

Factors influencing the post-implementation user satisfaction of SAP-ERPS

Factores que influyen en la satisfacción del usuario tras la implementación de SAP-ERPS

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ABSTRACT

Enterprise resource planning systems (ERPs) have become an essential management tool for large and small companies alike. Although several papers on ERPs have been published in recent decades, only some studies have focused on user satisfaction during post-implementation. Based on the theories of technological acceptance and task-technology fit, we examine how the interrelationship of individual attitudes and matching between task and ERP affects user satisfaction in a public university that adopted an SAP-ERP. We distributed a questionnaire and analyzed the responses of 126 users using a partial least squares structural equation modeling (PLS-SEM model). Results show that perceived utility and overall benefits significantly predict user satisfaction. Moreover, overall benefits are influenced by the perception of efficiency in the task, improvements in coordination, and strategic alignment. Customization of the system had no statistical effect on the model.

Keywords: SAP, ERP, user satisfaction, higher education, useful perception.

RESUMEN

Los sistemas de planificación de recursos empresariales (ERP) se han convertido en una herramienta de gestión esencial tanto para las grandes como para las pequeñas empresas. Aunque en las últimas décadas se ha publicado un gran número de artículos sobre los ERP, pocos estudios se han centrado en la satisfacción de los usuarios durante la fase posterior a la implementación. Basándonos en las teorías de la aceptación tecnológica y del ajuste tarea-tecnología, examinamos cómo la interrelación de las actitudes individuales y el ajuste entre la tarea y el ERP afecta a la satisfacción de los usuarios en una universidad pública que adoptó un SAP-ERP. Distribuimos un cuestionario y analizamos las respuestas de 126 usuarios mediante un modelo de ecuaciones estructurales de mínimos cuadrados parciales (PLS-SEM). Los resultados muestran que la utilidad percibida y los beneficios globales predicen significativamente la satisfacción de los usuarios. Además, los beneficios globales están influidos por la percepción de eficiencia en la tarea, las mejoras en la coordinación y la alineación estratégica. La personalización del sistema no tuvo ningún efecto estadístico en el modelo.

Palabras clave: SAP, ERP, satisfacción del usuario, educación superior, percepción de utilidad.

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INTRODUCTION

Enterprise resource planning systems, or ERPs, have become essential for managing large and small companies. SAP, the leading ERP brand, is used by more than 440,000 companies in 180 countries, and 92% of Global Forbes 2000 companies use it as a platform for their processes. The presence of ERPs has expanded as companies continue adapting to more significant complexities imposed by the Internet. Lately, emerging technologies such as cloud computing, robotics, and the Internet of things (IoT) have leveraged ERP implementation. Lower costs in ERP licenses have also pushed a sustained growth of this market, reaching even the smallest companies. This market is projected to reach \$70.3 billion by 2025, which implies a growth of 10.5% CAGR.

A large amount of literature on ERPs has recently been published [1]. Researchers have studied ERPs from different perspectives, including over thirty research areas, such as issues related to implementation, causes for failures, and critical success factors (CSF), among others. Much of the research has focused on CSFs [2-5]. A second topic widely addressed is the implementation of ERPs [6-8], and other authors have focused on implementation strategies [9-11].

A reportedly under-investigated area is ERPs' pre- and post-implementation [1, 12, 13]. In the pre-implementation phase, decisions are made to adopt the ERP, and all preparatory activities are executed. Consequently, it is highly intertwined with implementation and is a critical phase for its success [14]. The post-implementation phase is also under-studied. Several authors argue that ERP issues continue even after implementing the system [1], [15] argue that implementing an ERP does not end when the system "goes live." However, since investing in these systems is considered strategic, the benefits are typically observed for two to three years after implementation.

There is a consensus in the literature that researchers evaluate ERP implementation better, particularly in identifying whether the system meets organizational needs [1]. Authors have shown that user satisfaction impacts the use of the system by employees [1]. While these authors focus on the effects of ERPs at

the organizational level, few studies have focused on the effects of post-implementation at the user level [12]. A crucial gap, as user dissatisfaction can lead to ERP implementation failure or underutilization [8].

To address this gap, we researched how individual attitudes (perceived usefulness of the ERP) and the fit between the system and the user's tasks affected user satisfaction. The data was collected from a public university in Chile that, in 2017, adopted an ERP system based on SAP. The university decided to acquire SAP-ERP as part of its strategic modernization plan. In the first stage, the institutional purchasing and sales modules were implemented, identified as SD and MM, and budget planning, BCP. Likewise, part of the use of the modules HCM (salaries and contracts), T&E (travel and official duties), SSFF (official resume), FI (treasury and accounting), and CO (budgets). Management hoped to replace all the administrative systems used for more than 20 years by implementing an ERP that integrated the administrative and financial platforms.

The new system had a large impact on the organization. The most notorious effect was on the routines of the employees, as it generated user resistance. Consequently, implementing this ERP required the management to completely reengineer their processes and establish new procedures, thus increasing response times of routine procedures. After two years, upper management and users now agree that the ERP has begun to generate its anticipated benefits. Therefore, this case allows us the opportunity to study post-implementation user satisfaction.

This study makes two contributions to understanding ERPs effects post-implementation. First, it contributes to a greater understanding of ERP user satisfaction. Second, it provides new information on the effects of ERPs in academic institutions. The literature has scarcely researched ERP in this kind of institution, which, given a university's precise and complex nature, deserves a distinct look from researchers.

Methodologically, we gathered data from 140 SAP users using a questionnaire. After reviewing the answers, 126 questionnaires were processed. We tested the proposed model and the corresponding hypotheses using partial least squares.

CASE STUDY

We collected data through a survey of SAP-ERP users at a university located south of Santiago. It is a medium-sized public university with approximately 10,000 students.

In 2015, the university acquired an ERP system to replace all of its old systems that were run using silo software. In 2017, management began the process of implementing the ERP SAP R/3. The project's objective was to implement an ERP that would integrate the administrative and financial processes of the organization (purchases, contracts, and remunerations, among others), thus improving the coordination of tasks and decision-making.

This project impacted work routines, particularly because it generated resistance in university employees. Implementing the ERP required processes to be reengineered and new workflows to be established, resulting in new response times, different regulations, and changes in procedures and specialized work units. These changes led, in part, to the employees' resistance to the project.

Upper management implemented three measures to reduce resistance: 1) mass and periodic training for all users; 2) economic incentives to finish the training; and 3) tailoring the system by developing specific applications. After two years, the system is now used by most employees. Upper management and users have come to a consensus that the ERP has begun to produce its long-anticipated benefits.

The rest of this text is divided into six sections. The second section summarizes the theoretical framework relevant to this research. The third section describes the methodology used in this study. Results of the PLS model are presented in the fourth section, and the fifth section discusses these results. The last section presents the conclusions of this study.

THEORETICAL FRAMEWORK

ERP is a well-established area, and a plethora of published work exists. Authors have found a large number of published works studying various aspects of the ERP life cycle. Extant research predominantly focuses on the implementation phase, and more research is needed on pre and post-implementation

[1, 13]. Although the publication of studies on post-implementation is incipient, more research must be done. Post-implementation is the most extended phase, and many problems still need to be studied [13].

In studies focused on post-implementation, user satisfaction is a topic that has attracted the attention of researchers [13]. User satisfaction is considered one of the most important constructs for evaluating the success of IT ventures from a user perspective [16]. [17] explored the relationship between accounting benefits and the satisfaction of ERP users. They analyzed evidence from 175 accountants and 96 IT professionals in 193 companies. They confirmed that there are accounting benefits derived from ERP systems. [18] analyzed how user adaptation in the post-implementation phase influences perceived benefits. Their results showed that sustainable benefits of ERPs after implementation mainly depend on users' degree of adaptation to the system.

Post-implementation user satisfaction has been studied from different perspectives. A study by [19] examines the organizational factors that influence ERP implementation. Their results suggest that the support and commitment of senior management are critical for the system's success. Furthermore, the success of implementation depends on user satisfaction and the correct use of the system. [20] studied the effect of social structure on user participation in post-implementation. They found that centrality positively affects post-implementation in three dimensions: user participation, practical activity, and group communication. These dimensions positively affect user satisfaction. A study by [21] investigated determinants contributing to user satisfaction and the successful adoption of ERP. The results showed that senior management support, training, and system quality are predictors of user satisfaction [22] analyzed the influence of the work position and educational level of users on their satisfaction with the ERP system. They found that users' years of education and position are directly related to their satisfaction with this type of system [7] and found that organizational factors were most effectively managed when the highest rate of positive perception was obtained; however, preventive, corrective measures were neither adequate nor sufficient, obtaining the least positive perception.

Other researchers have focused on the system, information, and service quality aspects of an ERP. [12] studied what ERP qualities affected its successful implementation. Based on the Delone and McLean model, they found that three qualities determine user satisfaction: service quality, system quality, and information quality. [23] analyzed ERPs' impact on users' performance in higher education institutions. They found that end-user performance is affected by factors such as system quality, task-technology fit, and information quality. [24] studied the impact of ERP utility on implementation success through the mediating role of user satisfaction. They concluded that the usability of an ERP's usability significantly influences the project's successful implementation, specifically in terms of individual and organizational success. [25] explored the consequences of implementing an ERP, studying the Flagship University in Botswana. They found that improving management efficiency and user satisfaction confirms the success of the ERP. Participants also detected obstacles in the system, such as inaccurate information, establishing new routines for academic and administrative staff, facing deficiencies in change management, and needing more training/support.

Another perspective is how the organization can improve user satisfaction with the ERP. Al-Jabri [26] examined the impact of communication campaigns, training, perceived benefits, and ease of use on user satisfaction with ERP. The results show that ease of use and perceived benefits mediate the relationship between training and satisfaction and partially mediate the relationship between communication and satisfaction. [27] When using ERP, the impact of adequate training since previous studies had determined that conventional training does not allow users to understand the system fully and directly results in lower user satisfaction. The authors sought to measure the effects of gamification in training. Their results show that users trained with a gamified method learned better than those trained with conventional methods, reaching higher levels of user satisfaction. [28] studied the determinants of successful ERP implementation in the health field. They found a significant influence of training, leadership support, and ease of use on the success of the implementation. They also found that user satisfaction plays an important role in the ease of use and successful of ERP implementation.

THEORETICAL GAP AND HYPOTHESIS PROPOSAL

Previous literature makes it clear that user satisfaction is a key factor in understanding the success of an ERP in the post-implementation phase. Many studies have investigated user satisfaction from different perspectives. These studies have demonstrated the positive effects of system and information quality on user satisfaction [19-21]. Other ones have shown that individual factors, such as perceived usefulness and ease of use, influence user satisfaction [7, 29]. Indeed, [30] found that user perception and perceived usefulness is a significant determinants of end-user satisfaction, which assists in the maximum utilization of the ERP system. However, studies that have analyzed the combined effect of individual factors and task-ERP adjustment on user satisfaction are more limited.

Evidence shows that a good fit between the user's task and the system's functionality improves user satisfaction and performance [23]. One of the first papers to propose this positive relationship was the Task-Technology Fit Theory or TTF [31]. TTF proposes that a good match between the task and the system will positively impact the user's performance and the system's use. Later, [32] proposed that task-technology fit was a predictor of user satisfaction and ERP success. Several studies have confirmed that user satisfaction can be explained by the fit between the task and the technology. [33] investigated the use of an ERP using the TAM and TTF models, finding that TAM and TTF help predict the use of an ERP. [34] TTF had a strong positive impact on user satisfaction with the Internet and its performance.

We propose that the user perceives the task-technology fit as a general benefit of the ERP. Studies have confirmed the considerable influence of aspects regarding ERP because user satisfaction is formed through users' overall perception of the system [35]. [36] focused on the benefits of ERP. While previous literature specifically focused on the implementation process, the authors focused on the post-implementation benefits of an ERP system. They studied the effects of system customization-the ability to align the ERP with organizational procedures, efficiency in tasks, and improvements in coordination-on user satisfaction. Their study concludes that customization and organizational mechanisms strongly related to the users' perception of benefits.

HYPOTHESIS

Previous studies highlight the importance of expanding research regarding the user satisfaction of ERPs. Several studies address this issue, most of them during the implementation stage. However, there needs to be more research on user satisfaction in the post-implementation stage. Based on the studies by [37, 29 and 36], we decided to carry out an institutional-level study to analyze the relationship between the concepts reviewed and their influence on user satisfaction.

One of the first works that studied factors influencing user satisfaction was [30]. They found that perceived utility and learning capacity are predictors of satisfaction. [38] found that the satisfaction of ERP users is determined, among other reasons, by the quality of the ERP system, the perceived utility, and the quality of the information provided by the system [39]. [40] establish that user satisfaction and perceived utility are predictors for whether to continue with an ERP. This information leads us to the first hypothesis of this investigation:

H1: Perceived utility positively affects user satisfaction.

[41] suggests that the benefits of an ERP are interconnected, and that business leaders should perceive the realization of those benefits as a continuous cycle in implementation and post-implementation. [42] claims companies should only adopt an ERP if the perceived benefits exceed the associated risks and costs. Also, [43] presents evidence that satisfaction with an ERP increases when the user understands that the system will allow them to improve their performance without additional effort. Therefore, a company needs to have an IT Government that communicates the overall benefits of the ERP effectively [44]. As a result, this leads us to the second hypothesis of this investigation:

H2: Perceived overall benefits positively affect user satisfaction.

[36] found that the overall benefits perceived by users can be explained by four constructs: system customization or personalization, task efficiency, coordination improvements, and strategic alignment. We will now develop each of these hypotheses.

Customization, defined as a strategy to adapt ERP to the needs of an organization and to reduce the mismatch between existing procedures and routines and the system, may affect how users perceive benefits [45]. Studies on the positive effects of ERP customization on user satisfaction are inconclusive. [46] concluded that the number of customizations and modifications of the ERP system has no substantial impact on the use of the ERP or user satisfaction. [47] points out that professionals and suppliers recommend personalizing the software as little as possible and instead adapting processes to meet the system's features. Lastly, [48] claims that effectively implementing ERP add-on programs should be limited since they reduce the advantages of a system intended to standardize the company's business processes. However, these results are only partially conclusive because studies indicate that the personification of ERP did not affect the perceived benefit of the system. For instance, [29] measured the end-user satisfaction of ERP-SAP. The authors showed a strong association between user satisfaction and perceived usefulness. However, they also concluded that if the ERP's user interface is standard, the level of satisfaction will stay the same. This association leads us to the third hypothesis:

H3: Customization positively affects the overall benefits perceived by the user.

Task efficiency states that employees are more efficient when they have more instant access to information and when the different units of an organization are more interdependent [49]. A successfully implemented ERP could deliver updated, real-time information to the company's employees, from executives to frontline employees. Consequently, ERPs can reduce labor and inventory costs and improve productivity [50]. Companies with knowledge of IT governance will achieve greater effectiveness in routine tasks during the post-implementation stage [44]. Ultimately, the main reasons an ERP tool is used are related to management efficiency and user satisfaction [25]. These reasons lead us to the fourth hypothesis.

H4: The perception of task efficiency positively affects the overall benefits perceived by the user.

Because the purpose of an ERP is to improve internal coordination between different departments in an

organization, improving coordination should affect the benefits perceived by users [51, 52] show that organizational coordination –redesign and integration of the organizational process– and organizational learning are critical for reducing implementation costs. [53] mention that successfully implementing ERP can improve the coordination between units and lead to faster and better decisions. Companies that decide to implement an ERP need resources and coordination across areas. Without these, they will probably not succeed [54]. In this context, the fifth hypothesis of this study is:

H5: The perception of coordination improvements positively affects the overall benefits perceived by the user.

[55] demonstrated a positive association between strategic alignment and ERP projects. They determined that the more the ERP strategy is aligned with the commercial strategy, the more likely the ERP project will be completed within the established time and budget. [56] established that management commitment and a clear strategic objective are critical in implementing a successful ERP. According to [57], intangible factors such as strategic alignment, leadership commitment, and corporative culture significantly impact on the implementation of an ERP. In the review by

[58], senior management and strategic alignment support were the most frequent when implementing an ERP. [59] claims that the implementation of an information system must be aligned with the needs and business strategy of the company. [60] explain that a company must consider its particular business requirements and strategic alignment to implement an ERP successfully. These requirements lead us to the sixth hypothesis:

H6: The perception of strategic alignment positively affects the overall benefits perceived by the user.

Figure 1 shows the proposed hypothesis model for this research.

METHODOLOGY

Data collection

Data collection consisted of a three-stage process. The first phase was preparing the questionnaire and piloting it with ten users to eliminate errors in writing and understanding. The users were of different ages, positions, and user profiles in SAP. The responses to the pilot test were not included in the final database. The changes made after the pilot were minor and mainly related to writing, except for two items that were eliminated because they did not correspond to the

Source: Own elaboration.

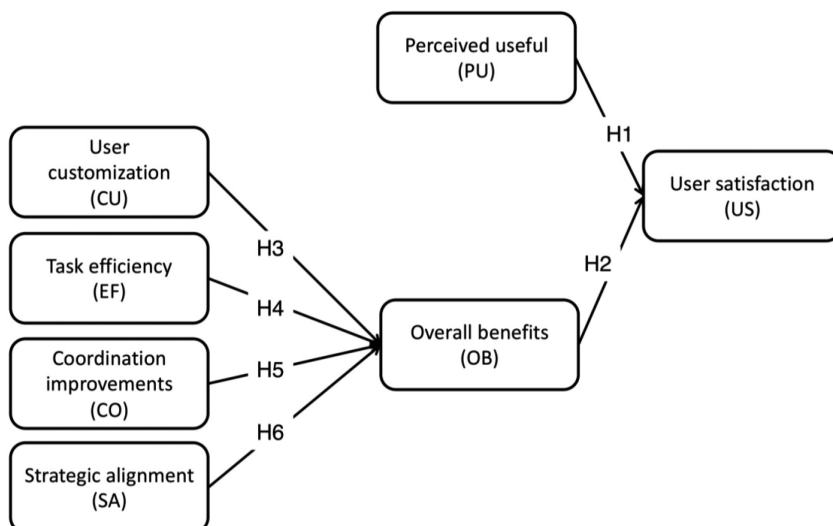


Figure 1. Proposed hypothesis model.

context at the university. The second stage consisted of distributing the questionnaire. The last stage was processing the data. In order to discover patterns of false answers, six questions were configured with inverted scales. These inverted questions allowed us to verify whether the users gave reflected answers. All cases in which these questions were answered inconsistently were discarded from the database.

In the end, the questionnaire was composed of 48 questions, divided into two sections. The questions in the first section were demographic, such as types of users (SAP establishes two types: approvers and requesters), sex, age range, and others. The second section was intended to measure the seven constructs of the model (see Appendix 1). These items were based on the findings of previous studies to ensure content validity [36, 37, 29]. Satisfaction with the system (SS) and perceived utility (PU) constructs were measured using 12 items (see Table 1). System customization (SC) and strategic alignment (SA) constructs were measured using five items. The constructs for overall benefits (OB), task efficiency (EF), and coordination improvements (CI) were measured using three items. All items were answered using a five-point Likert scale.

140 users answered the survey; 14 questionnaires were discarded because they were incomplete or because participants answered the inversed questions inconsistently. Finally, 126 surveys were processed. Of them, 48 were approving users, and 78 were requesting users.

Table 1. Number of items by constructs.

Construct	Items
Satisfaction	12
Perceived Utility	12
Overall Benefits	03
Customization	05
Task Efficiency	03
Coordination Improvements	03
Strategic Alignment	05

Source: Own elaboration.

RESULTS

The proposed model and the corresponding hypotheses were tested using PLS-SEM. We

used the software SmartPLS 3.2.9. Authors have highlighted the advantages of PLS-SEM over other methods, such as CB-SEM. [61] the arguments are that PLS-SEM is appropriate when the research focus is predictive rather than explanatory. Also, an advantage of PLS-SEM is that it produces a specific score for each composite for each observation [61]. Finally, PLS-SEM can manipulate data that do not follow a normal distribution.

Analysis with PLS began by examining the measurement model to assess the reliability and validity of constructs and items. Subsequently, the structural model and its hypotheses were tested. And we finished by analyzing the quality of the model.

EVALUATION OF THE MEASUREMENT MODEL

Table 2 and Table 3 present the results of the final measurement model, including information on the measurement model's reliability, validity, and loads. Even though most of the items were validated in [36, 37], and [29], for this study, the items were revalidated in terms of reliability and validity.

Table 2 presents the cross loads of the items. To evaluate the measurement model, we followed the recommendations of [61]; acceptable loads for each item are those over 0.7; 34 of our items met this criterion. According to the authors' recommendations three items had a load lower than 0.4 and were immediately eliminated. The remaining eleven items were in the range of 0.4 to 0.7. [61] suggest that in these cases, the effect of these items on the reliability and validity of the model should be reviewed individually to decide whether to remove them or not. Of the eleven, we decided to eliminate six, and five remained. In total, nine items were removed, which is 20% of the total 45 items. This number of items removed is the maximum acceptable to avoid having problems measuring the constructs. The load patterns supported the internal consistency of the final measurement model.

Reliability and validity were evaluated using three criteria (Table 3). Internal consistency (reliability) was established using composite reliability (CR) and Cronbach's Alpha. In all constructs, both indicators exceeded the established minimum threshold of 0.7 [62]. Convergent validity was established using the AVE criteria. As seen in Table 3, all AVEs are more

Table 2. Loads of the measurement model.

	OB	EF	CO	CU	SA	US	PU
BB1	0.894						
BB2	0.957						
BB3	0.931						
BE1		0.804					
BE2		0.839					
BE3		0.831					
BE4		0.900					
BE5		0.830					
BM1			0.924				
BM2			0.946				
BM3			0.934				
BP1				0.830			
BP2				0.675			
BP3				0.666			
BP4				0.630			
BP5				0.788			
BT1					0.813		
BT2					0.827		
BT4					0.815		
BT5					0.747		
S1						0.779	
S2						0.786	
S3						0.768	
S4						0.846	
S6						0.775	
S7						0.784	
S8						0.795	
S9						0.821	
S10						0.787	
S11						0.610	
S12						0.738	
U1							0.742
U3							0.821
U5							0.805
U8							0.836
U9							0.663

Source: Own elaboration.

significant than 0.5, established as a minimum threshold [61, 62], indicating satisfactory convergent validity.

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio Criteria (HTMT). To determine discriminant validity, researchers often use cross-loading or Fornell-Larcker criteria [61]. However, recent research has found that cross-loads have problems detecting validity failures when two constructs are highly correlated, so [61] suggests that HTMT is a better discriminant validity indicator. This criterion establishes that the confidence interval of the HTMT statistic should not include the value 1 for all combinations of constructs [61]. Table 4 shows that all indicators are within the acceptable range, confirming the discriminant validity of the model.

STRUCTURAL MODEL

We implemented a bootstrapping method to evaluate the structural model (5,000 sub-samples, BCa bootstrap, two-tailed, and 5% significance level). Firstly, we check the structural model for collinearity issues among predictors. VIF values above 5 indicate collinearity issues. None of the VIF values were greater than 5, indicating no collinearity problems. Table 5 reveals that five of the six hypotheses are supported. The most influential construct in user satisfaction is perceived utility ($\beta = 0.607$). The overall benefits construct the second most influential ($\beta = 0.282$). Moving on in the model, three of the four constructs significantly influence on the overall benefits. The most influential construct in overall benefits is improvements in coordination ($\beta = 0.374$), followed by strategic alignment ($\beta = 0.369$) and task efficiency ($\beta = 0.245$). The customization of the system does not influence the overall benefits.

Figure 2 summarizes the results of the structural model. As can be seen, coordination improvement, task efficiency, and strategic alignment account for 66.9% of the variance in overall benefits ($R^2 = 0.669$), which is a moderate to substantive value. On the other hand, the overall benefits and perceived utility constructs explain 68.4% of the variance of user satisfaction ($R^2 = 0.684$), which is a moderate to substantive value.

MODEL QUALITY

Three aspects were evaluated: the effect of size (f^2), the predictive relevance of the model (see Table 6), and

Table 3. Construct reliability and validity of the measurement model: Cronbach's Alpha, Composite Reliability, and AVE.

	Cronbach's Alpha (> 0.7)	Composite Reliability (> 0.7)	Average Variance Extracted (AVE) (> 0.5)	Reliability established?	Divergent validity established?
CO	0.928	0.954	0.874	YES	YES
CU	0.717	0.838	0.635	YES	YES
EF	0.897	0.924	0.708	YES	YES
OB	0.919	0.949	0.861	YES	YES
PU	0.833	0.889	0.667	YES	YES
SA	0.816	0.878	0.642	YES	YES
US	0.933	0.944	0.626	YES	YES

Source: Own elaboration.

Table 4. Heterotrait-Monotrait Ratio (HTMT) for discriminant validity evaluation (5,000 sub-samples, BCa bootstrap, two-tailed, and 5% level of significance).

	Sample Mean (M)	2.5%	97.5%	Discriminant validity established? (*)
CU -> CO	0.820	0.692	0.913	YES
EF -> CO	0.706	0.590	0.805	YES
EF -> CU	0.675	0.540	0.796	YES
OB -> CO	0.779	0.677	0.864	YES
OB -> CU	0.706	0.568	0.815	YES
OB -> EF	0.717	0.590	0.813	YES
PU -> CO	0.832	0.739	0.904	YES
PU -> CU	0.749	0.611	0.852	YES
PU -> EF	0.733	0.597	0.840	YES
PU -> OB	0.806	0.673	0.899	YES
SA -> CO	0.583	0.374	0.728	YES
SA -> CU	0.754	0.592	0.865	YES
SA -> EF	0.532	0.355	0.672	YES
SA -> OB	0.768	0.637	0.865	YES
SA -> PU	0.540	0.328	0.698	YES
US -> CO	0.750	0.635	0.842	YES
US -> CU	0.731	0.578	0.839	YES
US -> EF	0.718	0.596	0.812	YES
US -> OB	0.765	0.660	0.849	YES
US -> PU	0.909	0.801	0.980	YES
US -> SA	0.555	0.330	0.719	YES

(*) HTMT confidence interval does not include 1.

Source: Own elaboration.

Table 5. Results of the bootstrapping test to evaluate the structural model (5,000 sub-samples, BCa bootstrap, two-tailed and significance level of 5%).

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Conclusion
PU -> US	0.607	0.621	0.082	7.425	0.000	Supported
OB -> US	0.282	0.268	0.085	3.326	0.001	Supported
CU -> OB	-0.007	0.006	0.075	0.098	0.922	Not Supported
EF -> OB	0.245	0.252	0.077	3.204	0.001	Supported
CO -> OB	0.374	0.357	0.092	4.069	0.000	Supported
SA -> OB	0.369	0.368	0.057	6.466	0.000	Supported

Source: Own elaboration.

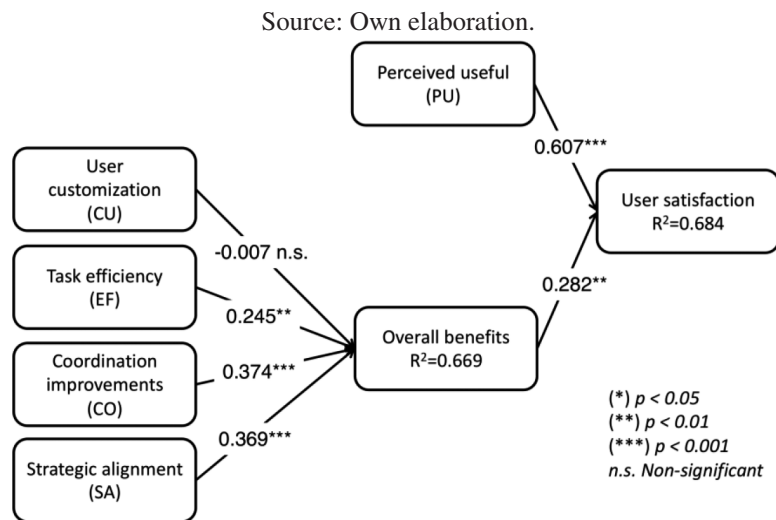


Figure 2. The resulting structural model.

the model's fit to measure the model's quality. The size effect is used to measure a construct's impact on the dependent variable [61]. Table 6 shows that efficiency in the task had a common effect on overall benefits ($f^2 < 0,020$), while improvements in coordination and strategic alignment had a medium effect ($0,020 > f^2 > 0,150$). Overall benefits had a common effect on user satisfaction, and strategic alignment significantly affected user satisfaction ($f^2 > 0,350$).

We measured the predictive relevance of the model using the value Q^2 [61]. In the case of the overall benefits construct, Q^2 was 0.579; for user satisfaction, Q^2 was 0.409.

Considering the f^2 obtained, and given that both Q^2 are much higher than zero, the results support the predictive relevance of the model regarding user satisfaction.

Table 6. Effect of the model.

	OB	US	Conclusion
PU		0.592	High
OB		0.128	Low
CU	0.000		Non-effect
EF	0.098		Low
CO	0.171		Medium
SA	0.250		Medium

Source: Own elaboration.

DISCUSSION

The results obtained in this study confirm the first two hypotheses. Both the utility and the overall benefits perceived by SAP users in the institution are significant determinants of user satisfaction.

The perceived utility is the factor that most strongly influences user satisfaction, and this finding is consistent with existing literature. For example, [30] concluded that perceived utility predicts satisfaction. Our results also coincide with [29], who confirmed a strong correlation between perceived utility and user satisfaction. Likewise, our results corroborate [39], who explains that the satisfaction of ERP users is due, among various reasons, to the system's perceived utility.

As for the overall benefits, our results are consistent with the findings of other researchers. They confirm [41] claims that reviewing benefits is a crucial part of the post-implementation stage and should be part of a continuous cycle. Additionally, our study verifies the findings of [42], who claims that companies will adapt and implement an ERP only if the benefits exceed the associated risks. Similarly, [43] concluded that users' satisfaction with an ERP is more significant when they understand that the system allows them to perform better without additional effort.

Our findings also confirm that coordination improvements, task efficiency, and strategic alignment

significantly affect the overall benefits. Improvement in coordination shows the most robust relationship. This result confirms previous findings. For example, [51] states that an organization adopting an ERP intends to improve coordination between its departments. Likewise, our result validates the claims of [53], who explain that correct implementation will lead to better coordination between units, allowing for better decision-making. Therefore, organizational coordination is critical to implement an ERP at a lower cost [52].

Regarding the task efficiency hypothesis, our results coincide with [49], who states that employees are more efficient when they have instant access to information. A successfully-implemented ERP will be able to deliver updated information [50]. At the same time, our results confirm the [25] study, which claims that management efficiency is one of the main reasons an ERP system is used.

In terms of strategic alignment, the significance of this variable is not a surprise and corroborates what is established by other researchers. For example, [55] shows that the more aligned the ERP system strategy is with the commercial strategy, the more likely the project will be executed on time. For their part, [56] claims that managerial commitment and a strategic objective are fundamental in implementing an ERP. Our results corroborate the importance of strategic alignment in the successful implementation of an ERP [57, 58, 60].

Compared to the previous hypotheses, customization does not influence the perception of overall benefits. This finding strongly contradicts the statements of various authors who claim that personalization affects the perception of overall benefits. For example, [36] concluded that personalization significantly influences benefits. [45] establish personalization as a strategy that allows companies to reduce the mismatch between software and the company's needs. Also, personalization is one of the criteria when incorporating an ERP system [63].

The university being studied is one explanation for why customization does not significantly affect user satisfaction. During implementation, the organization invested substantial resources in customizing the ERP-SAP; however, most users

use the SAP purchasing module, which is highly standardized in this ERP. We might question the efforts of the organization to customize an ERP predominantly used for its more standard modules. In the literature, the customization of ERPs has already been questioned. [47], for example, suppliers and professionals recommend limiting customization and focusing instead on adapting processes to the functionalities provided by the software. Similarly, [48] suggests that customization should not be used only for successful implementation as it reduces the advantages of software in the organization. Considering that the literature is inconclusive regarding the effect of personalization on the perception of overall benefits, more detailed studies on this construct are necessary.

CONCLUSIONS

This research seeks to better understand user satisfaction in an organization that adopted an ERP. We studied a Chilean university that implemented SAP as a new system to integrate its administrative and financial processes. Our results show that the utility perceived by users and the perception of overall benefits significantly predict user satisfaction. The perception of overall benefits is influenced by three factors: improvements in coordination, perception of efficiency in the task, and strategic alignment. The personalization of the system had no statistical effect on the model.

THEORETICAL IMPLICATIONS

This study contributes to a better understanding of the factors influencing ERP user satisfaction. Our results confirm that individual attitude (perceived usefulness) and task and system fit predict ERP user satisfaction. The 68,4% variance in user satisfaction indicates that the two constructs combined have a substantial level of explanation for user satisfaction. Our results show that customization did not effect satisfaction. Other authors have found the opposite, so more research is needed on the effects of ERP customization on user satisfaction. Likewise, our results confirm the value of the general benefits perceived in satisfaction; therefore, to provide a better understanding of the value of this construct, it is necessary to study it in depth, including more background and new variables.

PRACTICAL IMPLICATIONS

SAP is the most widely used ERP, which has important implications for companies that want to use this software. At the beginning of this article, we stressed that user satisfaction might be a reason for the partial use or even the failed implementation of an ERP. In that sense, to successfully manage the implementation of an ERP, upper management must ensure that users feel satisfied with the new ERP. To achieve this, project managers must make sure that the system helps users in their daily tasks and that users can perceive the benefits provided by the system in terms of efficiency and improved coordination. It must also be clear that there is alignment between the strategy of the organization and the ERP. Our results also show that efforts at personalizing the system do not contribute to satisfaction; therefore, management should not devote substantial resources to tailoring the system but rather allocate those resources to increasing the user perception of ERP utility.

LIMITATIONS AND FUTURE RESEARCH CONSIDERATION

This study has some limitations. It is a cross-sectional study, and the results could improve if a longitudinal study is carried out. The ERP implemented only included two modules, so there are processes and members of the organization that have not been directly affected by the system. The results may change when other modules are implemented. In this study, only SAP, a specific type of ERP, was analyzed, and the results could be studied with another type of ERP with different characteristics or from other brands. The study sample came from a small group of SAP users and an academic institution, a particular type of organization. It is then necessary to do more research on factors influencing post-implementation user satisfaction in other organizations such as companies, health institutions, and small businesses.

A final limitation is related to the individual's attitude. We do not include other constructs that measure users' attitudes, such as ease of use or social influence. Adoption theory has shown that these constructs and others influence the user's attitude toward technology adoption. Future work may include other user attitude constructs to validate or improve our results.

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APPENDIX 1

Question in spanish	Question in english
Creo que SAP proporciona la información exacta que necesito.	I believe SAP provides the exact information I need.
Me siento satisfecho con la precisión de SAP.	I am satisfied with the accuracy of SAP.
Pienso que SAP proporciona información actualizada.	I feel that SAP provides up-to-date information.
Siento que la información contenida en SAP satisface mis necesidades.	I feel that the information contained in SAP meets my needs.
Creo que SAP es intuitivo.	I think SAP is intuitive.
Pienso que SAP me proporciona suficiente información.	I feel that SAP provides me with enough information.
Creo que SAP y Success Factors se presentan en un formato útil.	I think SAP and Success Factors are presented in a useful format.
Creo que estoy conforme con los informes que entrega SAP para realizar mi trabajo.	I think I am satisfied with the reports that SAP delivers to do my job.
Cuando necesito información, SAP me la entrega oportunamente.	When I need information, SAP delivers it to me in a timely manner.
Pienso que la información en SAP es clara.	I think the information in SAP is clear.
Creo que SAP es fácil de usar.	I think SAP is easy to use.
Creo que SAP es preciso.	I think SAP is accurate.
Siento que el sistema ha superado mis expectativas iniciales.	I feel the system has exceeded my initial expectations.
Si SAP dejara de funcionar, siento que podría seguir haciendo mi trabajo bien.	If SAP were to stop working, I feel I could continue to do my job well.
Siento que SAP me ayuda a desempeñar de mejor forma mi trabajo.	I feel that SAP helps me perform my job better.
Antes de la implementación de SAP realizaba mejor mi trabajo.	Before the SAP implementation I performed my job better.
Siento que los reportes y resultados que me proporciona el sistema SAP son útiles.	I feel that the reports and results provided to me by the SAP system are useful.
Creo que los datos que recibo de SAP requieren corrección frecuentemente.	I feel that the data I receive from SAP requires frequent correction.
SAP me sobrecarga con más datos de los que siento que puedo usar.	SAP overloads me with more data than I feel I can use.
Creo que SAP me proporciona informes que parecen ser lo que exactamente necesito.	I feel that SAP provides me with reports that seem to be exactly what I need.
Entiendo cómo funciona SAP y cómo me ayuda en mi trabajo.	I understand how SAP works and how it helps me in my job.
Siento que SAP es difícil de operar para realizar mi trabajo.	I feel that SAP is difficult to operate to do my job.
Me gustaría que SAP fuese modificado o rediseñado nuevamente desde el principio.	I would like to see SAP modified or redesigned again from the ground up.
Pienso que una mayor cantidad de personas en la Universidad debería utilizar SAP.	I think that more people at the University should use SAP.
Siento que SAP ha sido ajustado para adaptarse bien a la Universidad.	I feel that SAP has been adjusted to fit the University well.
Pienso que el Departamento ERP Corporativo responde a las necesidades de sus usuarios y de la Universidad.	I think the Corporate ERP Department is responsive to the needs of its users and the University.
Pienso que los funcionarios tuvieron gran influencia en cómo fue configurado SAP en la Universidad.	I think the staff members had a great influence on how SAP was configured at the University.
Sé que en el proceso de implementación hubo que realizar cambios en SAP para ajustarse a los requisitos particulares de la Universidad.	I know that in the implementation process changes had to be made to SAP to fit the particular requirements of the University.
Siento que SAP fue modificado para satisfacer mejor las necesidades de la Universidad.	I feel that SAP was modified to better meet the needs of the University.
Siento que SAP ha mejorado la coordinación entre las diferentes unidades de la Universidad.	I feel that SAP has improved coordination between the different units of the University.
Pienso que SAP facilita la integración de información importante entre las diferentes unidades de la Universidad.	I feel that SAP facilitates the integration of important information between different units of the University.
Creo que SAP ayuda a diferentes unidades a estar sincronizadas.	I think SAP helps different units to be synchronized.

Question in spanish	Question in english
Siento que después de la implementación de SAP, los funcionarios que realizan compras, solicitan fondos y planifican presupuesto, necesitan menos tiempo para hacer su trabajo.	I feel that after the implementation of SAP, staff members who make purchases, request funds, and plan budget, need less time to do their work.
Siento que SAP ahorra tiempo en los procesos de finanzas, gestión de personas, o financiamiento institucional, entre otros.	I feel that SAP saves time in the processes of finance, people management, or institutional financing, among others.
Siento que después de la implementación de Success Factors, los funcionarios que realizan contratos a honorarios y supervisan procesos, necesitan menos tiempo para hacer su trabajo.	I feel that after the implementation of Success Factors, staff members who perform fee-based contracts and supervise processes need less time to do their work.
Creo que SAP ayuda a los funcionarios que realizan compras, solicitan fondos y planifican presupuesto, a ser más productivos.	I believe that SAP helps staff members who make purchases, request funds and plan budgets to be more productive.
Creo que Success Factors ayuda a los funcionarios que realizan contratos de honorarios y supervisan procesos, a ser más productivos.	I believe Success Factors helps staff members who perform fee contracts and oversee processes to be more productive.
Sé que el equipo directivo a cargo de SAP está alineado con los objetivos estratégicos de la Universidad.	I know that the management team in charge of SAP is aligned with the University's strategic objectives.
Posterior a la implementación de SAP, sé que se han definido equipos de trabajo para seguir desarrollando proyectos específicos del sistema.	After the implementation of SAP, I know that work teams have been defined to continue developing specific projects of the system.
Sé que existe una unidad que ayuda a los usuarios en las operaciones diarias de SAP.	I know that there is a unit that assists users in the daily operations of SAP.
Sé que existe un equipo que se reúne periódicamente para discutir problemas existentes en SAP y planificar mejoras.	I know that there is a team that meets periodically to discuss existing SAP problems and plan improvements.
Sé que la universidad ha participado en actividades nacionales e internacionales vinculadas a SAP.	I know that the university has participated in national and international activities related to SAP.
Siento que SAP ha sido un éxito.	I feel that SAP has been a success.
Creo que SAP ha mejorado significativamente el desempeño general de la institución.	I feel that SAP has significantly improved the overall performance of the institution.
Siento que SAP ha tenido un efecto positivo relevante en la institución.	I feel that SAP has had a relevant positive effect on the institution.