

Original Article

CIDEM-EDU: A Student-Centric Integrated Digital Marketing Model for Private Higher Education

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Abstract - Private higher technical education requires admission processes that connect student attraction, guidance, follow-up, and enrolment closing within an organized customer management route. This study proposes and evaluates CIDEM-EDU, a student-centric integrated digital marketing model aimed at strengthening customer management in the admission pathway of private higher education. A quantitative applied approach is used through a quasi-experimental design with non-equivalent groups and independent cohorts. The study includes 1331 enrolled students from SENATI Zonal Piura, with Talara as the experimental campus and Sechura as the control campus. Customer management is measured through a structured five-point Likert questionnaire organized into customer attraction, customer service and guidance, and customer follow-up. The instrument presents excellent reliability and a coherent three-factor structure. The results show that the experimental post-test group reaches the highest customer management level, with a mean of 65.6 and a median of 67.0. Welch's ANOVA confirms statistically significant differences among cohorts, $F(3, 310) = 313.0, p < .001$, and Games-Howell comparisons indicate that the experimental post-test group differs from the remaining groups. These findings show that CIDEM-EDU strengthens customer management by articulating digital contact, communication channels, commercial follow-up, remarketing, enrolment closing, and feedback as connected moments of the same admission process. The model contributes an integrated digital marketing framework for customer management in private higher technical education.

Keywords - Customer Management, Digital Marketing, Higher Education, Quasi-Experimental Design, Student Recruitment.

1. Introduction

In recent years, private higher technical education has operated in an increasingly competitive environment for student recruitment, in which marketing has ceased to be a peripheral resource and has become part of institutional positioning, communication, and attraction decisions [1]. Within this context, digital marketing has gained growing relevance, not only because it expands the points of contact between institutions and their audiences, but also because it enables more immediate, segmented, and continuous interactions through social media and other online channels [2].

Recent literature has examined the role of social media in higher education marketing by linking it with student engagement, institutional branding, enrolment decision-making, relationship management, and strategic marketing [2]. This line of evidence is relevant to the present study because it shows that digital communication does not operate only as a promotional resource but also as a mechanism that influences recruitment and institutional choice. In the Peruvian context, digital marketing has been associated with student recruitment in a higher education institution [3]. In

developing-country settings, both digital and traditional communication have been found to mediate institutional choice, although digital advertising appears to show a stronger mediating effect [4].

Likewise, recent evidence on social media and student acquisition indicates that recruitment depends not only on institutional digital presence, but also on the content communicated and on the way such content conveys quality, interaction, and service experience [5].

However, the limitation identified in the literature is that digital marketing in higher education has been examined mainly through partial lines of analysis, which makes it difficult to understand how attraction, communication, guidance, follow-up, and enrolment closing can operate as connected moments of the same admission process.

This gap is especially relevant in Latin American private higher technical education, where customer management requires more than the initial promotion of programmes and must include the relationship established with the prospective student before enrolment is completed [2]. From this



perspective, the problem addressed in this study is not the absence of evidence on digital marketing, but the lack of an integrated model capable of organizing these actions within a coherent customer management route.

In the study, digital marketing is understood as the set of activities carried out through digital media with the purpose of attracting potential customers, creating relationships, and projecting an institutional identity, while articulating actions and information aimed at promoting educational services [6]. In turn, customer management is understood as the effort aimed at providing excellent customer service and experience while incorporating strategies intended to foster customer retention [7].

In operational terms, this variable is expressed through three dimensions: customer attraction, customer service and guidance, and customer follow-up, which together structured the measurement of customer management in the admission process [8, 9]. The relevance of the SENATI case, Talara campus, Piura, Peru, lies in the possibility of examining this problem in a private higher technical education institution within a context in which a decline in prospect recruitment, dropout before enrolment, delays in course start dates, and dissatisfaction associated with deficient follow-up of potential customers had already been identified [6].

In addition, the study is based on the perceptions of enrolled students, since they are actors who have effectively gone through the admission pathway and are therefore in a position to retrospectively assess the processes that preceded enrolment. In this way, the research is not limited to describing digital marketing practices, but rather aims to propose a theoretical digital marketing model as the independent

intervention variable, oriented toward improving customer management as the dependent variable.

The contribution of the study, therefore, lies in moving the discussion from general references on digital marketing and student recruitment toward an articulated theoretical proposal for customer management in private higher technical education, as observed from the experience of already enrolled students. Consequently, the general objective of the study is to propose a digital marketing model for customer management in private higher education institutions, using the SENATI Talara campus, Piura, Peru, as the intervention case and the SENATI Sechura campus as the comparison site.

2. Materials and Methods

2.1. Research Design

The study was developed under a quantitative and applied approach, since its purpose was to evaluate the effect of a digital marketing model on customer management within the admission process of private higher technical education.

The methodological design corresponded to a quasi-experimental scheme with non-equivalent groups and independent cohorts, in which Talara was considered the experimental campus and Sechura the control campus.

In this design, digital marketing was defined as the independent intervention variable, while customer management was assessed as the dependent variable through the perceptions of enrolled students who had already completed the admission pathway. Since the pre-test and post-test cohorts were composed of different participants, the comparisons were made between unrelated groups, as summarized in Table 1.

Table 1. Methodological design of the study

Component	Description
Approach	Quantitative
Research type	Applied
Design	Quasi-experimental
Comparative structure	Non-equivalent groups
Sample type	Independent/unrelated
Independent intervention variable	Digital marketing (theoretical model proposal)
Dependent variable	Customer management
Unit of analysis	Enrolled students
Measurement moments	Pre-test and posttest
Control group	Sechura
Experimental group	Talara

Source: Own elaboration.

2.2. Population Frame

The reference population consisted of 1903 enrolled students in Zonal Piura. This population was not concentrated in a single campus, but was distributed across Piura, Paita, Talara, and Sechura, as summarized in Table 2.

This clarification is necessary because the study did not work with all campuses in the zonal division, but only with those selected for the methodological comparison between the experimental and control conditions.

Table 2. Enrolled campuses

Campus	Enrolled students
Piura	630
Paita	227
Talara	392
Sechura	117
Total	1903

Source: Own elaboration based on the institutional enrolment report

Within that reference population, the study was delimited to the Talara and Sechura campuses. In these campuses, all eligible students from two different measurement moments were included, which gave rise to independent cohorts. The

Talara campus was considered the experimental group, whereas the Sechura campus was considered the control group. The final structure of participants included in the analysis is presented in Table 3

Table 3. Study cohorts

Group	Campus	n
Control Pre	Sechura	117
Control Post	Sechura	126
Experimental Pre	Talara	392
Experimental Post	Talara	696
Total		1331

Source: Own elaboration.

2.3. Applied Instrument

The dependent variable was measured through a structured questionnaire administered to enrolled students. The instrument was designed to assess customer management from the perspective of participants who had effectively gone through the admission process; therefore, the unit of observation corresponded to students already incorporated into the institution. The response format was a five-point Likert scale, organized from lower to higher levels according to the degree of agreement expressed by each participant. The general structure of the instrument is summarized in Table 4.

The customer attraction dimension was formulated in coherence with the logic of understanding and approaching the customer before the exchange, as well as with the need to identify needs and generate institutional contact actions. The customer service and guidance dimension was grounded in perceived customer benefits in terms of treatment, advice, personalization, trust, information, and support during the relationship process. In turn, the customer follow-up dimension was based both on the need to organize customer information in order to anticipate needs and sustain the relationship and on the perspective of loyalty and retention aimed at favoring permanence [8, 9].

Table 4. Instrument structure

Variable	Dimension	Items	Scale
Customer management	Customer attraction	Item 14 to 18	5-point Likert scale
	Customer service and guidance	Item 19 to 23	5-point Likert scale
	Customer follow-up	Item 24 to 28	5-point Likert scale

Source: Own elaboration.

2.4. Instrument Reliability

The internal consistency of the scale was assessed through Cronbach's alpha and McDonald's omega. As shown in Table 5, both coefficients reached 0.966, indicating

excellent global reliability for the measurement of the dependent variable. In addition, the reported inter-item correlations were high and homogeneous across the fifteen items included in the scale.

Table 5. Global reliability indicators of the instrument

Reliability	Cronbach's alpha	Omega
Escala	0.966	0.966

Source: Prepared by the author based on Jamovi output.

2.5. Factorial Validity

Construct validity was examined through Exploratory Factor Analysis (EFA), since this procedure makes it possible

to determine whether the empirical grouping of the items is consistent with the theoretical structure proposed for the dependent variable. Before conducting the analysis, the

adequacy of the correlation matrix was assessed through the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity, whose results confirmed that the database met appropriate conditions for factor extraction, as shown in Table 6. Consequently, Tables 7 and 8 together show a coherent three-

factor structure with well-defined item loadings and balanced variance distribution culminating in an accumulated explained variance of 78.4%, which supports the construct's empirical consistency.

Table 6. Factorial fit

Indicator	Value
Global KMO	0.971
Bartlett χ^2	21144
Df	105
P	< .001
Extraction method	Minimum residual
Rotation	Oblimin

Source: Prepared by the author based on Jamovi R output

Table 7. Factor loadings

Factor Loads	Factor			
	1	2	3	Uniqueness
Item 24	0.931			0.179
Item 27	0.906			0.215
Item 28	0.892			0.207
Item 26	0.860			0.213
Item 25	0.841			0.208
Item 21		0.901		0.215
Item 19		0.900		0.204
Item 22		0.896		0.216
Item 23		0.867		0.215
Item 20		0.837		0.220
Item 15			0.907	0.210
Item 16			0.897	0.223
Item 18			0.880	0.226
Item 17			0.848	0.254
Item 14			0.840	0.231

Source: Prepared by the author based on Jamovi R output

Table 8. Summary of the extracted factor solution

Factor	Sum of loadings (SC)	% of variance	Cumulative %
F – 1	3.97	26.5	26.5
F – 2	3.94	26.2	52.7
F – 3	3.86	25.7	78.4

Source: Prepared by the author based on Jamovi output

2.6. Procedure

The study was carried out in two measurement moments following a pretest-posttest comparison scheme with independent groups. In each moment, the questionnaire was administered to students belonging to different cohorts; therefore, there was no follow-up of the same individuals across measurements.

The experimental condition corresponded to the Talara campus, whereas the control condition corresponded to the Sechura campus. The collected information was organized into a consolidated database for subsequent descriptive, psychometric, and inferential analyses.

2.7. Statistical analysis

The statistical analysis was organized into two levels. First, descriptive statistics were defined to characterize the total customer management variable and its dimensions. Second, the assumptions required for the selection of inferential tests were examined, particularly distribution normality by group and variance homogeneity. Normality was assessed through Kolmogorov-Smirnov with Lilliefors correction and Shapiro-Wilk tests, whose results are presented in Table 9. Based on this verification, and in combination with variance homogeneity assessment, the use of robust procedures for comparisons across independent cohorts was determined.

Table 9. Normality tests

Variable	Group	KS-Lilliefors D	KS-Lilliefors p	Shapiro-Wilk W	Shapiro-Wilk p
Customer management	Control Pre	0.062	.320	0.984	.176
	Control Post	0.073	.098	0.985	.169
	Experimental Pre	0.040	.142	0.995	.219
	Experimental Post	0.128	< .001	0.910	< .001

Source: Prepared by the author based on Jamovi R output

Since assumption checking showed partial non-normality and also required variance homogeneity assessment, the global comparison among groups was planned using robust procedures for independent samples. Accordingly, differences across cohorts were subsequently examined through Welch's ANOVA, while pairwise comparisons were conducted using the Games-Howell test. The descriptive and inferential results derived from these analytical decisions are presented in the results section.

2.8. Ethical and Data Privacy Considerations

Student data were treated confidentially and analyzed in aggregate form to protect participant identity and ensure responsible use of institutional information throughout the study.

3. Results and Discussion

3.1. Theoretical Model

3.1.1. Model Foundation

The CIDEM-EDU model is conceived as a theoretical intervention proposal aimed at improving customer management in private higher technical education through an articulated logic of planning, relationship building, and follow-up. Its foundation is based on the idea that marketing decisions should not operate as isolated actions, but as coordinated processes capable of connecting analysis, objective setting, strategic design, tactical execution, and performance evaluation within a single operational sequence [10].

From this perspective, the model adopts a strategic and relational orientation. Customer relationship management has been proposed as a cross-functional strategic approach aimed at developing and sustaining value-based relationships through integrated processes, rather than through technology alone or fragmented promotional actions [10]. In the same direction, the CRM literature recognizes that a customer-centred strategy requires the articulation of marketing, service, information, and assessment processes in order to transform data and interactions into useful organizational decisions [11]. On that basis, the proposal also assumes that digital marketing planning requires a logical structure capable of organizing the transition from diagnosis to control. In this sense, the SOSTAC framework offers a clear sequence composed of situation analysis, objectives, strategy, tactics, actions, and control, which makes it possible to organize the intervention into successive and coherent stages [12]. Consequently, the foundation of the model does not lie in the mechanical

addition of methodologies, but in their integration under a strategic logic aimed at attracting, serving, and following up the customer throughout the admission process.

3.1.2. Methodological Components

The model brings together five methodological components whose integration gives the proposal an ordered route from diagnosis to customer relationship management. Rather than functioning as separate instruments, these components are connected within a single intervention sequence aimed at student attraction, service, and follow-up throughout the admission process. Their general organization is presented in Table 10.

The SOSTAC component performs a sequencing function because it structures planning into situation analysis, objectives, strategy, tactics, actions, and control. This logic allows the intervention to be conducted through a defined route while maintaining coherence between the initial diagnosis and the subsequent evaluation [12]. The Business Model Canvas component provides a basis for value organization by specifying segments, value proposition, channels, customer relationships, resources, activities, partnerships, costs, and revenue. Its incorporation is relevant because it facilitates an integrated reading of the educational service and of the elements that sustain its relationship with the user [13].

The SMART component is incorporated to refine objective formulation. Its usefulness within the model lies in forcing the definition of specific, measurable, attainable, relevant, and time-bounded goals, thereby avoiding open-ended formulations that weaken follow-up and evaluation [14].

The AIDA component introduces a persuasive logic that is useful for guiding the prospect from initial attention to action. In functional terms, its contribution lies in organizing communication progressively so that the interest generated can be translated into effective decision-making [15].

The CRM component reinforces the relational dimension of the model because it shifts the focus from simple prospect attraction toward the construction of value-based relationships. From this perspective, its incorporation makes it possible to integrate strategy development, value creation, information management, multichannel articulation, and performance assessment in relation to the customer [10].

Table 10. Methodological components

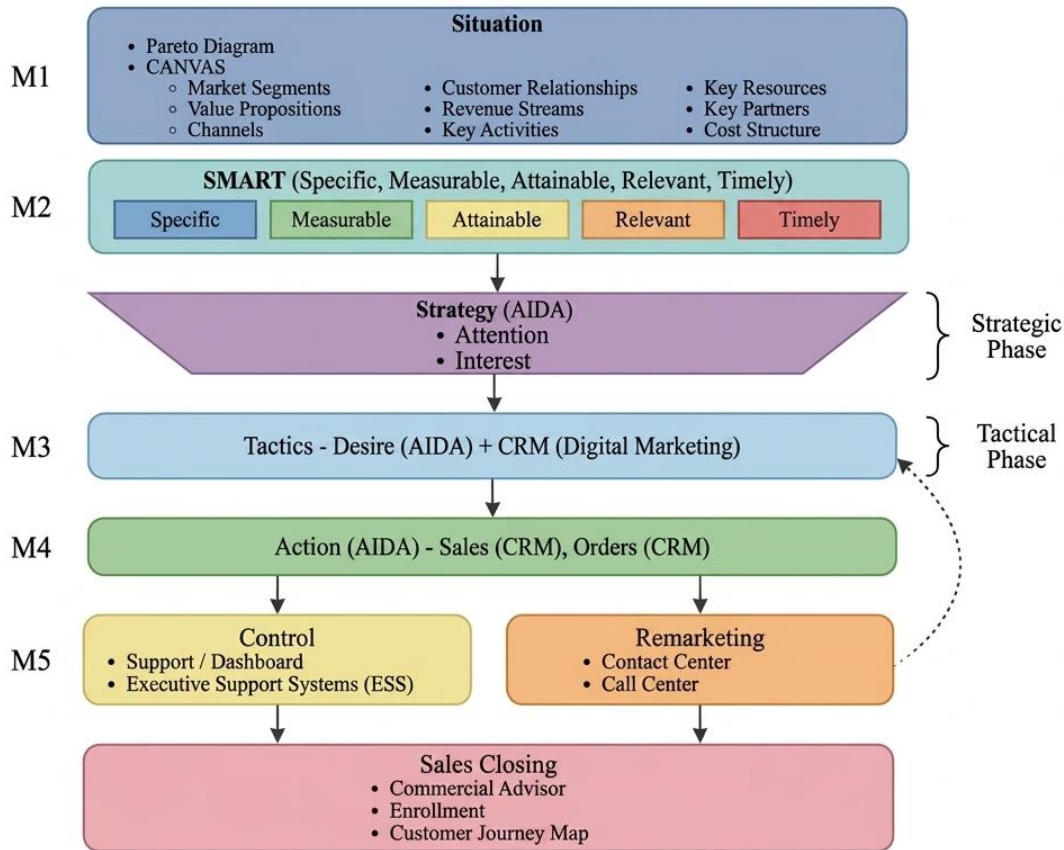
Component	Core contribution	Function within the model
SOSTAC	Structures the planning sequence	Organizes the proposal from diagnosis to control
Business Model Canvas	Clarifies value creation and delivery	Organizes segments, value proposition, channels, and customer relationships
SMART	Strengthens objective formulation	Defines operational goals with assessable criteria
AIDA	Orders persuasive communication	Guides the progression from attraction to action
CRM	Strengthens relational management	Supports relationship development, follow-up, and performance assessment

Source: Own elaboration

3.1.3. Model Structure

The model is organized into eight connected moments. These are situation, objective, strategy, tactics, action, control, remarketing, and sales closing.

This arrangement gives the proposal an internal order that begins with diagnosis, continues through the organization of intervention decisions, and extends toward conversion and subsequent relationship continuity with the student. Its general configuration is presented in Figure 1.



Source: Own elaboration

Fig. 1 General structure of the CIDEM-EDU model

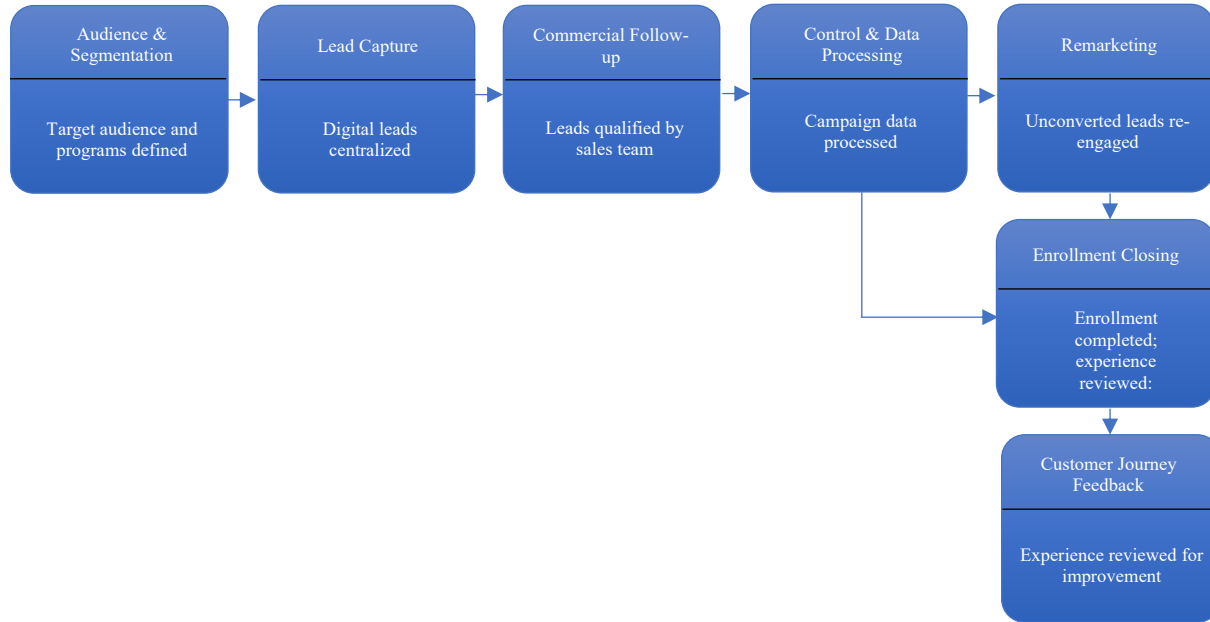
At the structural level, the model links the methodological base with the operational component of the proposal. For that reason, the architecture does not remain at the level of planning logic alone, but incorporates the nodes through which the intervention is executed and sustained, including

digital marketing, sales, orders, support, executive dashboard, contact center, commercial advisor, enrolment, and customer journey map. In that sense, Figure 1 should be read as the synthetic representation of the internal order that supports the model as a whole.

3.1.4. Model Operation

The operation of the model follows a continuous route that begins with the definition of the audience and the segmentation of programmes, and then, as shown in Figure 2, moves through lead capture, commercial follow-up, control

and data processing, remarketing, enrolment closing, and customer journey feedback. Under this route, the model does not remain at the level of attraction or first contact, but continues until conversion is achieved and the experience generated throughout the process is reviewed.



Source: Own elaboration

Fig. 2 Operational flow of the CIDEM-EDU model

After the target audience has been defined, the model moves into the Lead Capture stage, where digital leads are centralized, and then continues into Commercial Follow-up, where those leads are qualified by the sales team. Once this first commercial filtering has been completed, the route enters Control & Data Processing, where campaign data is processed in order to support subsequent decisions. It then proceeds to Remarketing, where unconverted leads are re-engaged, and to Enrollment Closing, where the process culminates in enrolment and in the review of the experience completed by the student.

The sequence reaches its final moment in Customer Journey Feedback, because the model assumes that closing the enrolment should not be treated as the end of the process, but as the point from which the institution assesses what occurred and identifies adjustments for subsequent cycles. Read in this way, Figure 2 represents not only a flow of actions, but also the internal logic through which attraction, follow-up, conversion, and feedback are connected within a single customer management route.

3.1.5. Functional Scope

The functional scope of the model is defined by the need to organize customer management throughout the admission process as a continuous and integrated sequence of actions, rather than as a set of isolated interventions. The model is

situated within a process-based logic in which the institution does not act only at the moment of promotional exposure, but rather structures a broader route that connects relationship-building activities from the first contact onward [10].

Within that general scope, the model incorporates customer attraction as its first functional component. This is because the admission process begins before any effective exchange takes place, at the stage in which the institution must identify, understand, and approach the prospective student. In that sense, attraction corresponds to the initial moment of contact-building, in which the organization seeks to understand the future customer and establish the first link that makes the subsequent relationship possible [8].

The model also incorporates customer service and guidance, because initial contact does not by itself constitute sufficient customer management unless it is transformed into timely communication, useful information, and support for decision-making. Under a relational perspective, customer management requires a closer and more consistent relationship with the customer, supported by communication, knowledge of customer needs, and organizational efforts aimed at building valuable and lasting relationships over time. For that reason, service and guidance are not secondary functions within the model, but a necessary part of the admission process itself [9].

Furthermore, customer follow-up constitutes a third function of the model because the relationship initiated in the stage of attraction and strengthened through service and guidance should continue after the prospective student has expressed initial interest. The scope of this function lies in sustaining the relationship through subsequent actions supported by the information obtained in previous interactions, so that the process may advance with continuity throughout the admission pathway.

This understanding is consistent with the relational perspective that emphasizes the conservation and strengthening of the customer base, the use of information gathered through interaction, and the need for detailed follow-up in order to support stable and long-term relationships [9].

Under that same perspective, retention may be incorporated into this subsection without conceptual inconsistency when it is understood not as an isolated operational stage, but as the broader relational orientation that gives continuity to attraction, service, guidance, and follow-up [9]. This interpretation is also compatible with CRM approaches that define customer management as an integrated effort aimed at identifying, acquiring, and retaining customers [11].

Finally, the functional scope of the model extends from the first institutional contact with the prospective student to the continuity of the relationship throughout the admission process.

The value of this scope lies in bringing together attraction, service and guidance, follow-up, and retention within a single line of customer management, so that each function contributes to the next and the process acquires a coherent relational orientation [9, 11].

3.2. Quantitative Results

3.2.1. Descriptive Results

Table 11 showed that the independent cohorts were predominantly composed of male students, who represented 78.7% of the total sample, whereas female students accounted for 21.3%. In age terms, the largest proportion corresponded to the 17–19 years group, with 68.8%, followed by the 20–24 years group, with 24.6%. The proportions of students aged 25–29 years and 30 years or older were lower, at 5.3% and 1.3%, respectively.

Regarding student status, new students clearly predominated, representing 97.3% of the total, while returning students accounted for only 2.7%.

Table 11. Sociodemographic profile and student status across independent cohorts

Variable	Category	Control Pre		Control Post		Experimental Pre		Experimental Post		Total	
Campus		Sechura				Talara					
		f	%	F	%	F	%	F	%		
Sex	Male	91	77.8 %	95	75.4 %	311	79.3 %	551	79.2 %	1048	78.7 %
	Female	26	22.2%	31	24.6 %	81	20.7 %	145	20.8 %	283	21.3 %
Age	17–19 years	74	63.2%	85	67.5 %	262	66.8 %	495	71.1 %	916	68.8 %
	20–24 years	32	27.4%	29	23.0 %	101	25.8 %	165	23.7 %	327	24.6 %
	25–29 years	8	6.8%	10	7.9 %	22	5.6 %	31	4.5 %	71	5.3 %
	30+ years	3	2.6%	2	1.6 %	7	1.8 %	5	0.7 %	17	1.3 %
Student status	New student	112	95.7%	121	96.0 %	378	96.4 %	684	98.3 %	1295	97.3 %
	Returning student	5	4.3 %	5	4.0 %	14	3.6 %	12	1.7 %	36	2.7 %

Source: Prepared by the author based on Jamovi output

As shown in Table 12, the pattern of recruitment-related responses differed across cohorts and campuses. In Talara, the first source of knowledge was concentrated mainly in recommendations from another student during the pre-test, with 33.9%, whereas in the post-test, the greatest proportion shifted to Facebook with 28.0%.

Additional post-test growth was also observed in Instagram, WhatsApp and webinar or career fair, which were either absent or marginal in the pre-test. In Sechura, by contrast, the distribution remained more stable across both phases, with Facebook and recommendations from another

student maintaining the largest shares. The chi-square results reported in Table 13 indicate that this change was significant in Talara and in the total sample but not in Sechura.

A comparable shift was observed in the medium with the greatest influence on enrolment. In Talara, social media increased from 29.1% in the pre-test to 66.7% in the post-test, while the relative weight of recommendations from another student school talk and other traditional sources declined. In Sechura, the distribution was more stable with recommendation from another student's social media and school talk remaining the most visible categories in both

phases. According to Table 13, the association between phase and main influence was significant in Talara and in the total sample, whereas no significant change was observed in Sechura.

With respect to participation in informational activities, Talara presents a clearer movement between both measurement moments, increasing from 46.2% in the pre-test to 68.0% in the post-test. Sechura, on the other hand, shows a much more stable behavior, moving only from 46.2% to 48.4%.

This difference suggests that the participation of students in these activities acquired greater relevance in the experimental campus after the implementation of the model, which is consistent with an admission route that did not depend only on initial contact, but also on spaces of information and guidance before enrolment. The chi-square results in Table 13 confirm this interpretation, since the

association was statistically significant in Talara and in the total sample, but not in Sechura.

Regarding the main activity in which students participated, Talara showed a marked increase in webinar participation, which rose from 6.9% in the pre-test to 27.2% in the post-test.

At the same time, the proportion of not applicable responses declined from 53.8% to 32.0%, indicating a greater level of actual participation in institutional activities.

In Sechura, the distribution remained comparatively stable with not applicable continuing as the dominant category and only limited variation in the remaining activities.

The chi-square test reported in Table 13 was significant in Talara and in the total sample, whereas no significant association was identified in Sechura.

Table 12. Contingency tables

Items/Campus	Pre-test		Post-test		Pre-test		Post-test	
	Talara				Sechura			
Ítem 6. First_Source	f	%	F	%	f	%	F	%
Facebook	106	27.0%	195	28.0%	37	29.4%	35	29.9%
Instagram	0	0.0%	70	10.1%	1	0.8%	4	3.4%
WhatsApp	0	0.0%	82	11.8%	6	4.8%	2	1.7%
YouTube	35	8.9%	0	0.0%	2	1.6%	1	0.9%
Radio	8	2.0%	14	2.0%	8	6.3%	9	7.7%
Billboard /outdoor advertising	35	8.9%	21	3.0%	8	6.3%	8	6.8%
Flyer	24	6.1%	10	1.4%	4	3.2%	5	4.3%
School talk	86	21.9%	76	10.9%	20	15.9%	21	17.9%
Webinar or career fair	61	15.6%	0	0.0%	3	2.4%	1	0.9%
Recommendation from another student	133	33.9%	132	19.0%	34	27.0%	34	29.1%
Ítem 7. Main_Influence	f	%	F	%	f	%	F	%
Social media	114	29.1%	464	66.7%	34	27.4%	39	33.3%
Radio	8	2.0%	14	2.0%	10	7.7%	9	7.9%
Billboard /outdoor advertising	35	8.9%	20	2.9%	9	6.8%	7	6.3%
Flyer	24	6.1%	8	1.1%	5	4.3%	5	4.0%
School talk	74	18.9%	70	10.1%	22	17.8%	19	16.1%
Webinar or career fair	24	6.1%	81	11.6%	4	3.4%	5	4.0%
Recommendation from another student	113	28.8%	130	18.7%	41	32.6%	34	29.4%
Ítem 10. Activity Participation	f	%	F	%	f	%	F	%
Yes	181	46.2%	473	68.0%	54	42.7%	57	48.4%
No	211	53.8%	223	32.0%	72	57.3%	60	51.6%
Ítem 11. Main_Activity	f	%	F	%	f	%	F	%
Vocational talk	85	21.7%	124	17.8%	24	18.8%	20	17.5%
Webinar	27	6.9%	189	27.2%	6	5.1%	11	9.5%
Career fair	25	6.4%	62	8.9%	9	6.8%	7	5.6%
School-based activity	44	11.2%	98	14.1%	15	12.0%	19	15.9%
Not applicable	211	53.8%	223	32.0%	72	57.3%	60	51.6%

Note: Percentages were calculated within each cohort: Talara pre-test (n = 392), Talara post-test (n = 696), Sechura pre-test (n = 117), and Sechura post-test (n = 126).

Source: Prepared by the author based on Jamovi output

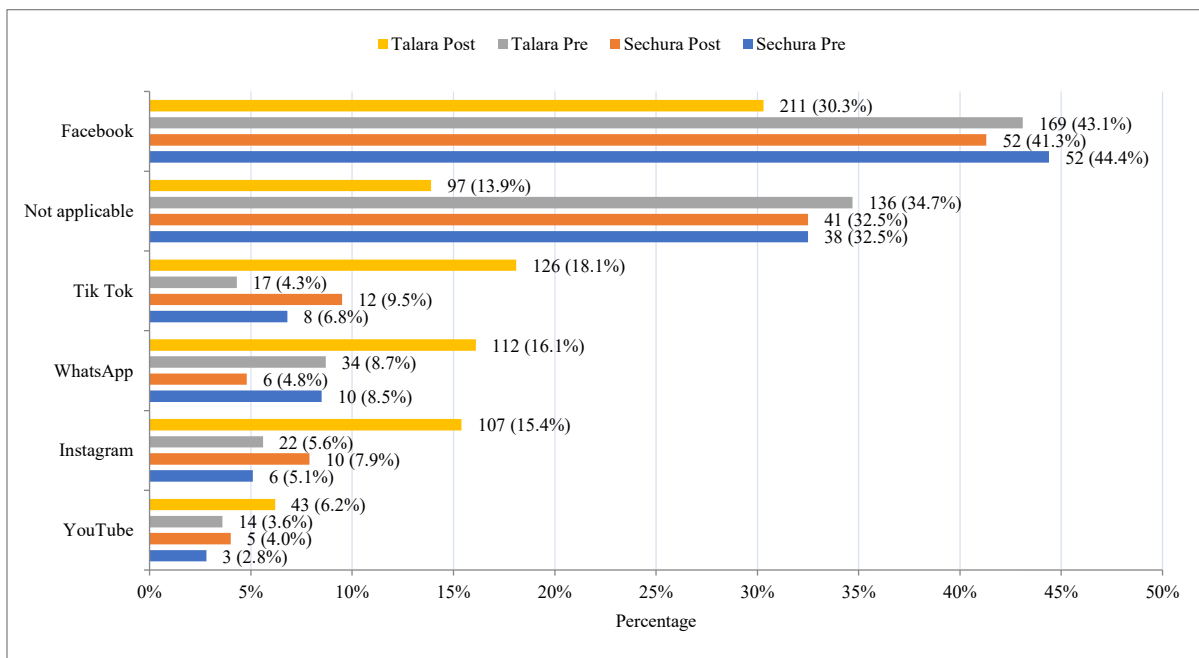
Table 13. Chi-square tests

Item's	Campus	Valor χ^2	Gl	Valor p
Ítem 6. First Source	Talara	217.91	9	< .001
	Sechura	5.06	9	.829
Ítem 7. Main Influence	Talara	141.45	6	< .001
	Sechura	1.43	6	.964
Ítem 10. Activity Participation	Talara	49.64	1	< .001
	Sechura	0.84	1	.360
Ítem 11. Main Activity	Talara	87.25	4	< .001
	Sechura	3.32	4	.506

Source: Prepared by the author based on Jamovi output

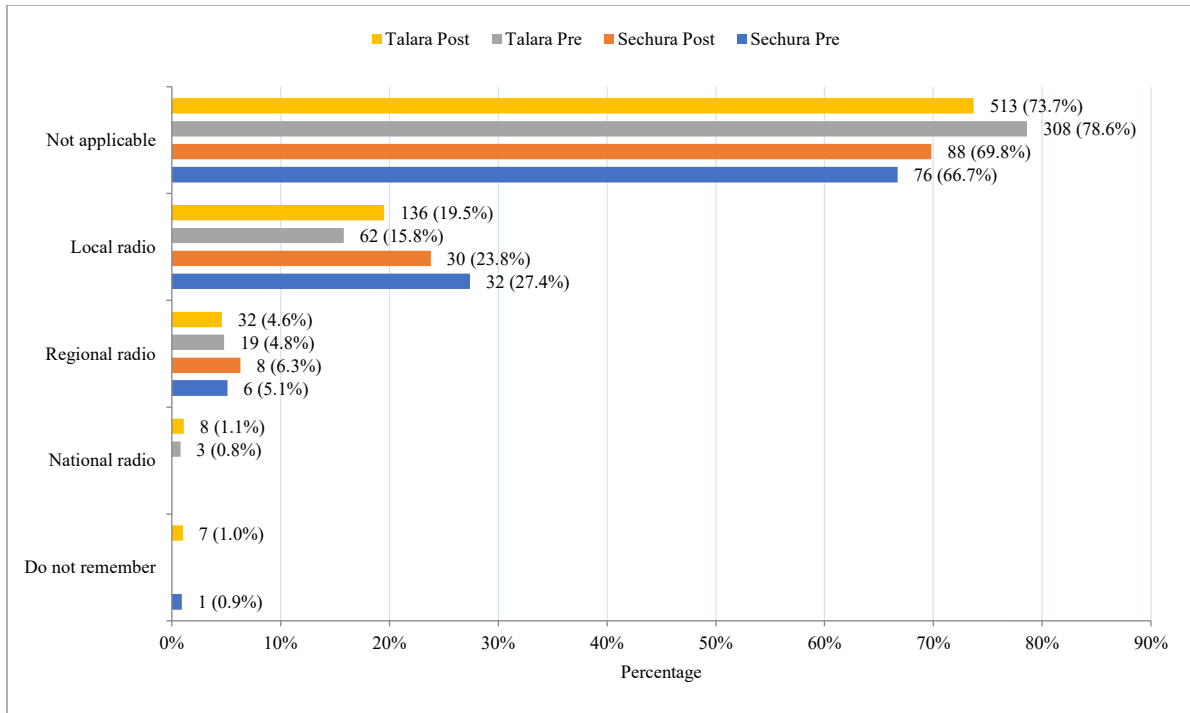
Consequently, the visual evidence derived from Figures 3 and 4 shows a communication environment associated with student attraction driven mainly by digital media maintaining radio in a secondary role by reflecting in Figure 3 how Facebook appeared as the most visible platform across both campuses reaching 44.4% and 43.4% in Sechura and 43.1% in the Talara pre-test before declining to 30.3% in the Talara post-test alongside a broader distribution expanding Instagram from 5.6% to 15.4% and WhatsApp from 8.7% to 16.1% simultaneously decreasing the “not applicable” category from 34.7% to 13.9% while Sechura maintained a more stable pattern across phases finding reinforcement in Figure 4 where the “not applicable” category concentrated the highest proportions in all cohorts ranging from 66.7% to 78.6% leaving local radio as secondary and regional or national radio as marginal overall indicating a contact ecosystem linked to the model structured mainly through digital channels completely consistent with the intervention’s emphasis on digital marketing and customer management.

Correspondingly, Figure 5 shows that direct digital contact before enrolment became a more defined component of the recruitment process in Talara, where the proportion of students who reported this interaction increased from 41.1% in the pre-test to 78.0% in the post-test. In Sechura, the variation was more limited, moving from 37.6% to 46.8%, which indicates that the change was concentrated mainly in the experimental campus. Figure 6 allows this result to be specified through the contact channel used by students, since in Talara, the “not applicable” category decreased from 58.9% to 22.0%, while WhatsApp increased from 11.5% to 31.2% and became the main effective channel after the implementation of the model. Facebook and phone call reached 18.1% and 13.2% respectively, but their presence remained secondary in relation to WhatsApp. Thus, the evidence suggests that the model did not only increase the presence of direct digital contact, but also gave greater operational definition to the contact route used in the experimental campus, which is consistent with its customer management orientation.



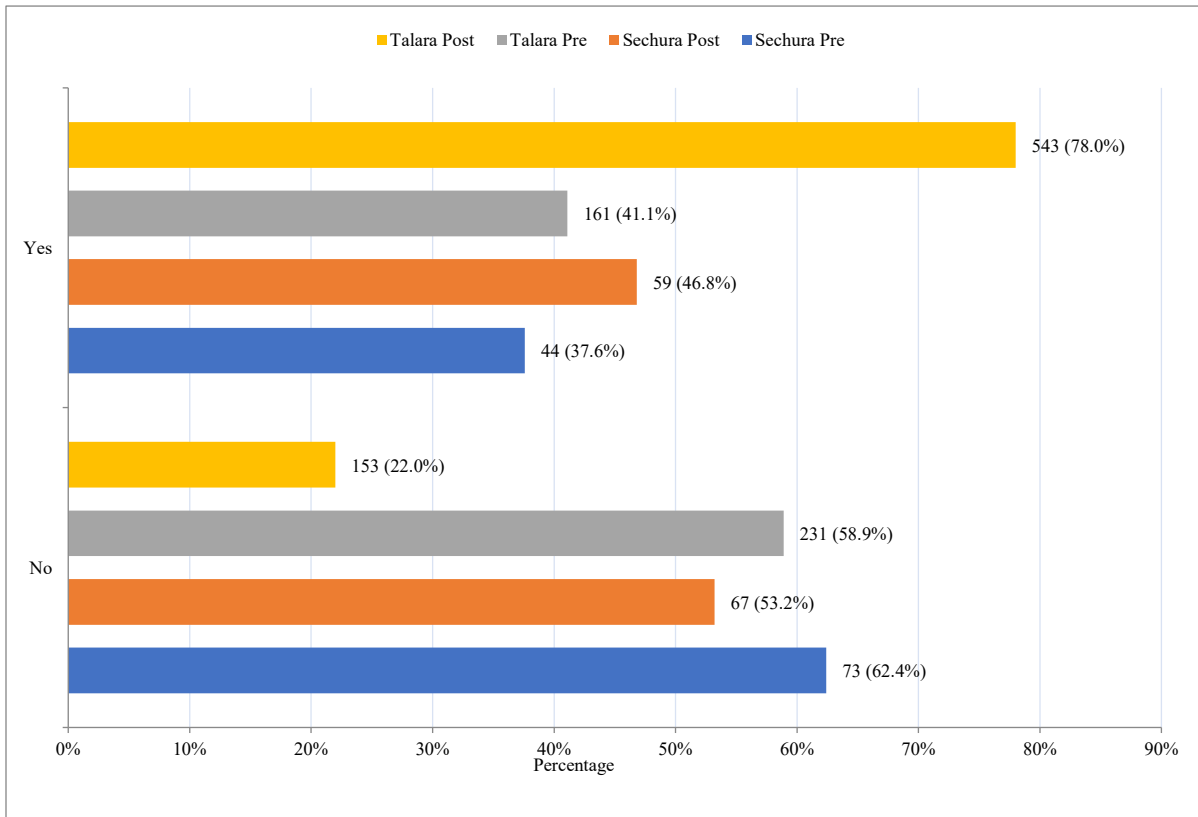
Source: Prepared by the author based on Jamovi R output

Fig. 3 Social media platform distribution (item 8)



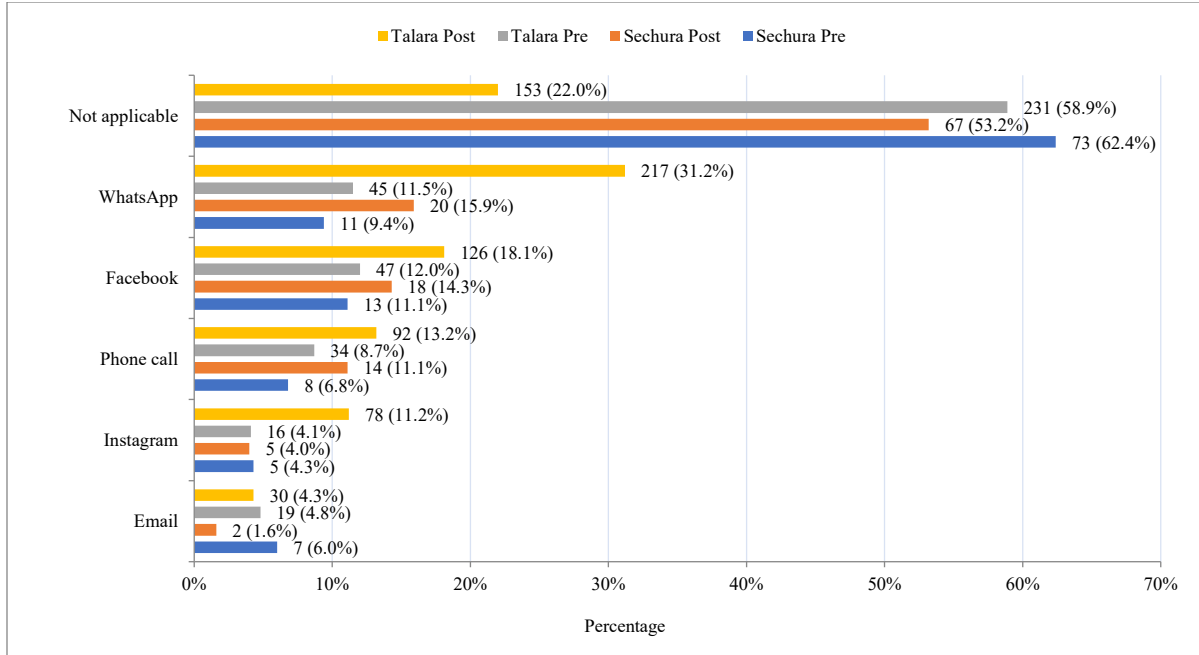
Source: Prepared by the author based on Jamovi R output

Fig. 4 Type of radio station (item 9)



Prepared by the author based on Jamovi R output

Fig. 5 Direct digital contact before enrolment (item 12)



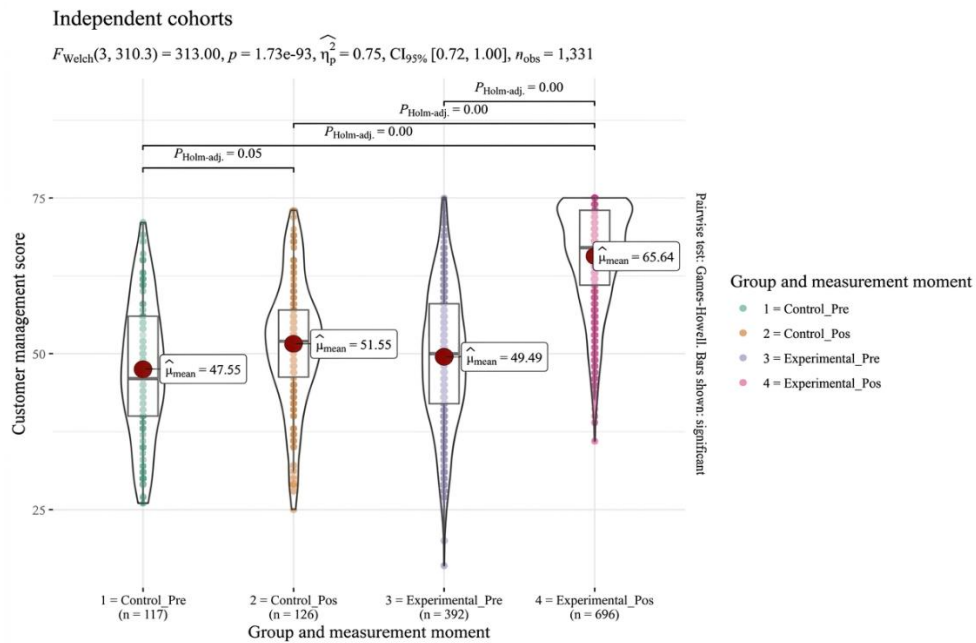
Prepared by the author based on Jamovi R output.

Fig. 6 Main contact channel distribution (item 13)

3.2.2. Inferential Results

Figure 7 shows the distribution of customer management scores across the four independent cohorts, considering Sechura as the control campus and Talara as the experimental campus.

The highest concentration of scores was observed in the experimental post-test group, with a mean of 65.6 and a median of 67.0, whereas the control pre-test, control post-test, and experimental pre-test groups showed lower means of 47.5, 51.5, and 49.5, respectively.



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Fig. 7 Distribution of customer management scores by group

This pattern indicates that the main descriptive change was located in Talara after the implementation of the model,

although its statistical confirmation is presented in the inferential analysis. As reported in Table 9, the normality

assumption was previously examined for customer management scores across groups. The homogeneity of variances assumption was then assessed before the global comparison, and its results are included in Table 14 together with Welch's ANOVA. Since this assumption was not met, Welch's ANOVA was used to compare the four independent cohorts. Table 14 shows that the assumption of homogeneity of variances was not satisfied, as indicated by Levene's test and Bartlett's test.

For this reason, the global comparison was performed using Welch's ANOVA, which showed statistically significant differences in customer management scores among the four cohorts, $F(3, 310) = 313.0$, $p < .001$. This result indicates that the distribution observed in Figure 7 was not only descriptive but also statistically supported, making it necessary to conduct post hoc analysis in order to identify the specific group comparisons associated with the effect of the model.

Table 14. Customer management Welch ANOVA

Analysis	Test	Statistic	df1	df2	P
Homogeneity of variances	Levene's test	13.9	3	1327	< .001
Homogeneity of variances	Bartlett's test	43.8	3	—	< .001
Global group comparison	Welch's ANOVA	313.0	3	310	< .001

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Table 15. Customer management post hoc comparisons

Comparison	Mean difference	p
Control Pre vs Experimental Pre	-1.94	.315
Control Pre vs Experimental Post	-18.1	< .001
Control Post vs Experimental Post	-14.1	< .001
Experimental Pre vs Experimental Post	-16.2	< .001

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Table 15 shows that the difference between the control pre-test and experimental pre-test groups was not statistically significant, indicating that both cohorts started from comparable levels of customer management before the implementation of the model. In contrast, the experimental post-test group differed significantly from the control pre-test, control post-test, and experimental pre-test groups, with mean differences of -18.1, -14.1, and -16.2, respectively. These comparisons indicate that the main change was concentrated in Talara after the intervention, supporting the interpretation that the model produced a measurable improvement in customer management within the experimental campus.

3.2.3. Discussion

The inferential results show that the CIDEM-EDU model was associated with a clear improvement in customer management in the experimental campus. This effect was observed in Talara after the implementation of the model, where the experimental post-test group reached the highest score, with a mean of 65.6 and a median of 67.0, while the control pre-test, control post-test, and experimental pre-test groups remained at lower levels.

This difference was statistically supported by Welch's ANOVA, $F(3, 310) = 313.0$, $p < .001$, and by the post hoc comparisons, which showed significant differences between the experimental post-test and the remaining cohorts. Therefore, the result is consistent with previous evidence from the Peruvian higher education context, where digital marketing was reported to have a positive effect on student recruitment [3].

The descriptive findings help explain the direction of this improvement, since the change in Talara was not limited to the final customer management score. Direct digital contact before enrolment increased from 41.1% to 78.0%, while WhatsApp rose from 11.5% to 31.2% as the main effective contact channel. This behavior is consistent with recent literature indicating that social media in higher education marketing is related to student engagement, enrolment decision-making, relationship management, and strategic marketing [2]. It also agrees with evidence from developing-country contexts showing that digital communication plays a relevant role in institutional choice and that digital advertising presents a stronger mediating effect than other communication tools [4].

In the admission process, the relevance of CIDEM-EDU is observed in the transition from digital visibility to relational continuity. In Talara, the post-intervention results suggest that digital channels operated as part of an organized route in which contact, information, guidance, and follow-up acquired greater operational coherence. This reading is consistent with evidence showing that social media content associated with interaction quality has a stronger effect on student acquisition than content focused only on environment or outcome quality [5]. Therefore, the model's contribution is not limited to the use of digital media, but to the way these channels were integrated into a customer management process that supported the relationship with the prospective student before enrolment.

From the CRM perspective, this result supports the need to understand customer management as a process that extends

beyond recruitment and continues through the relationship developed with the student. Recent research in higher education indicates that CRM supports the management of student relationships from recruitment to subsequent engagement, while strengthening personalization, communication, satisfaction, and institutional outcomes [16]. This interpretation is also coherent with the strategic view of CRM, which defines it as a cross-functional and process-oriented approach based on strategy development, value creation, multichannel integration, information management, and performance assessment [10]. Thus, CIDEM-EDU adapts this logic to private higher technical education by connecting digital marketing actions with institutional follow-up in the admission pathway.

Taken as a whole, the findings show that CIDEM-EDU offers an integrated route for customer management in the admission process. Its value does not lie only in the use of digital media, but in the articulation of digital contact, commercial follow-up, remarketing, enrolment closing, and feedback as connected moments of the same institutional process. This constitutes the main contribution of the study, since it provides empirical support for a model oriented to customer management in private higher technical education, using Talara as the intervention campus and Sechura as the comparison site.

4. Conclusion

The model was evaluated as an integrated digital marketing route aimed at strengthening customer management in private higher technical education. Under this intervention logic, the evidence showed that Talara concentrated the main improvement after the implementation of the model, since the experimental post-test group reached the highest level of customer management compared with the remaining cohorts. This result, supported by the inferential analysis, indicates that

the change observed in the experimental campus was not limited to a descriptive variation but corresponded to a statistically sustained effect associated with the intervention.

The findings also indicate that the model strengthened the admission pathway by giving greater order to digital contact, communication channels, commercial follow-up, and feedback. In this process, WhatsApp, direct digital contact, and social media acquired a more visible role in Talara, which shows that customer management in private higher technical education cannot depend only on isolated promotional actions. Rather, it requires a coordinated route in which attraction, service, guidance, follow-up, and enrolment closing operate as connected moments of the same institutional process.

Consequently, CIDEM-EDU contributes as a student-centric model that articulates digital marketing and customer relationship management in a context where admission processes depend on timely information, sustained contact, and structured follow-up. Its application in Talara provides empirical support for the model as an intervention proposal, while the comparison with Sechura reinforces the relevance of organizing customer management through a planned and measurable digital route.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

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