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The impact of service quality dimensions and language barriers on user satisfaction: A PLS-SEM analysis of global project management platforms

Wpływ wymiarów jakości usług i barier językowych na satysfakcję użytkowników: analiza PLS-SEM globalnych platform zarządzania projektami

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Abstract:

Research objectives and hypothesis/research questions

Grounded in the DeLone and McLean IS Success Model and the SERVQUAL framework, the research proposes that Usability Quality (UQ), Information Quality (IQ), and Service Interaction Quality (SIQ) serve as positive antecedents, while Language Barrier (LB) functions as a negative antecedent, of Overall User Satisfaction (OS).

Research methods

Employing a positivist, deductive approach, survey data were collected from 150 professionals operating in the multilingual business context of Malaysia. The data were analyzed using the rigorous analytical technique of Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess the measurement model's validity and test the structural hypotheses.

Main results

The results provide robust empirical support for the entire model. All four hypotheses were confirmed, revealing that Usability Quality (β = 0.42, p < 0.001) is the strongest positive predictor of satisfaction, followed by Service Interaction Quality (β = 0.31, p < 0.001) and Information Quality (β = 0.28, p < 0.001). Critically, the Language Barrier (β = -0.15, p = 0.004) demonstrated a statistically significant negative impact. Collectively, these constructs explain a substantial 68% of the variance in User Satisfaction.

Implications for theory and practice
Theoretically, this research makes a substantive contribution by successfully integrating a sociolinguistic communication barrier into established information systems success and service quality paradigms, thereby bridging discrete literatures and offering a more holistic framework for understanding digital service evaluation in globalized contexts. For practitioners, including SaaS product managers and executives, the findings deliver a validated, strategic roadmap. They underscore that achieving superior satisfaction and sustainable competitive advantage necessitates a synchronized, multi-faceted strategy: relentless investment in intuitive user experience design, ensuring impeccable data integrity and governance, cultivating a customer support function characterized by empathy and expertise, and implementing proactive, comprehensive localization to mitigate linguistic and cultural friction, thereby fostering a truly inclusive global user experience.

Keywords:
user satisfaction, SaaS, project management platforms, usability quality, information quality, service interaction quality, language barrier, PLS-SEM

Abstrakt:
Cel badań i hipotezy/pytania badawcze
Badania oparte na modelu sukcesu IS DeLone'a i McLeana oraz na modelu SERVQUAL sugerują, że Jakość Użyteczności (UQ), Jakość Informacji (IQ) oraz Jakość Interakcji z Usługami (SIQ) są pozytywnymi poprzednikami, podczas gdy Bariera Językowa (LB) pełni rolę negatywnego poprzednika ogólnej Satysfakcji Użytkownika (OS).
Metody badawcze
Stosując pozytywistyczne, dedukcyjne podejście, zebrano dane ankietowe od 150 specjalistów działających w wielojęzycznym kontekście biznesowym Malezji. Dane zostały przeanalizowane z użyciem rygorystycznej techniki analitycznej Partial Least Squares Structural Equation Modeling (PLS-SEM), aby ocenić trafność modelu pomiarowego i przetestować hipotezy strukturalne.
Główne wyniki
Wyniki stanowią solidne empiryczne wsparcie dla całego modelu. Wszystkie cztery hipotezy zostały potwierdzone, ujawniając, że Jakość Użyteczności (β = 0,42, p < 0,001) jest najsilniejszym dodatnim predyktorem satysfakcji, następnie Jakość Interakcji z Usługami (β = 0,31, p < 0,001) oraz Jakość Informacji (β = 0,28, p < 0,001). Co istotne, Bariera Językowa (β = -0,15, p = 0,004) wykazała statystycznie istotny negatywny wpływ. Łącznie te konstrukcje tłumaczą znaczące 68% wariancji w Satysfakcji Użytkownika.
Implikacje dla teorii i praktyki
Teoretycznie badania te wnoszą istotny wkład, skutecznie integrując barierę komunikacji socjolingwistycznej z ustalonymi paradygmatami sukcesu systemów informacyjnych i jakości usług, łącząc tym samym odrębne literatury i oferując bardziej holistyczne ramy zrozumienia oceny usług cyfrowych w kontekstach zglobalizowanych. Dla praktyków, w tym menedżerów produktów SaaS i kadry zarządzającej, wyniki stanowią zweryfikowaną, strategiczną mapę drogową. Podkreślają, że osiągnięcie najwyższej satysfakcji i trwałej przewagi konkurencyjnej wymaga zsynchronizowanej, wieloaspektowej strategii: nieustannego inwestowania w intuicyjne projektowanie doświadczenia użytkownika, zapewnienia nieskazitelnej integralności i zarządzania danymi, rozwijania funkcji wsparcia klienta opartej na empatii i eksperckości oraz wdrażania proaktywnej, kompleksowej lokalizacji w celu ograniczenia tarć językowych i kulturowych, co sprzyja prawdziwie inkluzywnemu globalnemu doświadczeniu użytkownika.

Słowa kluczowe:
satysfakcja użytkownika, SaaS, platformy zarządzania projektami, jakość użyteczności, jakość informacji, jakość interakcji z usługą, bariera językowa, PLS-SEM

Introduction

The architecture of the contemporary organizational workplace has been fundamentally and irrevocably reshaped by the forces of digital transformation, globalization, and the increasing prevalence of remote and hybrid work models (Mohammed, Khan, Syed, 2023; Trenerry, Chng, Wang et al., 2021) At the heart of this transformation lies cloud-based Software-as-a-Service (SaaS) platforms, which have become the indispensable digital infrastructure for businesses of all sizes and across all industries. Among this diverse ecosystem of SaaS solutions, project management and collaboration tools such as Asana, Trello, Monday.com, Jira, and Basecamp occupy a position of critical strategic importance (Kamila, Marzuq, 2024; Miah, 2025; Baul, Rana, Adan et al., 2022). These platforms are tasked with a mission that is both complex and essential: to orchestrate multifaceted workflows, centralize and streamline communication, provide real-time visibility into project health and resource allocation, and ultimately, to ensure the successful and timely execution of strategic initiatives. They are the digital nexus where strategy is translated into action and where geographically dispersed teams converge to create value.

In this hyper-competitive market landscape, characterized by low switching costs, frequent product innovations, and a plethora of available alternatives, the battle for market share is increasingly won or lost on the basis of user experience and satisfaction (Liu, Si, 2022; Paul, Ueno, Dennis et al., 2024). User satisfaction has thus transcended its role as a mere key performance indicator (KPI) to become a primary predictor of critical business outcomes, including customer retention, subscription renewal rates, customer lifetime value (CLV), and organic growth fueled by positive word-of-mouth and referrals (Ali, Shabn, 2024; Meili, 2022). A dissatisfied user is not merely a lost revenue stream; they represent a potential advocate for a competitor and a testament to a failed value proposition.

However, the determinants of user satisfaction in this specific context are far from simplistic; they are complex, interdependent, and extend well beyond a mere checklist of functionalities or technical specifications. As stated by Hulu, Raharjo, and Simanungkalit (2024) a platform may boast a comprehensive array of powerful features, but if end users find its interface cumbersome and non-intuitive to navigate (a failure of Usability Quality), if the data presented on task deadlines, dependencies, and team responsibilities is perceived as unreliable or outdated (a failure of Information Quality), or if the customer support is slow, unknowledgeable, or unempathetic when technical or operational problems arise (a failure of Service Interaction Quality), then user satisfaction will inevitably erode, regardless of the platform's underlying technical prowess (Lemon, Khannam, Hossain et al., 2024).

Furthermore, as businesses and their teams operate on an increasingly global scale, a previously underemphasized factor rises to paramount salience: the Language Barrier (Loderer, Muehlfeld, Wilken et al., 2024; Cherednichenko, Sytnikov, Romankiv et al., 2024). When a development team in Warsaw, a marketing team in São Paulo, and a key client in Tokyo are compelled to collaborate on a single, unified platform, linguistic and cultural friction can severely impede the very collaboration, clarity, and efficiency the tool is fundamentally designed to facilitate. An untranslated user interface, support agents who lack proficiency in the user's native language, or help documentation that is not properly localized can create significant friction, leading to misunderstandings, errors, and a profound sense of exclusion and frustration.

While the extant academic literature has extensively explored various facets of service quality and user satisfaction in generic e-commerce contexts or broad information systems studies, a conspicuous gap remains. There is a distinct lack of integrated, theoretically grounded models that specifically address the unique and potent confluence of system-centric, information-centric, human-interaction-centric, and communication-centric factors within the global SaaS ecosystem, particularly for collaboration tools where these elements are so deeply intertwined. This study seeks to address this significant gap by developing, articulating, and empirically testing a holistic and nuanced research model. The model systematically investigates the direct effects of Usability Quality (UQ), Information Quality (IQ), Service Interaction Quality (SIQ), and Language Barrier (LB) on the Overall Satisfaction (OS) of users with project management platforms.

The central research question that guides and animates this empirical inquiry is: To what extent do Usability Quality, Information Quality, Service Interaction Quality, and Language Barrier collectively and individually influence user satisfaction in the context of global project management platforms?

By employing a rigorous Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology on a robust dataset of 150 users, this research aims to move beyond theoretical postulation and anecdotal evidence to provide quantifiable, statistically sound evidence. The ultimate objective is to offer SaaS providers, product leaders, and corporate decision-makers a clear, validated, and prioritized strategic roadmap for enhancing user satisfaction, mitigating churn, and achieving sustainable, profitable growth in an increasingly globalized and demanding digital economy.

1. Literature review and hypotheses development

This section provides a comprehensive foundation for the research by delving into the theoretical underpinnings of each key construct within the proposed model. It draws upon and synthesizes literature from information systems, marketing, human-computer interaction, and international business to build a robust and persuasive rationale for the formulated hypotheses.

1.1. User satisfaction in the SaaS context

User satisfaction is a cornerstone construct in information systems (IS) research and a critical component of the widely cited DeLone and McLean IS Success Model. It is conceptually defined as the end user's summary affective and cognitive psychological state resulting from their aggregate experiences with a specific information system (DeLone, McLean, 2003). It represents the degree to which the user believes that the system available to them meets their personal, professional, and task-related needs. In the specific, high-stakes context of SaaS, satisfaction is not a passive outcome but a dynamic and pivotal antecedent to a cascade of crucial business outcomes. It is directly linked to subscription renewal decisions, willingness to upgrade to higher-tier plans (upselling), and the propensity to recommend the service to others (Shekhar, Jain, Khan, 2023; Yang, Sun, Zhang et al., 2015). The subscription-based "pay-as-you-go" economic model of SaaS means that user dissatisfaction can translate into immediate and often irreversible churn, making its management a top-tier strategic priority. For project management tools specifically, user satisfaction is intrinsically tied to the user's perceived ability to complete their work more efficiently, effectively, and collaboratively than would be possible without the tool. It is, therefore, a direct and sensitive barometer of the platform's delivered value proposition.

1.2. Usability Quality (UQ) and User Satisfaction

Usability Quality is a concept with deep roots in the field of human-computer interaction (HCI) and user experience (UX) design. The International Organization for Standardization (ISO) provides a formal definition, describing usability as the "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use" (ISO 9241-11, 2018). According to Soongpol, Netinant, and Rukhiran (2024), in the practical, day-to-day context of a project management platform, however, this abstract definition translates into a set of tangible attributes: "an intuitive and logically structured interface, clear and consistent navigation, a minimal number of clicks or

steps required to complete common actions (such as creating a task or generating a report), a shallow and supportive learning curve for new users, and robust error prevention and recovery mechanisms."

The theoretical link between usability and user satisfaction is robust and well-supported by several foundational models. The Technology Acceptance Model (TAM), one of the most influential theories in IS, posits that Perceived Ease of Use is a fundamental direct determinant of both attitudes toward using a system and its actual usage (Lee, Ramasamy, Subbarao, 2025; Davis, 1989). A platform characterized by high UQ effectively reduces the user's cognitive load, minimizes frustration and mental effort, and allows the user to focus their intellectual resources on their core work in managing projects and collaborating with teammates rather than on the mechanics of operating the tool itself (Barbossa, Carvalho, 2024). This state of "cognitive flow," where interaction with the system is seamless and almost unconscious, is a powerful generator of positive affective states, which directly translates into higher levels of reported satisfaction (Eesee, Varga, Eigner et al., 2025). In contrast, a platform with poor usability creates friction, acts as a constant source of minor aggravations, and can make simple tasks feel laborious, thereby directly undermining satisfaction.

In the contextual application to project management platforms, consider a project manager during a critical product launch phase, needing to quickly reassign a cascading set of tasks due to an unexpected team member's absence. In a platform with high UQ, this action would be straightforward and could be accomplished in seconds. In a platform with low UQ, it might involve navigating through multiple confusing menus, encountering unclear dialogues, and potentially making errors, a process that could take minutes and generate significant stress. The satisfaction impact of these two scenarios is profoundly different. Therefore, we formally hypothesize:

H1: Usability Quality has a positive and significant effect on User Satisfaction with project management platforms.

1.3. Information Quality (IQ) and User Satisfaction

Information Quality shifts the focus from how users interact with the system to what the system provides to them, the content and data outputs. Stemming directly from the DeLone and McLean IS Success Model (2003), Information Quality is a multidimensional construct. In the context of project management platforms, its most critical dimensions include: Accuracy: The correctness and reliability of task deadlines, assigned owners, status updates, and progress percentages. Timeliness: The provision of notifications, alerts, and updates in real-time or with minimal latency, precisely when they are needed for decision-making (Crossette-Thambiah, Berleant, Abuhalimeh, 2024; Wang, Liu, Li et al., 2023). Relevance: The extent to which the

information presented to a specific user is applicable, pertinent, and helpful for their particular tasks and responsibilities, avoiding information overload (Osei-Kyei, Chan, 2018; Rani, Arifin, Norazman et al., 2020). Completeness: The assurance that all relevant project information including task descriptions, attached files, comment histories, and dependency links is available, accessible, and not missing critical components (Wang, Liu, Li et al., 2023). Consistency: The presentation of information in a uniform, coherent, and non-contradictory format across different modules and views of the platform (e.g., list view, board view, calendar view, Gantt chart (Wang, Liu, Li et al., 2023; Azwan Abd Aziz, Nor, Jusoh et al., 2024).

Users of a project management platform rely on it as the "single source of truth" for their projects. It is the definitive repository for project reality. Poor IQ, such as a task status that is not updated, a missing file attachment, or an inaccurate display of a project timeline directly erodes trust in the platform. This loss of trust can lead to poor decision-making, project delays, duplicated work, and ultimately, real-world financial and reputation costs for the organization (Folke, 2025). High-quality information, in stark contrast, empowers users to make accurate, confident, and timely decisions. It fosters a sense of control and mastery over the project environment, which is a key driver of psychological satisfaction and reduced anxiety.

In the contextual application to project management platforms, a product manager relying on a project dashboard to report to executives must have absolute confidence that the "percent complete" metrics and milestone dates are accurate. If the dashboard displays outdated or incorrect data due to a sync error or a user interface bug, the manager's credibility is damaged, and their satisfaction with the platform plummets. The platform has failed in its core promise. Therefore, we formally hypothesize:

H2: Information Quality has a positive and significant effect on User Satisfaction with project management platforms.

1.4. Service Interaction Quality (SIQ) and User Satisfaction

Service Interaction Quality captures the crucial human element of service delivery, a dimension that was famously elaborated and operationalized in the SERVQUAL framework by Parasuraman, Zeithaml and Berry (1988). While our model's UQ and IQ constructs cover aspects of the "tangibles" (the digital interface) and "reliability" (consistent performance), the SIQ construct aligns directly with three core SERVQUAL dimensions: responsiveness (promptness and willingness to help), assurance (the knowledge, competence, and courtesy of employees and their ability to inspire trust and confidence), and empathy (the provision of caring, individualized attention to the customer).

In the context of theoretical linkage and rationale, even in highly automated digital services, the need for human interaction frequently arises, particularly during moments of truth such as initial on-boarding, complex problem-solving, billing inquiries, or when users encounter perplexing technical bugs (Hollebeek, Sprott, Brady, 2021). The quality of this interaction is not merely a support function; it is a strategic touch point. Research on the service recovery paradox even suggests that a service failure followed by an exceptionally high-quality, empathetic, and effective recovery can lead to higher levels of satisfaction and loyalty than if no failure had occurred at all (Rifi, Mostafa, 2022). This highlights the profound power of service interaction. Empathetic, responsive, and competent support staff can de-escalate user frustration, resolve issues efficiently, and create a memorable, positive emotional connection with the brand, thereby salvaging and potentially even enhancing overall satisfaction and loyalty.

Imagine a scenario where a critical integration between the project management platform and the company's version control system (like GitHub) fails abruptly on the eve of a major release. The quality of the interaction with the support team, their speed of response, their technical knowledge in diagnosing the problem, their communication clarity, and their empathy for the user's stressful situation will be indelibly imprinted on the user's memory. A positive experience can build immense goodwill, while a poor one can be the final catalyst for a decision to churn. Therefore, we formally hypothesize:

H3: Service Interaction Quality has a positive and significant effect on User Satisfaction with project management platforms.

1.5. Language Barrier (LB) and User Satisfaction

The Language Barrier construct refers to the communicative obstacles and frictions that arise when two or more parties involved in a service interaction do not share a common linguistic or dialectal foundation (Ginsburgh, Weber, 2020). In a global SaaS context, this barrier manifests in several specific ways: an untranslated or poorly localized user interface (UI), customer support agents who are not proficient in the user's native language, help documentation, knowledge bases, and tutorials that are unavailable in the user's preferred language, and the use of complex jargon, idioms, or cultural references that do not translate well across cultures (Pandey, Noorullah, 2024).

The negative consequences of language barriers are well-documented in international business, services marketing, and sociolinguistics literature. They can lead to miscommunication and errors, a fundamental misunderstanding of instructions, system alerts, or policy terms, leading to incorrect actions (Tenzer, Terjesen, Harzing, 2021).

It also increased cognitive effort and fatigue if the user must constantly expend extra mental energy to decode messages, translate in their head, and guess at meanings (Dryzer, Chib, 2024). Increase in frustration, anxiety, and a sense of incompetence is also notable when users feeling of being unable to communicate one's needs effectively or to fully understand the system can be deeply frustrating and demotivating (Luo, Xiong, 2025). Lastly it lead to perceived discrimination or unfairness, where users may feel that the service provider does not value them enough to communicate in their language, leading to a sense of marginalization (Salleh, Mohl, Nordin et al., 2021). Theories such as Communication Accommodation Theory Gallois, Ogay, Giles (2005) postulate that when a speaker (or, by extension, a service provider) fails to converge or accommodate to the listener's linguistic style, it can be perceived as a lack of effort or respect, increasing social distance and reducing satisfaction.

In a contextual application to project management platforms, a non-native English speaker on a team in Mexico City may struggle to understand a complex error message when setting up an automation rule. They might hesitate to contact support due to a lack of confidence in their English proficiency, leaving the problem unresolved and creating a persistent workaround that hampers efficiency. This friction directly undermines the collaborative and empowering purpose of the tool. The platform, instead of being a bridge, becomes a barrier. Therefore, we formally hypothesize:

H4: Language Barrier has a negative and significant effect on User Satisfaction with project management platforms.

1.6. The Integrated Research Model and Its Theoretical Synthesis

The proposed research model, depicted schematically in Figure 1, represents a synthesis of these four distinct but interrelated streams of literature into a coherent, unified framework that is specifically tailored for the global SaaS environment. It posits that User Satisfaction is not a monolithic outcome but rather a function of the platform's operational excellence and design integrity (UQ), its reliability and trustworthiness as an information repository (IQ), the competence and empathy of its human support infrastructure (SIQ), and the notable absence of communicative and cultural friction (LB). This integrated approach provides a more holistic, nuanced, and contemporaneously relevant framework for diagnosing the drivers of satisfaction in complex, digitally-native, and globally deployed collaboration tools. It moves beyond siloed perspectives to acknowledge that in the user's lived experience, these dimensions are perceived and evaluated in concert.

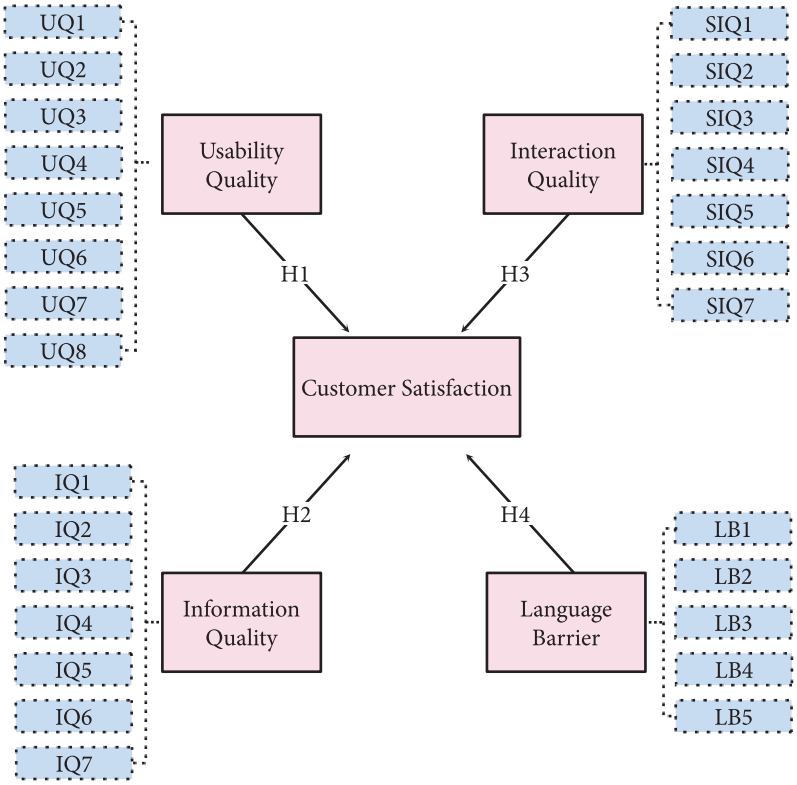

Fig. 1. The proposed research model
Source: own elaboration

2. Methodology

2.1. Research philosophy and approach

This study is grounded in a positivist research philosophy, which assumes that social reality is objective and can be studied through observable, measurable facts. It employs a deductive approach, whereby theoretical hypotheses are derived from existing literature and then subjected to empirical testing through quantitative methods. A cross-sectional survey-based design was adopted, as it is well-suited for collecting data from a sizable sample at a single point in time to test the relationships between the constructs in the proposed model.

2.2. Measurement model and instrument development

All constructs in the proposed model were operationalize as first-order reflective constructs. To ensure content validity the degree to which the items accurately represent the theoretical construct the measurement items were adapted from well-established scales in the peer-reviewed literature and then carefully contextualized for the specific domain of project management platforms. All items were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Usability Quality (UQ): This construct was measured using eight items (UQ1-UQ8). The items were adapted from scales developed by Davis (1989) for the Perceived Ease of Use construct in the Technology Acceptance Model and from the usability principles articulated by Nielsen (1993). Sample items include: "The platform's interface is intuitive and easy to navigate (UQ1)," „Learning to operate the platform was easy for me (UQ3)," "I can quickly find the features and functions I need (UQ5)," and "The platform responds quickly to my actions (UQ7)."

Information Quality (IQ): This construct was measured using seven items (IQ1-IQ7), primarily adapted from the works of DeLone and McLean (2003), and Wixom and Todd (2005). Sample items include: "The information on task deadlines and assignments is accurate (IQ1)," "The platform provides me with timely notifications and updates (IQ3)," "The information provided by the platform is relevant to my work (IQ5)," and "The reporting features provide complete and comprehensive data (IQ7)."

Service Interaction Quality (SIQ): This construct was measured using seven items (SIQ1-SIQ7), adapted from the responsiveness, assurance, and empathy dimensions of the seminal SERVQUAL scale by Parasuraman, Zeithaml, and Berry (1988). Sample items include: "The customer support team is responsive to my inquiries (SIQ1)," "Support staff are knowledgeable and can solve my problems (SIQ3)," "I feel the support team treats me with courtesy and respect (SIQ5)," and "The support team provides personalized attention to my issue (SIQ7)."

Language Barrier (LB): This construct was measured using four items (LB1-LB4). The items were developed and adapted from research on communication barriers in international services and global management (Harzing, Feely, 2008). Sample items include: "I sometimes have difficulty understanding the language used in the platform's interface (LB1)," "Language differences have made it difficult to communicate with customer support (LB2)," "The help documentation and tutorials are not available in my preferred language (LB3)," and "I need to put in extra effort to understand the platform due to language issues (LB4)."

User Satisfaction (OS): The dependent variable, Overall Satisfaction, was measured with a single, global item (OS): "Overall, I am satisfied with this project management platform." The use of a single-item measure for a broad, concrete, and

uni-dimensional construct like overall satisfaction is psychometrically justified and widely accepted in marketing and IS research (Bergkvist, Rossiter, 2007; Wanous, Reichers, Hudy, 1997). It reduces survey fatigue, avoids the potential for redundancy inherent in multi-item scales for such a global evaluation, and has been shown to have strong predictive validity.

2.3. Data collection and sample characterization

The survey instrument was distributed electronically through a combination of professional networks on LinkedIn (with a specific focus on groups for Malaysian professionals and the tech industry), specialized online communities and forums dedicated to project management (e.g., Reddit communities, specialized Slack groups), and targeted mailing lists to reach professionals in Malaysia, a context where English is widely used as a second language in business. To ensure data quality and relevance, screening questions were implemented at the beginning of the survey to confirm that respondents were active, current users of a specified project management platform (e.g., "Which of the following project management platforms do you use regularly for your work?") and were currently employed at a company operating within Malaysia. This process yielded a final sample of 150 complete and usable responses from professionals in Malaysian companies, providing a relevant context for analyzing the impact of Language Barriers. A post-hoc statistical power analysis was conducted using G*Power software. The analysis confirmed that a sample size of 150 is more than adequate for detecting medium-sized effect sizes with a statistical power of 0.95 at a significance level of $\alpha = 0.05$ in a PLS-SEM context with four predictor variables, thus mitigating concerns about Type II errors (Hair, Risher, Sarstedt et al., 2019).

2.4. Demographic profile

The sample consists predominantly of mid-career professionals (26-35 years old) with substantial work experience (2-10 years), reflecting a cohort with significant influence over software adoption and use within their teams. A majority work in small-to-medium-sized enterprises (SMEs) within the technology sector. The most commonly used platforms were Asana, Trello, and Monday.com. Critically for this study, the sample's self-reported English proficiency is high, with 88% of respondents rating themselves at an intermediate level or above, confirming the context of English as a second language in the Malaysian business environment while ensuring respondents had the necessary language skills to comprehend the survey items.

Table 1. Participant demographic characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	82	54.7
	Female	68	45.3
Age	18-25 years	22	14.7
	26-35 years	75	50.0
	36-45 years	42	28.0
	46 years and above	11	7.3
Professional role	Project Manager	45	30.0
	Team Lead/Supervisor	33	22.0
	Software Developer/Engineer	30	20.0
	Marketing & Sales Professional	18	12.0
	Other (Designer, Analyst, etc.)	24	16.0
Years of professional experience	Less than 2 years	15	10.0
	2-5 years	48	32.0
	6-10 years	54	36.0
	More than 10 years	33	22.0
Primary industry	Technology/IT	63	42.0
	Manufacturing	27	18.0
	Finance/Banking	21	14.0
	Education	15	10.0
	Other (Consulting, Healthcare, etc.)	24	16.0
Primary platform used	Asana	45	30.0
	Trello	39	26.0
	Monday.com	36	24.0
	Jira	21	14.0
	Other (Basecamp, ClickUp, etc.)	9	6.0
Proficiency in English	Beginner	6	4.0
	Intermediate	57	38.0
	Advanced	75	50.0
	Native/Bilingual	12	8.0

Source: own elaboration

2.5. Data analysis technique: Partial Least Squares (PLS-SEM)

The analysis adhered to the well-established two-step procedure recommended in the SEM literature: first, a thorough assessment of the measurement (outer) model to ensure the reliability and validity of the constructs, and second, a detailed assessment of the structural (inner) model to test the research hypotheses. The bootstrapping procedure with 5,000 sub-samples was employed to generate standard errors and t-statistics for significance testing of the path coefficients.

The collected data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the SmartPLS 4 software. This analytical technique was selected over the more traditional covariance-based SEM (CB-SEM) for several compelling theoretical and practical reasons, as extensively outlined by Hair, Risher, Sarstedt et al. (2019).

The primary objective of this study is to predict the key target construct, User Satisfaction, and to identify the relative importance of its driver constructs, a prediction-oriented research goal for which PLS-SEM is explicitly designed and considered ideal. Furthermore, while the model is firmly grounded in established theory, the integration of the Language Barrier construct alongside the three traditional service quality factors gives the model an element of exploratory character, for which PLS-SEM is highly suitable and recommended.

Practical considerations also supported this choice, as PLS-SEM is known for its robustness with complex models and is less demanding in terms of minimum sample size requirements and distributional assumptions compared to CB-SEM. This is particularly appropriate given that PLS-SEM does not require the assumption of normally distributed data, which is often violated when using Likert-scale data, as is the case in this study.

The analysis adhered to the well-established two-step procedure recommended in the SEM literature. This involved first conducting a thorough assessment of the measurement (outer) model to ensure the reliability and validity of the constructs, followed by a detailed assessment of the structural (inner) model to test the research hypotheses. Finally, a bootstrapping procedure with 5,000 sub-samples was employed to generate standard errors and t-statistics for significance testing of the path coefficients.

3. Results

3.1. Preliminary data screening and common method bias assessment

Prior to the main analysis, the data set was screened for missing values, unengaged responses, and uni-variate outliers. No missing values were present, and no responses were identified as unengaged (e.g., straight-lining). Examination of z-scores revealed no extreme uni-variate outliers that would unduly influence the results. Given that the data was collected from a single source using a self-reported survey, the potential for Common Method Bias (CMB) was assessed statistically using Harman's single-factor test. The results indicated that no single factor accounted for the majority of the covariance (the largest factor explained 38.2% of the variance, which is below the 50% threshold), suggesting that CMB is not a pervasive issue in this data-set.

3.2. Measurement model assessment

A rigorous assessment of the measurement model is a critical prerequisite for evaluating the structural model. This involves examining internal consistency reliability, convergent validity, and discriminant validity.

Internal Consistency Reliability: This metric assesses the degree to which the items measuring a construct are consistent in their scores, essentially measuring the internal homogeneity of the scale. As presented in Table 1, both Cronbach's Alpha and the more modern and robust Composite Reliability (rho_a) for all multi-item constructs significantly exceed the recommended threshold of 0.70 (Nunnally, Bernstein, 1994). This indicates a high level of internal consistency and reliability for all the reflective constructs in the model.

Table 2. Reliability and convergent validity

Construct	Indicator	Outer loading	Cronbach's Alpha	Composite reliability (rho_a)	AVE
Usability Quality (UQ)			0.89	0.90	0.62
The platform's interface is intuitive and easy to navigate.	UQ1	0.82			
It is easy to learn how to use the platform.	UQ2	0.80			
I find it easy to get the platform to do what I want it to do.	UQ3	0.78			
My interaction with the platform is clear and understandable.	UQ4	0.79			

cont. tab. 2

Construct	Indicator	Outer loading	Cronbach's Alpha	Composite reliability (rho_a)	AVE
I can quickly find the features and functions I need.	UQ5	0.81			
The platform is not cumbersome to use.	UQ6	0.75			
The platform responds quickly to my actions.	UQ7	0.76			
Overall, I find the platform easy to use.	UQ8	0.77			
Information Quality (IQ)			0.87	0.88	0.59
The information displayed (e.g., deadlines, task status) is accurate.	IQ1	0.80			
The platform provides sufficient information for my tasks.	IQ2	0.78			
The notifications I receive are timely.	IQ3	0.76			
The information provided is relevant to my work.	IQ4	0.79			
The platform provides complete information for my tasks.	IQ5	0.75			
The information in the platform is well-organized and consistent.	IQ6	0.74			
The reporting features provide comprehensive data.	IQ7	0.73			
Service Interaction (SIQ)			0.91	0.92	0.68
The customer support team is responsive to my inquiries.	SIQ1	0.84			
Support staff give me prompt service.	SIQ2	0.83			
Support staff are knowledgeable and can solve my problems.	SIQ3	0.85			
The behavior of support staff instills confidence in me.	SIQ4	0.82			
I feel the support team treats me with courtesy and respect.	SIQ5	0.81			
Support staff give me individual attention.	SIQ6	0.79			

cont. tab. 2

Construct	Indicator	Outer loading	Cronbach's Alpha	Composite reliability (rho_a)	AVE
The support team understands my specific needs.	SIQ7	0.80			
Language Barrier (LB)			0.85	0.86	0.65
I sometimes have difficulty understanding the language used in the platform's interface.	LB1	0.84			
Language differences have made it difficult to communicate with customer support.	LB2	0.83			
The help documentation is not available in my preferred language.	LB3	0.79			
I need to put in extra effort to understand the platform due to language issues.	LB4	0.76			
Customer Satisfaction (OS)			1.00	1.00	1.00
	OS	1.00			

Source: own elaboration

Convergent Validity: This form of validity examines the extent to which a construct converges in its items by sharing a high proportion of variance. The primary metric used is the Average Variance Extracted (AVE). As per the criterion established by Fornell and Larcker (1981), an AVE value of 0.50 or higher indicates that the construct explains more than half of the variance of its indicators, which is considered evidence of satisfactory convergent validity. Table 1 confirms that all AVE values are well above the 0.50 benchmark. Furthermore, at the indicator level, all outer loading's were statistically significant and exceeded the recommended value of 0.708, providing additional, strong evidence for convergent validity at the item level.

Discriminant Validity: This form of validity ensures that a construct is truly distinct from other constructs in the model, i.e., it measures a unique phenomenon not captured by other constructs. The Heterotrait-Monotrait (HTMT) ratio of correlations, a modern and superior criterion recommended by Henseler, Ringle, and Sarstedt (2015), was used. As a rule of thumb, an HTMT value below 0.85 (conservative threshold) or 0.90 (liberal threshold) indicates that discriminant validity has been established. The HTMT matrix presented in Table 3 shows that all inter-construct values are comfortably below the conservative 0.85 threshold. This provides strong evidence that each construct in the model is empirically distinct and captures a unique aspect of the user's experience.

Table 3. Discriminant validity – Heterotrait-Monotrait (HTMT) Matrix

	IQ	LB	OS	SIQ	UQ
IQ					
LB	0.31				
OS	0.72	0.41			
SIQ	0.55	0.28	0.78		
UQ	0.63	0.39	0.81	0.61	

Source: own elaboration

3.3. Structural model assessment and hypothesis testing

With a valid and reliable measurement model established, the focus now shifts to evaluating the structural model. This involves examining the path coefficients (their magnitude and direction), their statistical significance levels (using the bootstrapping procedure), and the model's overall explanatory power (R^2).

Table 4. Hypothesis testing results

Hypothesis	Path	Path coefficient (β)	*t*-statistic	*p*-value	Supported?
H1	UQ -> OS (Satisfaction)	0.42	5.81	< 0.001	Yes
H2	IQ -> OS (Satisfaction)	0.28	3.95	< 0.001	Yes
H3	SIQ -> OS (Satisfaction)	0.31	4.52	< 0.001	Yes
H4	LB -> OS (Satisfaction)	-0.15	2.89	0.004	Yes

Source: own elaboration

The results of the PLS-SEM analysis provide strong and unambiguous statistical support for all four research hypotheses.

H1 is strongly supported, revealing that Usability Quality has a substantial, positive, and highly statistically significant effect on User Satisfaction ($\beta = 0.42$, $p < 0.001$). This is the single strongest relationship in the entire model, unequivocally underscoring the foundational and non-negotiable role of a well-designed, easy-to-use interface in the user's overall evaluation of the platform.

H2 is supported, confirming that Information Quality is a significant and positive contributor to user satisfaction ($\beta = 0.28$, $p < 0.001$). Users demonstrably value and rely on accurate, timely, and relevant content and data, and its presence is a key driver of their positive assessment.

H3 is supported, demonstrating that Service Interaction Quality is also a potent and significant driver of satisfaction ($\beta = 0.31$, $p < 0.001$). The quality of the human interaction during support encounters is a critical component of the overall service experience and a powerful lever for influencing user sentiment.

H4 is supported, establishing that the Language Barrier has a statistically significant and negative impact on user satisfaction ($\beta = -0.15$, $p = 0.004$). This finding confirms that communicative friction, arising from language differences, is not a peripheral issue but a direct and meaningful antecedent of user dissatisfaction in globalized usage contexts.

The model's overall explanatory power is substantial and impressive. The four predictor constructs (UQ, IQ, SIQ, LB) collectively explain **68% of the variance ($R^2 = 0.68$)** in the User Satisfaction construct. According to the benchmarks provided by Chin (1998), an R^2 value of 0.67 is considered substantial, 0.33 is considered moderate, and 0.19 is considered weak in behavioral science research. Therefore, the model demonstrates a substantial level of explanatory power, indicating that it successfully captures the key drivers of satisfaction in this domain.

To further assess the robustness and practical relevance of the findings, we examined the **effect size (f^2)** of each predictor construct. The f^2 indicates the relative contribution of an exogenous construct to the R^2 value of an endogenous construct. The analysis revealed that UQ ($f^2 = 0.21$) and SIQ ($f^2 = 0.12$) have medium effect sizes, while IQ ($f^2 = 0.08$) and LB ($f^2 = 0.03$) have small but nonetheless significant effect sizes according to Cohen's (1988) guidelines. This provides a more nuanced understanding of the relative impact of each driver.

4. Discussion

4.1. Synthesis and interpretation of key findings

The primary objective of this study was to develop and empirically validate a comprehensive model of user satisfaction for global project management platforms. The results provide robust, quantifiable evidence that supports the theoretical framework, yielding significant and actionable insights for both theory and practice. The confirmation of all four hypotheses validates the model's robustness and its applicability to the global SaaS context.

The most powerful finding is the strong support for **H1 (UQ -> OS)**. Usability Quality emerged as the dominant predictor of user satisfaction. This finding powerfully reinforces, in a specific and high-stakes context, the absolute centrality of user-centered design in the digital age. It suggests a clear hierarchy of user needs: before a platform can be valued for its powerful features or its reliable data, it

must first be fundamentally easy and pleasurable to use. For project management tools, which are often used under pressure and by individuals with varying levels of technical aptitude, a cumbersome interface is not just an inconvenience; it is a direct impediment to productivity and a primary source of daily frustration. This result should serve as a clarion call to SaaS providers that investment in world-class UX/UI design is not an optional expense but the most critical investment they can make in driving user satisfaction and retention.

The significant impact of **Service Interaction Quality (H3)**, which exhibited a slightly stronger effect than Information Quality, is a critical reminder of the enduring importance of the human touch, even in a domain dominated by software. This finding indicates that the role of customer support in SaaS is evolving from a reactive, cost-center function to a proactive, strategic differentiator. In a market where many core features are becoming commoditized, a reputation for exceptionally responsive, knowledgeable, and empathetic support can be a powerful, defensible competitive advantage. It is a key mechanism for building trust and emotional loyalty, which are crucial for reducing churn, particularly when users encounter inevitable technical problems or have complex configuration needs.

While slightly less powerful than UQ and SIQ in this specific model, the confirmed role of **Information Quality (H2)** remains vitally important. It reinforces the concept that the platform functions as a mission-critical "single source of truth." Users are not just interacting with a tool; they are relying on it as the authoritative repository for project reality. Inaccuracies in task dependencies, resource allocation, or milestone tracking are not merely software bugs; they have direct, tangible consequences on real-world projects, leading to miscommunication, delays, and financial loss. Therefore, maintaining impeccable information quality is a non-negotiable component of service excellence and a fundamental prerequisite for user trust.

Perhaps the most novel and strategically significant finding is the support for **H4 (LB -> OS)**. By successfully integrating and validating the Language Barrier construct within a traditional service quality model, this study makes a distinct and timely theoretical contribution. It empirically demonstrates that communication friction is not a secondary or niche concern but a direct and statistically significant antecedent of dissatisfaction. This finding expands the scope of service quality research for digital products, explicitly incorporating a key challenge of global service delivery. It suggests that models which focus solely on functional and interaction qualities may be incomplete for services operating in multicultural and multilingual contexts. For SaaS companies with global ambitions, this is a critical insight: ignoring localization and multilingual support is to ignore a direct and measurable drag on user satisfaction in key growth markets.

4.2. Theoretical implications

This research makes substantive and multi-layered contributions to information systems and service management literature by not only testing established frameworks in a new context but by actively extending them to address the realities of global digital service delivery:

Refining Foundational Theories: This study validates and refines the DeLone and McLean and SERVQUAL models within the global SaaS context, confirming their core tenets drive user satisfaction ($R^2 = 0.68$). Crucially, it quantifies a hierarchy of effects, revealing Usability Quality ($\beta = 0.42$) as a stronger predictor than Information Quality ($\beta = 0.28$). This nuance suggests that for feature-rich collaboration tools, experiential access to value is primary; poor usability renders reliable information secondary (Akter, Uddin, Rahman et al., 2024). The finding indicates the weighting of success factors in established models is context-dependent, with usability being paramount in daily-use, complex applications, thereby refining theoretical application for digital services.

Integrating the Language Barrier: The most significant theoretical advancement is the integration and validation of Language Barrier (LB) as a direct antecedent to satisfaction ($\beta = -0.15$). This bridges IS literature with sociolinguistics and international business, challenging the assumption of culturally neutral technology (Li, 2023). It establishes communicative friction as an intrinsic component of perceived service quality in global digital services, not merely an external factor. This expands service quality paradigms, arguing that "reliability" and "assurance" are compromised without linguistic clarity, making any satisfaction model incomplete if it omits communicative dimensions in a globalized economy.

Advancing "Service Interaction" in Digital Contexts: The strong effect of Service Interaction Quality ($\beta = 0.31$) corrects the assumption that automation diminishes human interaction's importance. It refines the theory of "moments of truth" for digital contexts, suggesting human support becomes a critical, high-leverage touch point during user frustration or failure. This implies SIQ carries disproportionate weight in satisfaction judgments due to its role in service recovery and complex problem-solving (Ozuem, Ranfagni, Willis et al., 2024). It extends the "service recovery paradox" into SaaS, theoretically repositioning support as a primary arena for trust-building and emotional loyalty formation within an automated relationship.

Providing a Quantified Framework for Future Research: This research provides a precise, empirically-calibrated baseline model for future inquiry. The quantified path coefficients and effect sizes offer a benchmark for comparative studies across SaaS verticals (e.g., CRM, FinTech). This enables theory testing on the context-dependency of driver importance such as whether Information Quality matters more in high-stakes domains. Furthermore, the robust PLS-SEM methodology offers a blueprint for testing complex, integrated models, paving the way for more ambitious research that introduces novel constructs alongside established ones.

4.3. Practical implications and managerial recommendations

The findings of this study translate into a clear, actionable, and prioritized strategic road-map for product managers, UX designers, customer support leaders, and executives at SaaS companies developing and selling project management and collaboration platforms.

Champion User-Centric Design: Given Usability Quality is the strongest satisfaction driver, UX must be a continuous strategic investment, not a peripheral concern (Basiran, Yusof, 2023; Talmera, Wardhana, Ratnasari, 2025) This requires a dedicated UX research function using mixed methods (usability testing, A/B testing) to guide product evolution based on real user behavior. Investment must also cover technical performance and on-boarding, engineered to deliver quick value (Zhou, Kumar, Furuoka, 2024; Majumder, 2025). Superior usability reduces cognitive load and friction, creating essential product "stickiness" that translates directly into higher retention rates, reduced churn, and increased customer lifetime value in the competitive SaaS landscape.

Elevate Customer Support to a Strategic Profit Center: The substantial influence of Service Interaction Quality necessitates transforming support from a cost center to a strategic loyalty driver. This shift begins with holistic agent training blending technical knowledge with empathy and de-escalation skills (Schleckser, 2023) Agents must be strategically empowered with tools and autonomy for first-contact resolution, with performance measured by quality metrics (CSAT, resolution rates) (Schleckser, 2023; Hendarto, Pradana, Rubiyanti, 2024). This approach leverages the service recovery paradox, where exceptional problem resolution can build stronger loyalty than flawless service, directly impacting retention and lifetime value by transforming negative events into loyalty-building opportunities.

Institute Rigorous Information Governance: The critical role of Information Quality demands a systematic approach to data governance, treating accuracy as a fundamental commitment (Bernardo, Simões, Barbosa et al., 2024). This involves implementing automated data quality checks and manual audits to proactively identify inconsistencies, ensuring the platform is a reliable "single source of truth." A formal content governance framework must maintain accuracy and consistency in all user-facing content. Transparent communication during issues is essential to maintain trust. This comprehensive approach protects the platform's most valuable asset – user trust – and builds a durable competitive advantage rooted in reliability.

Develop a Proactive Localization Strategy: The significant negative impact of Language Barrier requires moving beyond translation to embrace comprehensive localization as a core business strategy (Pinnola, 2024). This involves adapting the entire user experience, which includes interface, formats, and cultural references to resonate with target markets. Execution requires prioritizing key growth markets for full UI and documentation localization, supported by multilingual customer

support (Lin, Xiao, Liu et al, 2024) Underpinning this must be a commitment to clear, simple language. This strategy eliminates communication friction, accelerates international adoption, deepens engagement, and builds sustainable competitive advantage by directly addressing a key driver of satisfaction erosion.

5. Conclusion, limitations, and avenues for future research

5.1. Conclusion

This study set out to develop and validate an integrated model of user satisfaction for global project management platforms by combining three established service quality dimensions, Usability Quality, Information Quality, and Service Interaction Quality with the often-neglected construct of Language Barrier. Drawing on foundational theories in information systems success and service quality, the research proposed that these four factors jointly determine users' overall satisfaction with SaaS-based project management tools.

Using survey data from 150 professionals in Malaysian organizations and employing PLS-SEM, the study confirmed all four hypotheses. Usability Quality emerged as the strongest positive predictor of satisfaction, followed by Service Interaction Quality and Information Quality, while Language Barrier exerted a significant negative effect. Together, these constructs explained 68% of the variance in Overall Satisfaction, indicating that the model captures the dominant drivers of user evaluations in this context.

Theoretically, the findings reinforce the relevance of classic IS success and service quality frameworks in a contemporary SaaS environment and extend them by empirically integrating language-related communication barriers into the model. This demonstrates that user satisfaction in global digital services is shaped not only by interface design, information attributes, and human support, but also by the extent to which users can interact with the service in a linguistically comfortable and culturally sensitive manner.

From a practical standpoint, the results provide a prioritized agenda for SaaS providers. Investments in intuitive, low-friction interfaces and performant systems are essential foundations for satisfaction and retention. At the same time, building high-quality, empathetic customer support capabilities and instituting robust information quality and governance processes are critical for maintaining trust when users rely on the platform as a single source of project truth. Finally, systematic localization and reduction of language barriers are necessary conditions for unlocking the full value of project management platforms in multilingual markets.

Overall, the study shows that achieving and sustaining high user satisfaction in global project management platforms is not the result of a single design choice or feature, but of a coordinated strategy that aligns product usability, information integrity, human interaction quality, and language accessibility. This holistic perspective offers a useful foundation for both future academic work and managerial decision-making in the expanding global SaaS economy.

5.2. Limitations and avenues for future research

While this study provides valuable and robust insights, it is incumbent to acknowledge its limitations, as they define the boundaries of its conclusions and illuminate productive paths for future scholarly inquiry.

This study acknowledges several methodological limitations that warrant consideration. The measurement of the dependent variable utilized a single-item measure for Overall Satisfaction, which, while psycho metrically justified for a global evaluation, may not fully capture the construct's potential multi-dimensional nature encompassing both cognitive and affective components as comprehensively as a well-validated multi-item scale. Furthermore, the research employed a cross-sectional design, collecting self-reported data at a single point in time; while this provides a valuable snapshot, it precludes analysis of how the relationships between constructs might evolve as users gain experience or as the platform undergoes updates.

Additionally, while the context of project management platforms is highly relevant, the generalization of the findings to other SaaS verticals may be limited, as the relative importance of drivers like Information Quality could differ significantly in higher-stakes contexts such as FinTech or healthcare. Finally, the sample, though adequate for analysis, was one of convenience sourced from online communities and professional networks, which may not fully represent the diverse global population of users across all industries, company sizes, and cultural backgrounds. These limitations naturally give rise to several promising and fruitful directions for future research:

Future research should build upon this study's foundation by addressing its limitations and exploring new avenues. A primary direction involves employing multi-dimensional satisfaction scales within longitudinal or panel studies to track how user perceptions and the strength of the model's relationships evolve throughout the customer life cycle. This temporal perspective would reveal how initial impressions solidify or change with experience.

Furthermore, the generalization of these findings should be tested through replications in other SaaS verticals. Applying this model to contexts such as CRM systems (e.g., Salesforce), HRMS platforms (e.g., Workday), or creative collaboration tools (e.g., Figma) would be invaluable for understanding the context-dependency of the drivers of satisfaction, particularly whether the relative importance of factors like Information Quality shifts in environments with different stakes.

To deepen the theoretical understanding, subsequent research should investigate the model's complexity by incorporating moderating and mediating variables. It would be revealing to examine whether user expertise or cultural background moderates the relationships, or if constructs like perceived value and trust serve as psychological mechanisms that mediate the influence of usability and information quality on overall satisfaction.

The model could also be expanded by looking at consequential outcomes. Including variables such as actual churn behavior, word-of-mouth intention (e.g., NPS), and objective usage intensity metrics would create a more complete picture of the customer journey, linking perceptions directly to business-critical behaviors.

Finally, to add richness and context to the quantitative findings, future work should employ qualitative methods. In-depth interviews or focus groups could yield nuanced insights into why users perceive certain usability elements as effective or what specific language-related challenges prove most frustrating, providing a deeper layer of understanding. By actively pursuing these research avenues, scholars and practitioners can collectively advance our understanding of user satisfaction and loyalty in an increasingly digital and interconnected global business environment.

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