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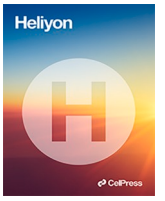

Research article

Engagement and loyalty in mobile applications for restaurant home deliveries

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ABSTRACT

This study examines user engagement and loyalty in mobile applications for restaurant home deliveries during the COVID-19 pandemic. It explores the concepts of loyalty, engagement, and interactivity, with convenience and safety as drivers for continued use.

Using Partial Least Squares Structural Equations Modelling (PLS-SEM), data from 349 users of restaurant ordering apps in Colombia was analysed. Results indicate that engagement, convenience, and safety positively influence loyalty. Interactivity indirectly affects loyalty through engagement.

This research sheds light on the factors impacting engagement and loyalty, specifically during the pandemic. It addresses underexplored marketing relationships and guides companies operating such apps to understand key drivers of user loyalty.

1. Introduction

Over the last few years, mobile applications and smartphones have become integral to everyday life [1], with mobile applications being strongly preferred over other media. Many users typically spend significantly more time using mobile applications (84%) compared to websites (14%) [2], making applications a focal point for analysing user behaviour. Regarding mobile applications for restaurant ordering, the outlook seems promising as home delivery of restaurant food amounts to a market volume of USD 58 million, and it is expected to increase in the coming years [3].

The preference for applications primarily stems from their ease of use, more personalised content and more straightforward navigation when compared to mobile websites [2,4]; additionally, mobile apps can contribute to enriching and maintaining the user's social capital [5] and satisfaction with life [6]. However, even if an application is widely used, almost 80 % of users stop using it within 90 days of installing it [7]. This represents a challenge to marketers in achieving mobile application user retention and fostering lasting relationships between consumers and brands, rendering the growth of the latter possible. Therefore, studying what drives the continued use of an application and what makes applications create engagement and loyalty is the subject of this research, as it plays a fundamental role for operators and marketing experts. Hence, this research centres on exploring the factors that underpin the sustained usage of an application and the elements contributing to fostering engagement and loyalty. Service-dominant logic and relationship marketing are fitting frameworks for home delivery apps because they recognise the service's interactive and value co-creation nature and the importance of cultivating enduring relationships with users. These theories provide a holistic perspective beyond transactional encounters, capturing the essence of continuous engagement and loyalty-building in the dynamic realm of app-based services [8].

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Recently, with the outbreak of COVID-19, the world had to adapt to unthinkable situations. The World Health Organization (WHO) [9] declared the COVID-19 pandemic on March 11, 2020; by May 2021, 184.8 million people had been infected with the virus, and more than four million had died from it [10]. Quarantines and other confinement measures taken by governments worldwide brought to light the technological challenges of facilitating connection among individuals [11], and offering home delivery services to make the provision of food and primary products possible while avoiding contagion and minimising exposures that would put the health of individuals and their families at risk. In Colombia, platforms such as iFood and Domicilios.com, which offer restaurant food exclusively, reported an increase of more than 50 % in their orders through applications during the 2020 quarantine compared to the first quarter of the same year [12], showing Colombians trusted this type of applications during the pandemic.

Even after the reopening of the catering industry as a measure to stop the economic effects of the pandemic [13], mobile applications for restaurant orders continue to be widely used; mobile commerce in the fast-food industry indeed indicates consumers prefer to buy their food online [14]. This research contributes to understanding the variables that influence user engagement and loyalty in the context of multi-restaurant ordering applications in Colombia. The implications of safety variable when ordering food during the pandemic caused by COVID-19 are also examined. Customer loyalty's benefits for companies, namely repurchase and recommendation [15], continue to drive interest from academics and practitioners to understand them better. For this reason, several research works have chosen to analyse critical factors that may positively impact user loyalty to the app. In the case of companies such as Rappi, Domicilios.com, and iFood, to name a few, there is an interest in determining whether the way users interact with and use them may affect their engagement and loyalty.

This research examines the relationship among different relevant factors in the use of applications, including interactivity (INT), convenience (CON), safety (SAF), engagement (ENG) and loyalty (LOY) towards such applications in a specific context, *i.e.*, the pandemic generated by COVID-19.

2. Theoretical framework

2.1. Loyalty

Loyalty is defined as the consumer's intention to display an interest in a company, to choose it over others, and to recommend it or increase their purchases in the following months [15]. Loyalty has been addressed both as a behavioural and affective or attitudinal factor [16–18]. In the behavioural domain, aspects related to the intention to repurchase or maintain a consistent consumption habit pattern in the future are grouped [19,20], while customers' attitude is assessed in the affective domain, which has become highly relevant because elements such as recommendation or preference when compared to other brands are evinced [15,21].

Previous studies have linked loyalty to engagement [1,22,23], trust, and satisfaction [19,21,24], showing a positive influence of these constructs on loyalty. With the recent COVID-19 pandemic, the use of mobile applications for restaurant orders has increased, leading to an interest in research focused on assessing satisfaction with mobile applications (Mobile Food Ordering Apps, MFOA) and their effect on their reuse. This shows that reuse is strongly determined by the satisfaction obtained [25] and that it also positively affects satisfaction and loyalty toward the restaurant [26]. In the case of mobile applications for clothing sales, it was found that engaging with mobile applications influences brand loyalty [1,22]; nevertheless, this impact did not turn out to be significant for tourism social network platforms (such as Booking.com and Trivago) [23]. These contradictory results support the need for further studies to better understand these relationships in different research contexts. Interactivity is considered another determinant factor of loyalty toward digital environments, particularly to social platforms [23] and online surveys [27].

In this study, loyalty is understood as a behavioural and affective construct that becomes apparent when the customer purchases or repurchases food on an MFOA and recommends others to order through it, despite situational influences or marketing efforts from other applications.

2.2. Engagement

Engagement refers to the connection a consumer has with a brand, manifested in cognitive, emotional and behavioural actions that are not necessarily evidenced in the purchase [23,28]. Although research on engagement has expanded significantly in recent years, there is still no universally accepted definition concerning this construct, even though most authors approach it from the multiple dimensions previously described [1,28–31].

In industries such as tourism [23,32–34] and education [35–37], engagement has been shown to be a direct predictor of loyalty [32,33], while other works have revealed it does not have a direct relationship with loyalty, but rather an effect mediated by other constructs [23]. Some studies have focused on examining the relationship between engagement and loyalty in the apps context [1,7,38]; establishing application engagement improves customer loyalty towards the brand and is even strengthened after continued use. In this study, engagement will be viewed as the customer's manifestation of a connection and involvement with mobile applications beyond usage.

Therefore, the subsequent hypothesis is being proposed:

H1. Engagement positively influences loyalty toward MFOA

2.3. Interactivity

Interactivity has been regarded as the extent to which two or more communication parties can act on each other, the medium through which they communicate, the messages they exchange, and the degree to which such interactions are synchronised [7]. The level of interactivity depends on who notices it because it is the user who must realise the potential that interaction provides [19]. For mobile devices, interactivity is the most prominent feature of communications, which offers personalised information [39]. This concept is usually studied through its several composing elements; however, there is no consensus on its scope and definition [20].

Overall, consumers are highly engaged with mobile applications and web platforms when they have reciprocal and interactive experiences with them [7,40], which becomes a critical factor for successful marketing in online environments [20]. In the case of university students who use mobile phones, interactivity has been shown to affect usability, which positively impacts brand loyalty through user satisfaction and trust [19]. Research has shown that interactivity positively affects customer satisfaction and loyalty. This is demonstrated by increased trust in mobile advertising for purchases [39] and by showing the intention to continue using smartphones [20]. As for online purchases through augmented reality, a significant effect of interactivity was found on a mobile application's perceived ease of use [41]. This study follows the definition of interactivity proposed by Ref. [7], that is, the extent to which two or more communication parties can interact through MFOA by exchanging messages and the degree to which said influences are synchronised.

H2. Interactivity positively influences engagement in MFOA

2.4. Convenience

Convenience is related to creating time and place benefits for users [42] and has been recognised as an important factor in mobile application adoption [1,43]. It refers to delivery at the most convenient time and place for the user or customer [44].

Convenience has been studied, given its impact on consumer purchasing decisions [45]. It has been shown to be an essential factor in creating a good shopping experience [46], which may influence the increase in online purchases [47]. An increase in user loyalty, with positive perceptions of convenience, has been observed in purchases or bookings made through mobile phones [48]. Prior research has indicated a relationship between interactivity and convenience, highlighting the significance of perceived interactivity in improving the mental evaluation of benefits through enhanced comprehension of the service received [49,50]. In addition, several studies have proved the significant effects of convenience on app engagement [7,51].

This research considers convenience a measure of benefits, in terms of time and little effort to consumers, associated with purchases through MFOA.

H3. Interactivity positively influences convenience perceived from MFOA

H4. Convenience positively influences engagement with MFOA

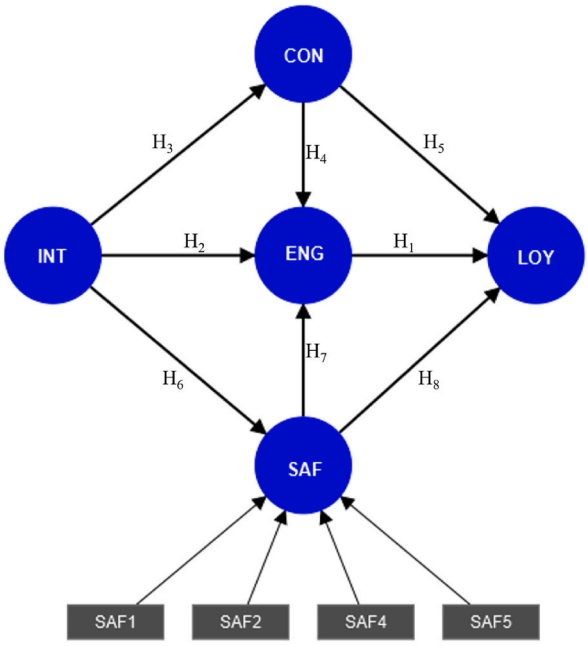

Fig. 1. Proposed hypothesis model.
Source(s): Figure created by authors

H5. Convenience positively influences loyalty to MFOA

2.5. Safety

Understood as a value, the goal of safety is harmony and stability of society, relationships, and oneself [52]. As food delivery apps have transformed how consumers order and consume food, especially during the mobility restrictions of the COVID-19 pandemic [53], safety has become a critical and relevant factor in studying the use of MFOA. It helps understand how users perceive and adopt current purchasing processes; their perception of contagion risk through MFOA is lower in comparison with physical purchases in a restaurant.

Studies have recently been conducted on the factors affecting the use of MFOA during the pandemic, such as designs evoking positive emotions in consumers [53], the effect of trust on satisfaction and in turn, the effect of the latter on continuance intention [54], as well as the attitude and trust associated with shopping routines on food order applications [55]. Interactivity influences safety perceptions by affecting the future emotions associated with the service [49]. Nevertheless, no evidence has been found in studies examining the effect of the safety experienced by users on engagement or loyalty, which is why it is relevant for this study to include such relationships. In this research, safety will be understood as the value that allows users to feel comfortable when using mobile applications for restaurant orders through the perception that clean and healthy products contribute to social order and family safety.

H6. Interactivity positively influences safety perceived from the use of MFOA

H7. Safety positively influences engagement with MFOA

H8. Safety positively influences loyalty to MFOA

Fig. 1 shows the proposed hypothesis model.

Table 1
Measurement scales.

Construct	Code	Item	References
Convenience	CON1	It's a convenient way to manage my time	[1,7]
	CON2	It makes my life easier	
	CON3	It fits in with my schedule	
	CON4	I obtain information in a timely manner	
	CON5	[P1] responds very quickly to my comments	
	CON6	[P1] processes my entry very quickly	
Interactivity	INT1	It facilitates two-way communication.	[1,7]
	INT2	It gives me the opportunity to respond	
	INT3	It makes me feel that they want to listen to their mobile users	
	INT4	It is effective in collecting user feedback	
Engagement with mobile applications	ENG1	It is fun to use	[1,30]
	ENG2	I find the contents shown in [P1] interesting	
	ENG3	[P1] allows to share information with others	
	ENG4	In [P1] it is possible to chat or exchange opinions with others	
	ENG5	It is easy to give my opinion through [P1]	
	ENG6	The content displayed in [P1] is updated	
	ENG7	Using [P1] is very fashionable	
	ENG8	It offers a personalised service	
	ENG9	I would like to pass on information about [P1] to my friends	
	ENG10	I enjoy spending time browsing [P1]	
	ENG11	I feel positive when I use [P1] to order from restaurants	
	ENG12	I feel good when I use [P1] to order from restaurants	
	ENG13	I spend a lot of time using [P1] to place orders.	
Loyalty	LOY1	I prefer it for ordering from restaurants over other mobile applications	[19,21]
	LOY2	I intend to use it for my next restaurant delivery order	
	LOY3	I recommend it for restaurant orders to other people (e.g., friends, relatives)	
	LOY4	I intend to pay more for my orders through [p1] than through other applications	
	LOY5	I am likely to use it again for ordering from restaurants	
	LOY6	I recommend that others use the app to order from restaurants	
	LOY7	My preference for it would not change voluntarily	
Safety	SAF1	It is clean	[59,60].
	SAF2	It contributes to social order	
	SAF3	It provides family safety	
	SAF4	It provides a sense of belonging	
	SAF5	It is healthy	

*In this questionnaire [P1] was replaced by the mobile food ordering application chosen by the user at the beginning of the questionnaire.
Source(s): Table created by authors

3. Methodology

3.1. Data gathering

Based on the theoretical framework, a hypothesis model was established. Reliable measurement scales from previous research were adapted for the specific research context in an online questionnaire due to the study's quantitative nature. Data was gathered in Colombia during March and Abril 2021 while lockdown restrictions were operating. For the instrument's design, a pilot test was carried out with 70 participants, 35 of whom were users of mobile applications for placing restaurant orders. This allowed for a better adaptation of the chosen scales, seeking better understanding by users and refining some items that showed low factor loadings in the preliminary reliability analysis. The sampling method was purposive, respecting the country's proportions regarding age and sex and aligning with methodologies employed in prior studies. The questionnaire was sent to a database of more than 3600 people and shared through WhatsApp, Facebook and LinkedIn social networks. Responses were received from 686 respondents, of whom 349 had used a mobile application for restaurant ordering in the last month and had answered the entire questionnaire. The MFOA under consideration were multi-restaurant apps.

Research ethics and consent were assured by: a) following COPE (Committee on Publication Ethics) core practices [56]; b) allowing respondents to freely participate or not in the survey; c) warranting anonymised data and not collecting identification variables [57]; and d) following Colombian personal information Law 1266 or *Habeas data* [58]. This research was approved by Comité para el Desarrollo de la Investigación (CODI) with ethical reference 2015-CODI.

3.2. Measurement scales

The measurement instrument was constructed from scales tried and tested in other studies (See Table 1). All scales were measured based on a five-point Likert rating. All constructs are reflective, except for safety, which is formative.

Additionally, classification variables were collected. This includes sex, age, education, income and social stratum. The latter variable is a classification carried out by municipal authorities through public service providers based on the housing characteristics and the household's location.

3.3. Analysis procedures

The Partial Least Squares Structural Equations Method (PLS-SEM) was employed for assessing and estimating relationships between reflective and formative constructs [61]. To this end, the SmartPLS 4 programme [62] was used, which does not require the normal distribution of the data, as it is a non-parametric technique. Additionally, this analysis method is suitable in predictive models that include both reflective and formative constructs [63], as is the case in this research. Three sequential stages were employed in this

Table 2
Demographic characteristics of the sample.

Demographic characteristics of the sample, n = 349	Frequency	%
Sex		
Male	171	49.0
Female	176	50.4
Age		
18–24 years	18	5.2
25–34 years	125	35.8
35–44 years	125	35.8
45–54 years	68	19.5
55–64 years	12	3.4
Over 65 years	18	5.2
Education		
Primary	17	4.9
Secondary	147	42.1
Undergraduate	184	52.7
Income		
Less than one minimum wage	9	2.6
Between 1 and 2 minimum wages	86	24.6
Between 3 and 5 minimum wages	154	44.1
More than five minimum wages	99	28.4
Economic stratum		
1	4	1.1
2	32	9.2
3	134	38.4
4	93	26.6
5	58	16.6
6	27	7.7

Source(s): Table created by authors

analysis: 1) validity analysis of the measurement model; 2) analysis of the structural model; and 3) predictive validity of the model.

4. Data analysis

4.1. Demographics

Table 2 provides a detailed breakdown of the sample's demographic characteristics, revealing that 49.0% of the individuals surveyed are men and 50.4% are women, representing the same proportions of the Colombian population. 71.6% are between the ages of 25 and 44, 94.2% of whom have a high school or undergraduate degree. It is also worth noting that only 2.6% earn less than one minimum wage and that 65% of the respondents belong to economic strata three and four.

4.2. Measurement model

In this research, a total of five constructs were examined, four of them of a first-order reflective nature and one, the safety construct, of a first-order formative nature. The latter is formative given that it is a latent construct composed of measurement indicators, these being the cause or antecedent of the construct, *i.e.* each indicator represents a dimension of the meaning of the latent variable so that when an indicator is removed, the variable loses part of its meaning; hence the importance of the indicators causing the construct [64]. Because of its uniqueness, this construct needs a separate measurement.

4.2.1. Convergent validity analysis

This validation aims to confirm that each item efficiently measures the constructs to be examined [65,66]. All outer loadings were significant, and most of them had acceptable factor loading values, although ENG6, ENG7, ENG13, CON5, LOY1, and LOY4 exhibited values lower than 0.7 [67]; however, these were not cleaned as they do not improve the Cronbach's alpha and composite reliability criteria, whose minimum values must be 0.7 [68] and the mean extracted variance, which must be greater than 0.5 [67]. As can be seen in Table 3, the criteria are met for all constructs, so it can be concluded that the model is reliable. Additionally, all items showed significant loadings ($p < 0.000$).

4.2.2. Discriminant validity analysis

Once the convergent validity of the items has been confirmed, the constructs are analysed to determine whether they have discriminant validity. From the information in Table 4, it can be concluded that the constructs meet the Fornell – Larcker criterion,

Table 3
Convergent validity of the model.

Construct	Outer loadings		T values	P values	Cronbach's alpha	Composite reliability	Average variance extracted
CON	CON1	0.693	15.504	0.000	0.821	0.831	0.524
	CON2	0.733	21.410	0.000			
	CON3	0.699	14.635	0.000			
	CON4	0.769	24.545	0.000			
	CON5	0.718	23.468	0.000			
	CON6	0.730	20.990	0.000			
ENG	ENG1	0.765	27.825	0.000	0.917	0.927	0.506
	ENG2	0.779	33.418	0.000			
	ENG3	0.716	23.889	0.000			
	ENG4	0.720	24.663	0.000			
	ENG5	0.723	24.016	0.000			
	ENG6	0.538	11.610	0.000			
	ENG7	0.558	12.330	0.000			
	ENG8	0.725	23.690	0.000			
	ENG9	0.746	24.795	0.000			
	ENG10	0.755	27.019	0.000			
	ENG11	0.807	40.485	0.000			
	ENG12	0.794	38.759	0.000			
	ENG13	0.548	11.189	0.000			
INT	INT1	0.873	46.982	0.000	0.914	0.914	0.794
	INT2	0.893	62.817	0.000			
	INT3	0.918	92.486	0.000			
	INT4	0.880	51.512	0.000			
LOY	LOY1	0.579	9.962	0.000	0.867	0.890	0.561
	LOY2	0.730	19.174	0.000			
	LOY3	0.854	56.146	0.000			
	LOY4	0.624	14.272	0.000			
	LOY5	0.748	23.715	0.000			
	LOY6	0.871	66.014	0.000			
	LOY7	0.789	31.970	0.000			

Source(s): Table created by authors

Table 4
Discriminant validity.

	CON	ENG	INT	LOY
CON	**0.724**	0.610	0.627	0.662
ENG	0.556	**0.711**	0.761	0.716
INT	0.578	0.704	**0.891**	0.565
LOY	0.570	0.665	0.516	**0.749**

Square Root of the AVE on the diagonal. HTMT above the diagonal and correlations between constructs below the diagonal.
Source(s): Table created by authors

according to which the values of the cross-relationships between constructs are lower than the relationships of each construct with itself; all constructs also meet the HTMT criterion (<0.85) [68], so the discriminant validity of the measurement model can be accepted.

4.2.3. Validity analysis for the formative variable

This analysis runs a redundancy test on the safety construct, for which the control item SAF3 is retrieved because it represents the construct as a whole. A model is then designed to confirm that the sum of the other items (SAF1, SAF2, SAF4 and SAF5) that make up the safety construct is equivalent to the control variable intended to measure the user's sense of safety when utilising mobile applications to order food from restaurants. In this test, it is verified that the path coefficient is greater than 0.7 [66,68]. Fig. 2 shows that the value obtained was 0.856, so it is correct to assume that the safety construct is formative and has convergent validity.

4.3. Collinearity statistical analyses (VIF)

In Table 5, the VIF values of the items that make up the safety construct are lower than 3.3 [68], demonstrating no collinearity between the items since the maximum value obtained is 2.71. It is observed that the values of the outer weights and outer loadings are significant for all the items since p-values are lower than 0.5 [65].

4.4. Structural model

4.4.1. Collinearity statistics (VIF)

Table 6 contains the Collinearity statistics. This analysis aims to verify that each construct has significant collinearity values (greater than 0.2 and less than 5) concerning the other constructs on which it converges in accordance with the established model [65,66].

The coefficients of determination, also known as R^2 and adjusted R^2 [68], are reviewed. These coefficients express the percentage of variation of the data concerning the linear regression of the dependent variable. According to this, the values in Table 7 are understood as follows: If $R^2 > 75\%$: substantial; $R^2 > 50\%$: moderate; if $R^2 < 20\%$: weak.

4.4.2. Hypothesis analysis

The positive and significant influence of engagement, convenience, and safety on loyalty is confirmed (See Table 8). Furthermore, it is confirmed that interactivity, convenience, and safety positively affect engagement and that interactivity positively influences safety and convenience, as seen in Fig. 3. The effects of convenience on engagement and loyalty, engagement and safety on loyalty, and interactivity on engagement are medium ($0.15 < F^2 < 0.35$). In contrast, the effects of interactivity on convenience and safety and safety on engagement are strong ($F^2 > 0.35$).

4.4.3. Analysis of specific or mediated indirect effects

This analysis demonstrates how one construct can indirectly affect another through one or more intermediate variables [66]. These relationships have a significant indirect effect, as seen in Table 9.

Safety and convenience influence loyalty directly and indirectly, and interactivity influences loyalty indirectly, mediated by several constructs.

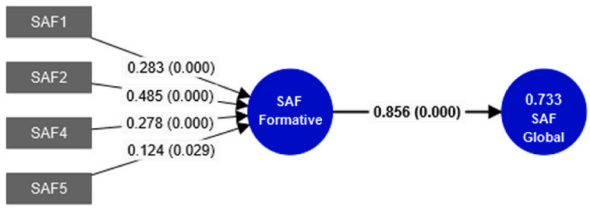

Fig. 2. Redundancy test – Safety Construct.
Source(s): Figure created by authors

Table 5
External weight criterion.

Construct	Item	VIF	Outer weights	Outer loadings
SAF	SAF1	1.702	0.159**	0.714***
	SAF2	2.271	0.261***	0.827***
	SAF4	2.741	0.341***	0.901***
	SAF5	2.122	0.412***	0.883***

***p* < 0.10; ****p* < 0.05; *****p* < 0.001**

Source(s): Table created by authors

Table 6
VIF values of the structural model.

	CON	ENG	INT	LOY	SAF
CON		1.583		1.478	
ENG				2.421	
INT	1.000	1.840			1.000
LOY					
SAF		1.607		2.195	

Source(s): Table created by authors

Table 7
R^2 and adjusted R^2 values of the structural model.

	R^2	Adjusted R^2
CON	0.335	0.333
ENG	0.659	0.656
LOY	0.524	0.520
SAF	0.345	0.343

It is observed that engagement and loyalty represent a moderate percentage of variation since the R^2 and adjusted R^2 are greater than 0.5 but less than 0.75 [68]. However, convenience and safety have a weaker representation of data (R^2 and adjusted $R^2 > 0.3$).
Source(s): Table created by authors

Table 8
Hypothesis testing.

Hypothesis	β	T value	P value		F^2
CON - > ENG	0.122	2.536	0.011	**	0.028
CON - > LOY	0.263	5.724	0.000	***	0.099
ENG - > LOY	0.352	6.017	0.000	***	0.107
INT - > CON	0.578	16.768	0.000	***	0.503
INT - > ENG	0.364	7.299	0.000	***	0.211
INT - > SAF	0.587	15.547	0.000	***	0.526
SAF - > ENG	0.458	9.509	0.000	***	0.383
SAF - > LOY	0.228	3.872	0.000	***	0.050

*$p < 0.10$; **$p < 0.05$; ***$p < 0.001$.
Source(s): Table created by authors

4.5. Predictive validity analysis

PLS predict is calculated for loyalty. Table 10 compares RMSE and MAE errors between the model generated with the PLS and the linear model, and those with the lowest values are highlighted. Errors are higher in the linear model for the loyalty variable in most indicators, as seen in the RMSE column and the MAE column. This indicates that predictive relevance is confirmed and that the predictive level is medium; that is, the PLS model relates the reactive items better than the linear model does [67].

Additionally, out-of-sample predictive power was tested through a CVPAT analysis. Average loss differences were less than zero and significant, demonstrating the model's predictive validity [69].

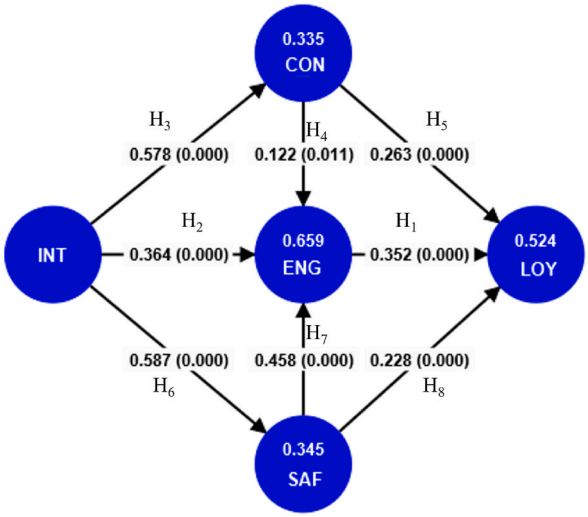

Fig. 3. Hypothesis testing model.
Source(s): Figure created by authors

Table 9
Indirect effects.

	β	T value	P value	
INT - > CON - > ENG	0.071	2.505	0.012	**
INT - > ENG - > LOY	0.128	4.848	0.000	***
INT - > SAF - > LOY	0.134	3.750	0.000	***
INT - > CON - > LOY	0.152	5.541	0.000	***
INT - > CON - > ENG - > LOY	0.025	2.220	0.026	**
SAF - > ENG - > LOY	0.161	5.057	0.000	***
INT - > SAF - > ENG	0.269	8.010	0.000	***
CON - > ENG - > LOY	0.043	2.261	0.024	**
INT - > SAF - > ENG - > LOY	0.095	4.733	0.000	***
INT - > CON - > ENG	0.071	2.505	0.012	**
INT - > ENG - > LOY	0.128	4.848	0.000	***
INT - > SAF - > LOY	0.134	3.750	0.000	***

*$p < 0.10$; **$p < 0.05$; ***$p < 0.001$.
Source(s): Table created by authors

Table 10
PLS predict.

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
LOY1	0.026	0.947	0.727	0.945	0.725
LOY2	0.084	0.887	0.691	0.886	0.692
LOY3	0.178	1.025	0.797	1.035	0.809
LOY4	0.163	1.177	0.975	1.182	0.970
LOY5	0.079	0.786	0.599	0.784	0.601
LOY6	0.227	0.966	0.758	0.980	0.766
LOY7	0.229	0.999	0.809	1.007	0.809

5. Discussion and conclusions

5.1. Theoretical and practical contributions

The eight hypotheses proposed in the study were accepted, and the findings support the existence of significant direct and indirect effects on loyalty. Engagement was confirmed as the main predictor of loyalty in MFOA.

In the first instance, H_1 ($\beta = 0.352$; $p < 0.001$) is confirmed, whereby engagement with the mobile application positively affects loyalty to the application, thus becoming its main predictor, which supports earlier studies [23,32–34]. As per the present study, it can be claimed that users express an emotional connection with MFOA that goes beyond a behaviour aimed exclusively at making a

purchase; there are other motivators, such as enjoying their time spent browsing it, feeling good and positive when using it, discovering entertaining and exciting content in its interface, among others. In this connection, engagement is a determining factor in the generation of loyalty towards these applications, given that users with high levels of engagement feel motivated to continue ordering frequently through this medium. To foster user loyalty, MFOA operators can promote the generation of engagement by including a social environment, which is not yet part of the applications' functionalities. The new generations prefer to exchange opinions and information to make decisions when choosing a service or placing an order.

Similarly, these research findings lead to accepting H_2 ($\beta = 0.364$; $p < 0.001$), which posits that interactivity positively influences engagement. This finding is precious for MFOA operators as it suggests that two-way communication is required to build positive relationships and attitudes toward MFOA. Interactivity could be considered one of the most important predictors of loyalty in an MFOA as it favours communication between user and operator. For this reason, this study aimed to determine whether there was a significant indirect relationship between the two variables. This is consistent with previous research findings [19,70], which demonstrated that the interactivity-loyalty relationship can only exist through mediation. This finding can be explained by the fact that current users are more demanding and are not satisfied with just feeling heard, collecting feedback from other users regarding their orders, or being able to communicate their opinions or concerns through their MFOA. Users usually have to deal with overload environments, which affects their attention capacity and triggers digital exhaustion and anxiety [71]. Loyalty building goes beyond interactivity and requires the perception of more significant benefits to prefer one application over others or even generate a repurchase from the same restaurant.

In this line, both H_3 ($\beta = 0.578$; $p < 0.001$) and H_6 ($\beta = 0.587$; $p < 0.001$) are confirmed, which indicates that interactivity has a positive influence on convenience and safety. This result emphasises the importance of encouraging interactivity within MFOA as it impacts convenience and safety perceptions. By enabling two-way communication (conversation or opinion exchange), users can better understand the benefits of time and effort and create positive emotions towards the app while feeling heard and motivated to continue using it. Moreover, previous research has demonstrated that users are more engaged with an MFOA when they have interactive experiences [7].

The findings of H_4 ($\beta = 0.122$; $p < 0.05$) and H_5 ($\beta = 0.263$; $p < 0.001$) reveal that convenience also has a positive influence on engagement and loyalty towards MFOA. This result indicates that the user appreciates more benefits and increases their engagement when they perceive that the application enhances saving time and avoiding long lines. Therefore, operators should concentrate their communication efforts on highlighting these benefits and ensure that the service guarantees that the time a user spends buying food in a restaurant can be dedicated to other activities. These findings are also in line with Yoon & Kim (2007) [45] and Pang & Wang (2023) [72] in that positive perceptions of convenience and utilitarian and hedonic motivations associated with mobile shopping increase the degree of loyalty [42,48,73]. Users look for convenience and reduced effort when choosing this option, so operators should focus on strategies that make their lives easier, such as proper time management, the ability to adjust to the user's schedule, timely information, and a fast ordering process.

Finally, with the COVID-19 pandemic, people were forced to look for alternatives to continue consuming their food reliably and safely while complying with government requirements to maintain social order and avoid the possibility of contagion or a sanction. As a result of this mandatory confinement, the use of MFOA grew exponentially. This research examined this atypical situation by positing hypotheses H_7 ($\beta = 0.458$; $p < 0.001$) and H_8 ($\beta = 0.228$; $p < 0.001$), which were both accepted, thus showing that safety perceptions positively impact both engagement and loyalty to MFOA. Given the preceding, this study offers crucial information by demonstrating that a sense of safety when using these applications during COVID-19 strongly influences a user's way of thinking and interacting with them and whether they choose to buy from them or recommend them, demonstrating engagement and loyalty. This is why operators must continue to focus on creating experiences that encourage a sense of safety, cleanliness, and contribution to social order through their service, even when returning to normality after the COVID-19 pandemic.

5.2. Limitations and future research

This study has some limitations, and it is thus not possible for its results to be completely generalised. First, the research was applied to a particular geographic area and for the specific context of MFOA, so more evidence is required for extrapolating the results to other regions and industries. Second, although convenience sample design is widely used in studies of this type, it has limitations and possible biases, which is also true for collecting information through an online questionnaire.

The attitude variable could be included in future research works, bearing in mind that MFOA adoption increased during the pandemic even though it was not always voluntary; despite some users having an unfavourable attitude towards them, they needed an alternative to deal with the contingency. Likewise, future studies could analyse the effect of perceived risk on loyalty toward MFOA, given that the handling of these applications still generates uncertainty for some users regarding order confirmation, data treatment by the law and secure money handling. Also, future studies could analyse the main predictors of loyalty, namely satisfaction, trust, and commitment, and consider technology-related behaviours such as interaction with bots and artificial intelligence assistants and how technology may contribute to generating exhaustion and anxiety in users, as suggested by some authors [71,74]. Finally, the relationships of the variables addressed in this research could be examined in other sectors, such as applications for games, sports, and social networks, to advance and contribute more studies on the validity of these relationships with mobile application loyalty in general.

Given the points mentioned above, marketing managers should observe the aspects that need to be considered, along with clear indications on how to strengthen factors that affect the use of MFOAs to achieve increased engagement and loyalty. This can be achieved by providing brand experiences that foster emotional states going beyond purchase, repurchase, and recommendation. By doing so, those who implement changes focused on increasing interactivity, convenience, and safety as determinants of engagement

and loyalty could attain a competitive advantage over other apps.

Data availability statement

The data of this article can be obtained upon request.

Ethics statement

This study was reviewed and approved by Comité para el Desarrollo de la Investigación (CODI) with ethical reference 2015-CODI. All participants provided informed consent to participate in the study.

CRediT authorship contribution statement

Beatriz Londoño-Giraldo: Writing – original draft, Supervision, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Yésika María López-Ramírez:** Writing – review & editing, Data curation, Conceptualization. **Jenny Vargas-Piedrahita:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:Jenny Vargas-Piedrahita reports administrative support was provided by Alimentos Cárnicos SAS.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e28289.

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