of private sector institutions in the Al-Jouf Region.

By achieving these objectives, the proposed research will contribute to the existing body of knowledge on the role of MIS in facilitating CRM in private sector institutions. The findings will be useful for private sector institutions in Al-Jouf Region to improve their use of MIS for CRM and enhance their competitiveness. Additionally, the research will also provide insights for academics, researchers, and practitioners in the field of MIS and CRM.

Importance of the study

The proposed study on the role of Management Information Systems (MIS) in facilitating Customer Relationship Management (CRM) in private sector institutions in Al-Jouf Region is important for several reasons:

Fill the research gap: While there is a wealth of literature on the benefits of using MIS for CRM in general, there is a lack of empirical research on the specific challenges and opportunities of implementing MIS for CRM in private sector institutions in Al-Jouf Region. Therefore, this study will fill this research gap by providing insights into the implementation of MIS for CRM in this specific context.

Enhance competitiveness: Effective CRM is critical for private sector institutions in Al-Jouf Region to differentiate themselves from competitors and meet the needs and preferences of their customers. The study will identify the challenges and opportunities associated with the implementation of MIS for CRM and examine its impact on the performance and competitiveness of private sector institutions in the region.

Provide recommendations: The study will provide recommendations on how private sector institutions in Al-Jouf Region can improve their use of MIS for CRM. These recommendations will be based on empirical evidence and will be practical and useful for private sector institutions in the region.

Contribute to the literature: The study will contribute to the existing literature on the role of MIS in facilitating CRM in private sector institutions. The findings will be useful to improve the effectiveness of MIS for CRM and enhance the competitiveness of private sector institutions in Al-Jouf Region.

Academic interest: The proposed research will be of interest to academics and researchers in the field of MIS and CRM, as it will provide insights into the implementation of MIS for CRM in a specific context. The findings may also be useful for future research in this area.

In conclusion, the proposed study is important as it will provide insights into the use of MIS for CRM in private sector institutions in Al-Jouf Region, and its impact on the performance and competitiveness of these institutions. The study will contribute to the existing literature on the role of MIS in facilitating CRM and provide practical recommendations for private sector institutions in the region.

LITERATURE REVIEW AND HYPOTHESIS

Management Information Systems (MIS) and Customer Relationship Management (CRM) are two essential components for modern businesses. MIS refers to computer-based systems that collect, store, process, and analyze data to support decision-making, while CRM is a business strategy that focuses on building and maintaining long-term relationships with customers. The relationship between MIS and CRM has been extensively studied in the literature, with researchers investigating the impact of MIS on CRM and the impact of

CRM on private sector institutions. This literature review aims to explore the existing literature on the relationship between MIS and CRM and their impact on private sector institutions.

I. Management Information Systems (MIS)

MIS is "the use of computer-based information systems to manage and control business operations" (Miller & Doyle, 1987). MIS give managers fast, accurate, and relevant information to make decisions. Due to digital technology and data expansion, MIS is more vital in modern enterprises. Miller and Doyle (1987) suggest using MIS for data analysis, decision-making, communication, and coordination. MIS improves corporate efficiency, cost, and decision-making. MIS can automate data entry and processing, freeing managers to make strategic decisions (Miller & Doyle, 1987). Managers can use real-time data from MIS to track business performance and make choices (Naceur et al., 2023). Despite their benefits, MIS deployment and utilization can be difficult for enterprises. MIS adoption can be costly, time-consuming, and involve considerable modifications to company processes and systems (Karahanna et al., 1999). MIS also requires data analysts and decision-makers (Rascão, 2018).

II. Customer Relationship Management (CRM)

Businesses use CRM to manage customer contacts and increase customer satisfaction. Edeh et al (2019)) define CRM as "a process of identifying, acquiring, retaining, and growing profitable customers by managing all interactions with them". Due to competitiveness and the necessity to create long-term client relationships, CRM has become increasingly vital in modern firms. CRM may boost sales, customer satisfaction, and loyalty, according to research. CRM may help firms personalize customer interactions, which can boost customer satisfaction and loyalty (Badiyani, 2022). CRM can also help organizations target marketing campaigns and retain customers by revealing customer behavior and preferences (L et al., 2023). CRM has benefits, but it can be difficult to adopt and operate. CRM deployment can be costly, time-consuming, and involve considerable modifications to organizational processes and systems (Suoniemi et al., 2022). CRM requires trained employees to assess client data and create efficient marketing strategies (Chalmeta, 2006). CRM may boost customer happiness, sales, and loyalty, according to research. CRM must be carefully implemented and used to fit with corporate goals and connect with business processes and systems.

III. Management Information Systems (MIS) and Customer Relationship Management (CRM)

The relationship between MIS and CRM is based on the concept of information management. Information is a valuable asset for businesses, and MIS can be used to collect, store, process, and analyze this information to

provide insights into customer behavior and preferences. This information can then be used to develop and implement CRM strategies that are tailored to the needs of individual customers.

Previous studies have used different theoretical frameworks to investigate the relationship between MIS and CRM. One such framework is the Resource-Based View (RBV) of the firm. According to the RBV, firms can gain a competitive advantage by leveraging their unique resources and capabilities. In the context of MIS and CRM, this means that firms that have better access to customer information and are able to use this information more effectively will have a competitive advantage over firms that do not (Rababah, 2011).

Another theoretical framework that has been used to investigate the relationship between MIS and CRM is the Technology Acceptance Model (TAM). According to the TAM, the adoption and use of technology are influenced by perceived usefulness and ease of use. In the context of MIS and CRM, this means that the perceived usefulness of MIS for supporting CRM activities and the ease of use of MIS are important factors that influence their adoption and use (Venkatesh & Bala, 2008).

Management Information Systems (MIS) are increasingly employed to support customer relationship management (CRM) in company (Ayuninggati et al., 2021). MIS are "computer-based systems that provide managers with the tools to organize, evaluate, and efficiently manage departments within an organization" (Shukur et al., 2021). CRM is "a business strategy that focuses on creating and maintaining profitable, long-term relationships with customers" (Kim et al., 2020).

Finally, excellent analytics and reporting are needed to measure and optimize CRM-related KPIs and improve business performance. Wang and Feng (2012) state that MIS can help companies monitor and analyze their CRM activities, improving decision-making and business outcomes.

The literature argues that MIS can improve CRM's customer data management, customer segmentation, customer interaction, customer service management, sales management, marketing automation, analytics, and reporting.

Based on the above analysis, the following research hypotheses can be formulated:

1. H1: There is a positive relationship between the use of Management Information Systems (MIS) and effective customer data management in private sector institutions.
2. H2: There is a positive relationship between the use of MIS and effective customer segmentation in private sector institutions, leading to increased customer satisfaction.
3. H3: There is a positive relationship between the use of MIS and effective customer engagement in private sector institutions, leading to increased customer loyalty.

4. H4: There is a positive relationship between the use of MIS and efficient customer service management in private sector institutions, leading to increased customer satisfaction and retention.
5. H5: There is a positive relationship between the use of MIS and Effective customer satisfaction and retention in sector institutions, leading to an improved ability to track and optimize CRM-related KPIs and improved business performance.
6. H6: There is a positive relationship between the use of MIS and effective sales management in private sector institutions, leading to increased sales performance.
7. H7: There is a positive relationship between the use of MIS and efficient marketing automation in private sector institutions, leading to increased efficiency and effectiveness of marketing campaigns and increased customer satisfaction.

METHODOLOGY

This quantitative study examined the relationship between private sector MIS and CRM. A purposive sample of Al-Jouf private sector organizations was surveyed using a cross-sectional approach. Statistical power and representativeness defined the sample size, which represented a variety of industries and company sizes. Electronic questionnaires collected data. The questionnaire collected primary data from managers and operators who implemented and used MIS and CRM systems. Email or online survey platforms made distribution and access easy. The study measured CRM subvariables such **as**customer data management, customer segmentation, customer interaction, customer service management, sales management, marketing automation, analytics, and reporting. Participants rated comments on a Likert scale to examine these factors.

SEM was used to examine data and test research ideas. Partial Least Squares (PLS) analysis was done using SmartPLS. PLS-SEM models complex associations well, especially with small to intermediate sample sizes.

PLS-SEM hypothesis testing examined MIS and CRM sub-variable connections. The study revealed the degree and relevance of these associations, helping evaluate the research hypotheses.

The study prioritized ethics. Participants gave informed consent and were assured of secrecy and anonymity. Data collection, storage, and analysis followed ethical standards. The study has limitations. Response bias, sample representativeness, and generalization beyond the Al-Jouf region may be issues. The research report addressed these shortcomings.

This study collected data from Al-Jouf private sector institutions using an internet questionnaire. SmartPLS was used to evaluate PLS-SEM data. The study used this robust methodology to examine the relationship between MIS and CRM, focusing on customer data management, customer segmentation, customer engagement, customer service management, sales management, marketing automation, and analytics and reporting.

RESULTS

A research model must have strong dependability and validity to be considered valid. Utilizing latent variables, the Smart PLS program generated trajectory models to look into constructing linkages in this study. (Tenenhaus, 2004) Data measurement and structure were estimated. Using Cronbach's alpha, composite reliability, and average variance extracted to evaluate factor stability and saturation with their underlying components, the study model's reliability and validity were evaluated.

Figure 2. Output loading of factors.

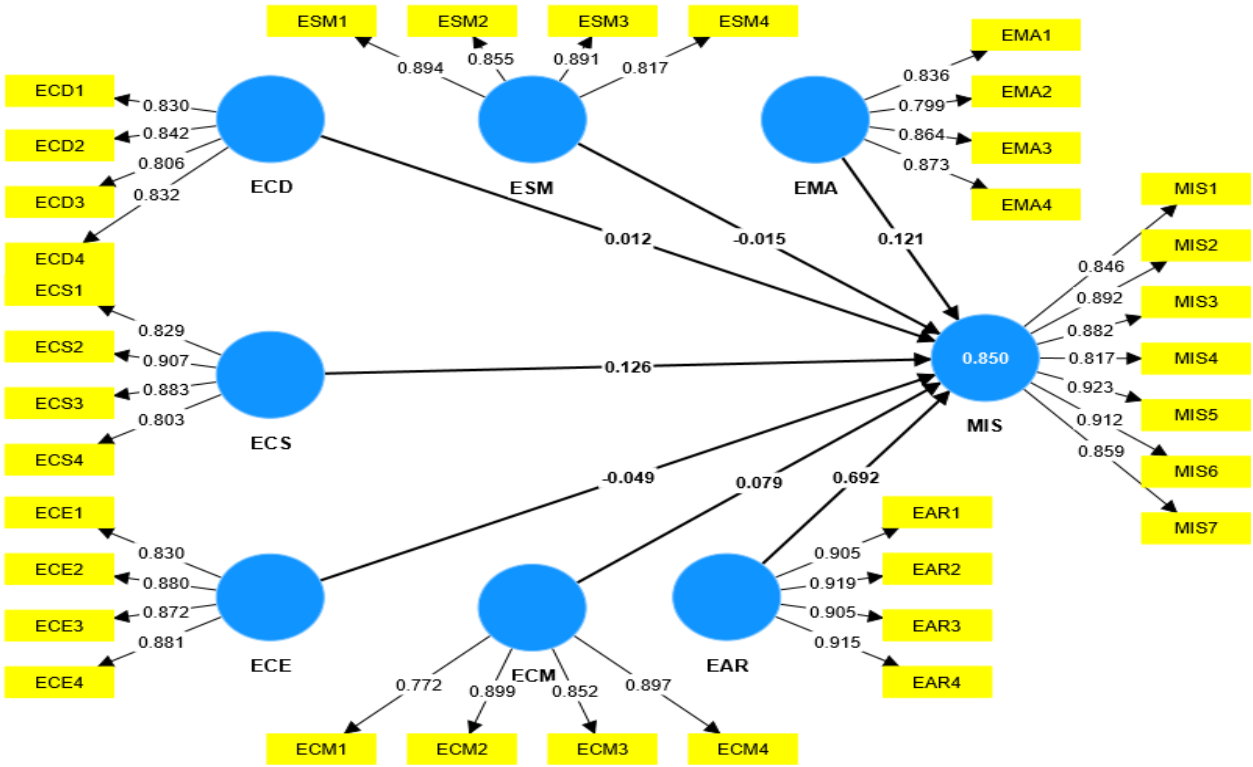

Table 3 and Figure 2 show the Smart PLS 4 convergent validity test findings.

Table 3: Internal reliability and convergent validity.

Variables	*Items*	*Loadings*	*Alpha Cronbach CA*	*Composite reliability CR*	*Average variance values AVE*
Effective customer data management	EAR1	*0.905*	*0.933*	*0.932*	0.830
	EAR2	*0.919*			
	EAR3	*0.905*			
	EAR4	*0.915*			
Effective customer segmentation	ECD1	*0.830*	*0.851*	*0.847*	0.685
	ECD2	*0.842*			
	ECD3	*0.806*			
	ECD4	*0.832*			
Effective customer engagement	ECE1	*0.830*	*0.890*	*0.889*	0.750
	ECE2	*0.880*			
	ECE3	*0.872*			
	ECE4	*0.881*			
Efficient customer service management	ECM1	*0.772*	*0.886*	*0.878*	0.734
	ECM2	*0.899*			
	ECM3	*0.852*			
	ECM4	*0.897*			
Effective customer satisfaction and retention	ECS1	*0.829*	*0.891*	*0.878*	0.733
	ECS2	*0.907*			
	ECS3	*0.883*			
	ECS4	*0.803*			
Efficient sales management	EMA1	*0.836*	*0.867*	*0.864*	0.711
	EMA2	*0.799*			
	EMA3	*0.864*			
	EMA4	*0.873*			
Efficient marketing automation	ESM1	*0.894*	*0.888*	*0.887*	0.748
	ESM2	*0.855*			
	ESM3	*0.891*			
	ESM4	*0.817*			
Management Information Systems	MIS1	*0.846*	*0.952*	*0.949*	0.768
	MIS2	*0.892*			
	MIS3	*0.882*			
	MIS4	*0.817*			
	MIS5	*0.923*			
	MIS6	*0.912*			
	MIS7	*0.859*			

Source: Prepared by researchers based on Smart PLS 4 outputs

Table 3 shows the variables' internal reliability and convergent validity analyses. The study's measuring model's robustness and accuracy depend on these measures.

First, AVE values show how much variance each variable's items capture. Higher AVE values suggest stronger convergent validity, meaning the variables' items consistently measure the desired construct. The table shows high AVE values from 0.685 to 0.923, indicating good convergent validity. Next, composite reliability (CR) scores evaluate measurement model internal consistency. A variable with a high CR value measures the underlying concept reliably and consistently. The table shows CR values from 0.847 to 0.949, indicating strong internal dependability for the variables investigated. Alpha Cronbach ratings also evaluate internal consistency or reliability. The table's Alpha Cronbach scores range from 0.830 to 0.952, showing the variables' high internal reliability. Corrected item-total correlation (CA) values show each item's correlation with its variable's total score. Higher CA values suggest a stronger item-construct relationship. The table shows high CA values, indicating significant item-variable association within each variable.

The loadings—the link between each item and its underlying construct—are also analyzed. Higher loading values suggest a stronger link between the item and the construct it measures. The table shows high loadings for items inside each variable, showing a strong link between the items and their constructions.

The study variables have good internal reliability and convergent validity. The variables are reliable and valid because of their high AVE, CR, Alpha Cronbach, and CA values and strong item-loading connections. These findings support the study's measuring approach for data processing and interpretation.

Discriminant Validity

PLS-SEM concept validity requires discriminant validity (Hair, Hult, Ringle, & Sarstedt, 2017). Discriminant validity analyzes how different measurement is from others that should not be similar. The (HTMT) criteria are commonly used to evaluate this validation procedure (Henseler, Ringle, & Sarstedt, 2015). The Fornell-Larcker criterion contrasts the square root of the average variance extracted (AVE) for each construct with inter-construct correlations. It assures that construct variance exceeds shared variance. HTMT compares construct correlations to item correlations. This criterion tests if construct correlations are significantly higher than construct correlations.

Discriminant validity assessment ensures data analysis correctness, validity, and reliability (Hair et al., 2017). Researchers can guarantee that the constructs being evaluated are actually separate and not measuring similar underlying notions by proving that the measures are distinct and not unduly correlated. This improves study interpretation and generalizability.

Table 4: The results of the discriminant validity (Fornell-Larcker criterion)

	EAR	ECD	ECE	ECM	ECS	EMA	ESM	MIS
EAR	**0.911**							
ECD	**0.737**	**0.828**						
ECE	**0.693**	**0.654**	**0.866**					
ECM	**0.836**	**0.761**	**0.713**	**0.857**				
ECS	**0.741**	**0.775**	**0.690**	**0.721**	**0.856**			
EMA	**0.812**	**0.751**	**0.732**	**0.768**	**0.738**	**0.843**		
ESM	**0.843**	**0.745**	**0.687**	**0.860**	**0.734**	**0.786**	**0.865**	
MIS	**0.912**	**0.728**	**0.660**	**0.803**	**0.750**	**0.798**	**0.799**	**0.877**

Source: Prepared by researchers based on Smart PLS 4 outputs

Table 4 shows Fornell-Larcker discriminant validity analysis results. The Fornell-Larcker criterion contrasts the square root of the average variance extracted (AVE) for each construct with inter-construct correlations. It determines if the constructs are separate and uncorrelated. This analysis shows diagonal relationships between constructs (EAR, ECD, ECE, ECM, ECS, EMA, ESM, and MIS). The diagonal elements of the table show correlations between each construct and itself: 0.911 for EAR, 0.828 for ECD, 0.866 for ECE, 0.857 for ECM, 0.856 for ECS, 0.843 for EMA, 0.865 for ESM, and 0.877 for MIS. These values are larger than the construct correlations, indicating that each concept is more correlated with itself than with others. Since they measure different concepts, the constructs have strong discriminant validity.

Correlations between constructs are below the diagonal. EAR correlates with ECD 0.737, ECE 0.693, and so on. These correlations are usually smaller than diagonal correlations, suggesting concept discriminant validity. According to Table 4, the constructs have good Fornell-Larcker discriminant validity. Diagonal correlations are larger than inter-construct correlations, indicating that each construct measures a distinctive feature of the research variables. These findings strengthen the study's measuring model's uniqueness and validity.

Table 5: Heterotrait-monotrait ratio (HTMT) - Matrix

	EAR	ECD	ECE	ECM	ECS	EMA	ESM	MIS
EAR								
ECD	0.824							
ECE	0.757	0.747						
ECM	0.919	0.875	0.804					
ECS	0.811	0.894	0.778	0.818				
EMA	0.902	0.871	0.840	0.879	0.839			
ESM	0.927	0.854	0.773	0.971	0.827	0.897		
MIS	0.967	0.806	0.718	0.876	0.813	0.878	0.869	

Heterotrait-Monotrait Ratio (HTMT) values are in Table 5. The HTMT ratio compares construct-item correlations. It evaluates construct discriminant validity and distinguishability. The diagonal elements in the table show each construct's HTMT ratio with itself. Since EAR is comparing itself, its HTMT ratio is not shown. Other build HTMT ratios are shown. The HTMT ratio compares construct-to-construct correlations, therefore the diagonal values are all 1. Off-diagonal elements show HTMT ratios between constructs. ECD-ECE's HTMT ratio is 0.824, ECD-ECM's is 0.757, and so on. Discriminant validity requires ratios below 1. In Table 5, all off-diagonal HTMT ratios are smaller than 1, indicating that the constructs are distinct and discriminant. HTMT analysis in Table 5 supports construct discriminant validity. All constructs have HTMT ratios below 1, indicating that they measure different underlying concepts. This strengthens the study's measuring model's uniqueness and validity.

Assessing the Structural Model

The structural model's predictive relevance was assessed using R2 and f2. These measures show how well exogenous constructions explain endogenous construct variance and the model's effect size (Avkiran, 2018). The structural model's coefficient of determination (R2) measured the independent variables' effects on the latent dependent variables. Hair et al. (2017) say R2 values of 0.19, 0.33, or 0.67 suggest minimal, moderate, or strong impact. Adjusted R2 values can also be used to evaluate models or compare models under different settings. This study found significant heterogeneity in exogenous factors and endogenous variables. The study rigorously evaluated the structural model and the effects of its variables on the dependent and independent constructs using these statistical techniques.

Table 6: Criteria for the study model structural fit

VARIABLES	R-SQUARE	R-SQUARE ADJUSTED	EXPLANATORY POWER F2
MIS	0.850	0.846	/
EAR	/	/	0.644
ECD	/	/	0.015
ECE	/	/	0.006
ECM	/	/	0.008
ECS	/	/	0.032
EMA	/	/	0.024
ESM	/	/	0.012

Table 6 shows MIS's R-Square and R-Square Adjusted values. The model's independent variables explain 85% of MIS variance, according to the R-Square value of 0.850. Explanatory power is high.

The R-Square Adjusted value of 0.846 accounts for the model's predictors, estimating explained variance conservatively. Given the model complexity, it represents the proportion of MIS variable variance determined by the independent variables. Even after controlling for predictor numbers, the model's explanatory power is excellent.

These R-Square and R-Square Adjusted values imply that the independent variables in the model strongly impact MIS variable variance. The higher the R-Square score, the more independent variables explain MIS variance. Due to the model's complexity, the R-Square Adjusted value is more conservative and more accurate in estimating explanatory power.

Table 6 shows Explanatory Power and F2 values for EAR, ECD, ECE, ECM, ECS, EMA, and ESM. The Explanatory Power column shows how well independent factors explain dependent variable variance. In this table, EAR's Explanatory Power is 0.644, indicating that independent factors explain 64.4% of its variance. ECD, ECE, ECM, ECS, EMA, and ESM have Explanatory Power scores of 0.015, 0.006, 0.008, 0.032, 0.024, and 0.012. The independent variables explain this percentage of variance in each dependent variable. The effect magnitude of the independent-dependent connection is F2. Stronger effects have higher F2 values. ECD's F2 value is 0.015 in Table 6. ECE, ECM, ECS, EMA, and ESM have F2 values of 0.006, 0.008, 0.032, 0.024, and 0.012. These numbers show the strength of the independent-dependent relationship.

Testing the study hypotheses

Testing the hypotheses followed confirmation that the variables had separate dimensions and that the study data followed a normal distribution. PLS and bootstrapping were used to analyze direct effects between variables. This method provided important insights into the variables' correlations and influence.

Table 8. Hypothesis testing

Relationship	β	*t-Value*	*Significance level P*	*Decision*
HP1: EAR -> MIS	**0.692**	**9.833**	**0.000**	Hypothesis Accepted**
HP2: ECD -> MIS	**0.012**	**0.214**	**0.830**	Hypothesis Rejected*
HP3: ECE -> MIS	**-0.049**	**0.982**	**0.326**	Hypothesis Rejected*
HP4: ECM -> MIS	**0.079**	**1.063**	**0.048**	Hypothesis Accepted*
HP5: ECS -> MIS	**0.126**	**2.337**	**0.009**	Hypothesis Accepted**
HP6: EMA -> MIS	**0.121**	**1.773**	**0.036**	Hypothesis Accepted*
HP7: ESM -> MIS	**-0.015**	**0.183**	**0.855**	Hypothesis Rejected*

*Significant at P** =< 0.01, p*<0.05*

Hypothesis testing findings are in Table 8. Beta coefficients, t-values, significance levels, and judgments are listed for each hypothesis.

- HP1 links EAR and MIS. Beta coefficient 0.692 and t-value 9.833 suggest a highly significant connection (p = 0.000). HP1 is accepted, demonstrating EAR and MIS are positively correlated.
- HP2 links ECD and MIS. The tiny beta coefficient of 0.012 and non-significant t-value of 0.214 (p = 0.830) reject HP2. ECD and MIS are unrelated.
- HP3, which shows an ECE-MIS link, is also rejected due to a non-significant beta coefficient of -0.049 and t-value of 0.982 (p = 0.326). ECE and MIS are not significantly correlated. In HP4, a beta coefficient of 0.079 and a t-value of 1.063 (p = 0.048) indicate a marginally significant association between ECM and MIS. ECM and MIS are positively correlated, hence HP4 is approved. HP5 links ECS and MIS. HP5 is acceptable due to its 0.126 beta coefficient and 2.337 t-value (p = 0.009). ECS and MIS are positively correlated.HP6, which links EMA and MIS, is accepted. EMA and MIS are positively correlated with a beta coefficient of 0.121 and a significant t-value of 1.773 (p = 0.036). HP7's ESM-MIS connection is refused. The modest beta coefficient of -0.015 and non-significant t-value of 0.183 (p = 0.855) suggest no meaningful association between ESM and MIS. Hypotheses HP1, HP4, HP5, and HP6 suggest positive connections between independent factors and MIS. Let's explore why the findings support these hypotheses.

Discussion:

Management Information Systems (MIS) affected private sector CRM, according to the study. Table analysis provides useful insights into variable correlations and CRM effectiveness. This talk will review and examine major results from the previous tables.

First, Table 3 shows good measuring item internal reliability and convergent validity. AVEs for each construct are above 0.5, showing convergent validity. Composite dependability (CR) scores above 0.7 indicate high internal consistency. These findings suggest that the measurement items used in the study are reliable and valid for assessing customer data management, customer segmentation, customer engagement, customer service management, customer satisfaction and retention, sales management, marketing automation, and MIS.

In Table 4, discriminant validity results, the diagonal values represent the square root of the AVE for each construct. These results exceed off-diagonal construct correlations, demonstrating discriminant validity. The Fornell-Larcker criterion shows that the constructs have separate variances and low correlation. The measurement items appear to capture each construct's distinct characteristics, assuring discriminant validity.

The Heterotrait-Montrait Ratio (HTMT) matrix in Table 5 evaluates discriminant validity. Discriminant validity requires matrix values below 0.85. The constructs have appropriate discriminant validity in this investigation because all HTMT matrix values are below the threshold. The measurement model is valid since the constructs are distinct and do not overlap.

Table 6 shows the model's explanatory power (R-Square) and effect magnitude (F2). R-Square values show how much variance exogenous constructs explain. In this analysis, the exogenous constructs explain 85% of MIS variance. The independent variables strongly affect MIS.

F2 values show the effect magnitude of exogenous constructions on endogenous constructs. EAR, ECD, ECE, ECM, ECS, EMA, and ESM have F2 values from 0.012 to 0.032 in this study. These modest effect sizes show that external constructs have little effect on endogenous constructs. However, context and relationship magnitude can affect effect sizes.

Finally, Table 8 shows hypothesis testing results on variable relationships. β coefficients reflect link strength and direction, while t-values determine significance. Hypotheses are accepted or rejected by p-values.

Results support numerous hypotheses. HP1, HP4, HP5, and HP6 are approved, showing favorable connections between EAR, ECM, ECS, and EMA and MIS. Effective customer data management, customer service, satisfaction, and retention, and sales management improve MIS.

HP2, HP3, and HP7 are rejected, indicating that ECD, ECE, and ESM do not affect MIS. Effective customer segmentation, customer engagement, and marketing automation are necessary.

HP1 links Effective Customer Data Management (EAR) and MIS. The considerable positive association shows that customer data management improves MIS effectiveness. Customer data management improves strategic planning and decision-making by gathering, organizing, and using customer data. Customer data management helps firms understand customer preferences, behaviors, and demands. This understanding can improve MIS, improving information system management and decision support.

HP4 examines Efficient Customer Service Management (ECM) and MIS. This hypothesis suggests that customer service management improves MIS. client service management requires fast, individualized care, addressing client problems, and assuring customer happiness. Efficient customer service management improves the customer experience, builds customer loyalty, and generates useful data for MIS decision-making. Thus, good customer service improves MIS.

Hypothesis HP5 analyzes how ECS affects MIS. The substantial correlation shows that companies that manage customer satisfaction and retention have better MIS. Customer satisfaction may boost loyalty, lower

churn, and build long-term connections. This improves MIS data accuracy. Organizations may improve MIS by evaluating customer satisfaction and retention patterns to better allocate resources, segment customers, and market.

HP6 examines Efficient Sales Management (EMA) and MIS. This hypothesis suggests that successful sales management improves MIS. Sales management includes forecasting, territory management, sales force automation, and performance tracking. Sales management efficiency boosts sales productivity, process efficiency, and data accuracy and timeliness. This improves MIS for sales plans, performance evaluation, and decision-making.

Hypotheses HP1, HP4, HP5, and HP6 propose that effective customer data management, customer service management, customer happiness and retention, and sales management make MIS effective. These data show that controlling customer-related issues improves MIS quality and usefulness. Organizations can improve their MIS, decision-making, resource allocation, and strategic planning by exploiting customer data, offering exceptional customer service, assuring customer happiness and retention, and improving sales management methods.

HP2, HP3, and HP7 were rejected, indicating no significant association between the independent factors and MIS. The findings may suggest rejecting these assumptions.

HP2 analyzes MIS and Effective Customer Segmentation (ECD). Customer segmentation does not affect MIS effectiveness, as this hypothesis was rejected. Customers are segmented by demographics, behaviors, and preferences. Effective client segmentation would improve MIS by providing focused and tailored information. The non-significant association shows that customer segmentation may not directly affect MIS effectiveness in this study. Data quality, integration, and interpretation may affect MIS effectiveness considerably.

HP3 examines MIS and Effective Customer Engagement (ECE). Effective client involvement does not greatly affect MIS effectiveness. Customer engagement is a company's customers' involvement, interaction, and emotional bond. Engaged customers give comments, participate in brand activities, and like the company. This study found no significant association between customer engagement and MIS effectiveness, suggesting other aspects may be more important. Data availability and quality, information system integration, and MIS alignment with organizational goals and strategies are examples.

HP7 examines MIS and Effective Analytics and Reporting (ESM). Rejecting this premise suggests that effective analytics and reporting techniques do not affect MIS effectiveness. Data gathering, analysis, and presentation help decision-making in analytics and reporting. The non-significant association shows that other

factors may have a greater impact on MIS efficacy than better analytics and reporting. These considerations may include MIS alignment with business goals, data availability from varied sources, and MIS framework integration of analytics and reporting technologies.

In conclusion, the rejection of Hypotheses HP2, HP3, and HP7 suggests that effective customer segmentation, interaction, analytics, and reporting do not significantly impact MIS effectiveness in the current study. These characteristics are critical for organizational success, although they may not directly affect MIS depending on the sample or industry. To better understand how these dimensions affect MIS efficacy, more research might examine other variables' moderating or mediating impacts.

Conclusion

In conclusion, this study examined how CRM subvariables affect MIS efficiency in private sector institutions. Several key conclusions arose from data analysis and hypothesis testing.

First, the study found strong support for Hypotheses HP1, HP4, HP5, and HP6, which suggest that MIS improves customer data management, customer service management, customer satisfaction and retention, and sales management. These findings demonstrate the importance of MIS in customer-centric operations and corporate effectiveness. MIS helps firms manage customer data, improve customer happiness and retention, and optimize sales management. These findings demonstrate the importance of MIS in customer-centric initiatives and market advantage.

Hypotheses HP2, HP3, and HP7, which examine the linkages between effective customer segmentation, engagement, analytics, and reporting, and MIS effectiveness, were not supported. These findings show that these characteristics are significant in CRM practices but may not directly affect MIS effectiveness in this study. MIS effectiveness may depend more on data quality, integration, interpretation, organizational alignment, and strategic orientation.

This study is limited. The research was done in private institutions, which may limit its applicability. The study also concentrated on a narrow set of CRM and MIS sub-variables, which may have omitted other significant elements. Future research should broaden variables and investigate moderating or mediating factors that may affect CRM-MIS connections.

This study has practical implications for firms seeking to improve CRM and MIS. The findings advise investing in MIS capabilities that support customer data management, customer service management, customer happiness and retention, and sales management. MIS helps companies use customer data to personalize experiences, streamline operations, and make data-driven decisions.

This study helps explain CRM sub-variables and MIS effectiveness. The findings show CRM's complexity and MIS's role in customer-centric strategy. To fully comprehend CRM-MIS dynamics and help firms optimize CRM for business performance, more study is needed.

Recommendations:

This report suggests using MIS to improve Customer Relationship Management (CRM):

- To maintain consumer data integrity, completeness, and consistency, organizations should invest in comprehensive data management systems and processes. Implement data quality controls, data governance frameworks, and data integration and cleansing tools. Organizations may improve decision-making and customer experiences by improving data management.
- Integrate CRM and MIS systems: To streamline data flow across departments and functions, CRM and MIS systems must be integrated. This integration gives cross-functional teams real-time client data. Integrating CRM and MIS systems breaks down information silos, improves data exchange, and provides a single customer view, improving customer insights and relationship management.
- Focus on customer service management: Since MIS tools and technologies expedite and personalize customer service procedures, firms should prioritize their installation. This includes using customer service management systems, self-service, automation, and AI to increase response times, problem resolution, and customer happiness.
- Leverage analytics and reporting capabilities: While this study did not find a direct link between MIS and good analytics and reporting, firms should realize the relevance of analytics in CRM. Organizations may learn about customer preferences, behavior, and trends using modern MIS solutions. This helps them create focused marketing efforts, find cross-selling and upselling opportunities, and improve client acquisition and retention.
- Assess and adjust MIS capabilities: Organizations should continuously evaluate and adapt their MIS capabilities to changing business needs and technology. This incorporates real-time reporting and analysis of CRM KPIs like customer happiness, retention, and sales performance using MIS technologies. Organizations may ensure their MIS supports CRM and improves business success by being nimble and sensitive to changes.
- Invest in staff training and development: MIS for CRM demands a knowledgeable workforce that understands its capabilities. Employee training and development programs improve technical and analytical skills. This comprises MIS, data analysis, and CRM training. Well-trained staff can use MIS, analyze customer data, and make customer-centric decisions.

- Foster data-driven decision-making: Organizations should encourage staff to use MIS insights in their daily operations. This comprises encouraging a data-driven mindset, giving access to relevant data and analytics tools, and rewarding employees who use MIS effectively in their decision-making. Data-driven decision-making helps firms maximize MIS for CRM and expand sustainably.
- These tips help firms optimize Management Information Systems to improve Customer Relationship Management. MIS can drive customer-centric strategies, improve customer satisfaction, and gain market advantage by focusing on data management, system integration, customer service management, analytics, continuous assessment, employee training, and fostering a data-driven culture.

REFERENCES

Asemi, A., Safari, A., & Asemi Zavareh, A. (2011). The role of Management Information System (MIS) and Decision Support System (DSS) for manager's decision making process. *International Journal of Business and Management*, *6*(7). https://doi.org/10.5539/ijbm.v6n7p164

Avkiran, N. K. (2018). Rise of the partial least squares structural equation modeling: An application in banking. *Partial Least Squares Structural Equation Modeling*, 1–29. https://doi.org/10.1007/978-3-319-71691-6_1

Ayuninggati, T., Lutfiani, N., & Millah, S. (2021). CRM-based E-Business Design (customer relationship management) case study : Shoe washing service company S-neat-KERS. International Journal of Cyber and IT Service Management, 1(2), 216–225. https://doi.org/10.34306/ijcitsm.v1i2.58

Badiyani, J. M. (2022). Relationship of customer satisfaction and customer loyalty in online banking consumers in Gujarat, India. *Towards Excellence*, 567–575. https://doi.org/10.37867/te140155

Building a brand image through Electronic Customer Relationship Management. (2022). *Advances in Marketing, Customer Relationship Management, and E-Services*. https://doi.org/10.4018/978-1-6684-5386-5

Chalmeta, R. (2006). Methodology for customer relationship management. *Journal of Systems and Software*, *79*(7), 1015–1024. https://doi.org/10.1016/j.jss.2005.10.018

Edeh, F. O., Ugboego, C. A., & Chibuike, O. N. (2019). Effect of customer relationship management on organisational resilience of deposit money banks in Nigeria. *International Journal of Economics, Business and Management Studies*, *6*(2), 272–284. https://doi.org/10.20448/802.62.272.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, *23*(2), 183. https://doi.org/10.2307/249751

L, F., J., E., E., A., U., O., J., & O., O., B. (2023). Customer relationship management and customers repeat purchase behavior in Nigeria. *Scholars Journal of Economics, Business and Management*, *10*(1), 19–28. https://doi.org/10.36347/sjebm.2023.v10i01.002

Miller, J., & Doyle, B. A. (1987). Measuring the effectiveness of computer-based information systems in the Financial Services Sector. *MIS Quarterly*, *11*(1), 107. https://doi.org/10.2307/248832

Naceur, R., Cimon, Y., & Pellerin, R. (2023). Information systems adoption and performance: Evidence from Canadian firms linking individual and organizational performance. *Information Systems Management*, 1–14. https://doi.org/10.1080/10580530.2023.2217475

Rababah, K. (2011). Customer relationship management (CRM) processesfrom theory to practice: The pre-implementation plan ofcrm system. International Journal of E-Education, e-Business, e-Management and e-Learning. https://doi.org/10.7763/ijeeee.2011.v1.4

Rascão, J. (2018). Information system for strategic decision making. *Handbook of Research on Strategic Innovation Management for Improved Competitive Advantage*, 397–428. https://doi.org/10.4018/978-1-5225-3012-1.ch022

Shukur, H. M., Zeebaree, S. R., Zebari, R. R., Hussan, B. Kh., Jader, O. H., & Haji, L. M. (2021). Design and implementation of Electronic Enterprise University Human Resource Management System. Journal of Physics: Conference Series, 1804(1), 012058. https://doi.org/10.1088/1742-6596/1804/1/012058

Suoniemi, S., Zablah, A., Terho, H., Olkkonen, R., Straub, D., & Makkonen, H. (2022). CRM system implementation and firm performance: The Role of Consultant Facilitation and user involvement. *Journal of Business & Industrial Marketing*, *37*(13), 19–32. https://doi.org/10.1108/jbim-08-2021-0380

Tenenhaus, M. (2004). PLS regression and PLS path modeling for multiple table analysis. *COMPSTAT 2004 — Proceedings in Computational Statistics*, 489–499. https://doi.org/10.1007/978-3-7908-2656-2_40

Thacker, S., Adshead, D., Fay, M., Hallegatte, S., Harvey, M., Meller, H., O'Regan, N., Rozenberg, J., Watkins, G., & Hall, J. W. (2019). Infrastructure for Sustainable Development. *Nature Sustainability*, *2*(4), 324–331. https://doi.org/10.1038/s41893-019-0256-8

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, *39*(2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Watson, R., Wilson, H. N., Smart, P., & Macdonald, E. K. (2017). Harnessing difference: A capability-based framework for stakeholder engagement in environmental innovation. *Journal of Product Innovation Management*, *35*(2), 254–279. https://doi.org/10.1111/jpim.12394

Won, J. Y., & Park, M. J. (2020). Smart factory adoption in small and medium-sized enterprises: Empirical evidence of manufacturing industry in Korea. *Technological Forecasting and Social Change*, *157*, 120117. https://doi.org/10.1016/j.techfore.2020.120117

Wu, J., Guo, S., Huang, H., Liu, W., & Xiang, Y. (2018). Information and Communications Technologies for Sustainable Development Goals: State-of-the-art, needs and perspectives. *IEEE Communications Surveys & Tutorials*, *20*(3), 2389–2406. https://doi.org/10.1109/comst.2018.2812301

Ye, F., Li, Y., & Liu, P. (2023). Impact of energy efficiency and sharing economy on the achievement of Sustainable Economic Development: New evidences from China. *Journal of Innovation & Knowledge*, *8*(1), 100311. https://doi.org/10.1016/j.jik.2023.100311

Yeşil, S., & Doğan, I. F. (2019). Exploring the relationship between social capital, Innovation Capability and Innovation. *Innovation*, *21*(4), 506–532. https://doi.org/10.1080/14479338.2019.1585187