RESEARCH ARTICLE

Key Factors Influencing Consumer Adoption Intentions of Super Apps in Germany

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ABSTRACT This study analyzes consumer adoption intentions of super apps in Western countries, where widespread implementation lags behind other world regions, despite tech giants' aspirations. Primary data was collected through a representative online survey in Germany (N = 1,019). Leveraging the UTAUT2 framework extended with perceived risk, structural equation modeling (SEM) was utilized to examine adoption intentions and contributing factors. Overall, our results show that smartphone users in Germany are ready to adopt super apps. Performance expectancy and price value are the most influential predictors to explain adoption intentions, while perceived risk has a significant negative impact. Notably, among socio-economic factors, only gender was significant, with males being more likely to adopt super apps. Prospective super app providers should therefore prioritize features that deliver both utility and economic value to consumers. Building trust through transparency and collaborating with local businesses are crucial for success in markets like Germany. Finally, to maximize market penetration as well as increasing acceptance, the needs and preferences of female consumers need to be addressed explicitly.

INDEX TERMS Super apps, smartphones, mobile apps, adoption intention, technology acceptance, UTAUT2.

I. INTRODUCTION

Super apps, a concept that has flourished predominantly in Asian countries, represent a revolutionary shift in how consumers interact with technology, combining multiple services into a single platform [1], [2], [3], [4], [5]. While there is not yet a unified definition for super apps, Steinberg et al. [5, p. 1407] describes them as "[…] do-everything apps that bring together an expansive suite of services within a single interface". Notable examples of super apps include WeChat, Alipay, LINE, KakaoTalk, Gojek, and Grab, which all have integrated various daily activities and transformed from single-purpose to multi-purpose super apps [6], [7].

This consolidation has not only streamlined consumer experience but also significantly impacted the economic landscape. For instance, WeChat's ascent to over 1.33 billion monthly users has accelerated China's transition towards digital payments and broader internet adoption, providing a

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substantial benefit to both the economy and businesses [8]. Market research suggests that by 2027, more than 50% of the global population could be daily active super app users [9], while the global super apps market size is projected to reach $722.4 billion by 2032 [10].

In contrast to their widespread acceptance and success in Asia, however, the uptake of super apps in Europe and North America (hereinafter referred to as Western countries) has been relatively slow. Platform firms such as X, Uber, or Bolt are currently making strides towards evolving into super apps, exploring business models that consolidate multiple services [11], [12]. Nevertheless, despite these efforts, the concept of super apps remains in its infancy in these regions, suggesting a significant untapped potential. Accordingly, both businesses and consumers in Western countries might currently be missing out on the substantial benefits that super apps offer, including network effects and the convenience of accessing a plethora of services through a single platform.

The literature suggests that this circumstance can be attributed to several key factors that contrast sharply with

the environment in Asia where such apps have thrived [13], [14].

First, Western countries have long-established internet economies, where digital needs are already met through a variety of existing services in a fragmented app market. This setting starkly contrasts with Asia's, where the rise of super apps has coincided with a rapidly developing internet economy, providing a unique opportunity for these platforms to integrate various services into one platform [13], [14].

Second, the lack of financial inclusion and access to a western-like banking system in many Asian markets has also played a significant role. Super apps have bridged this gap by incorporating digital wallet features (e.g., WeChat Pay, Alipay, LINE Pay), thereby addressing a critical need in these economies [14].

Third, cultural factors, including a higher propensity in Asian societies to embrace new digital technologies and specific practices like monetary gift-giving, have facilitated the adoption and growth of super apps. Conversely, in Western countries, there is a more pronounced skepticism towards large corporations and data sharing, which could hinder the acceptance of such integrated platforms [13], [15].

Fourth, regulatory environments also play a crucial role, with Asian markets generally having looser regulations regarding data privacy and antitrust enforcement compared to the ever-strengthening frameworks in Western countries. For instance, the EU has introduced pioneering regulations like the Digital Markets Act (DMA) and Digital Services Act (DSA), implemented in March 2024, which could present challenges for the development of super apps [13], [14], [16].

Finally, business concerns such as feature bloat, infrastructure limitations, reduced advertising revenue, and stock market skepticism towards diversification [13] or the lack of capabilities [6] could deter platforms from pursuing the super app business model.

Collectively, the above factors contribute to the relative absence of super apps in Western countries, indicating a complex interplay of market dynamics, cultural preferences, and regulatory environments.

Despite these numerous reasons suggested by the literature, there remains a notable lack of empirical research focused on understanding consumer acceptance of super apps to truly identify potential market demand. While a handful of studies, such as those by Salehi et al. [3] and Zhu et al. [7], have explored super app acceptance and use in Asian context, to our knowledge, no equivalent research exists in the context of Western countries that considers their unique regulatory and cultural contexts. This represents a critical research gap, emphasizing the need for studies that examine the distinct challenges and opportunities for super apps within these regions to inform discussions about necessary regulatory adaptations.

As the first study to bridge this research gap and quantify consumer interest in super apps in Western context, we focus on Germany as an exemplary case due to its pioneering role within the EU in regulating the internet, data privacy, and

digital platforms. Germany has introduced several key initiatives that predate and have shaped broader EU regulations, making it an ideal context to explore the complexities and potential for super app acceptance in Western countries.

To this end, we conducted a representative online survey among smartphone users in Germany (N = 1,019). Building on the UTAUT2 model as the theoretical foundation, structural equation modeling (SEM) was utilized to address the following question: (RQ1) *Which factors explain interest in super apps among smartphone users in Germany?*

This study contributes to the literature on technology acceptance by identifying key factors influencing consumer interest in adopting super apps in Germany. By examining these factors, we provide insights into the unique challenges and opportunities that super apps face in Western markets compared to their widespread success in Asia. Hence, our findings, such as the importance of price value balanced with concerns around data privacy, hold valuable managerial implications for prospective super app providers. By tailoring their offerings and functionalities to address these factors, super app providers can better resonate with the target audience, ultimately increasing the likelihood of consumer adoption. Moreover, the study informs policymakers about the need to establish a legal framework that addresses potential challenges and ensures responsible practices within the super app ecosystem. This proactive approach can help mitigate perceived consumer risks and foster a healthy environment for both the demand and supply side. While focusing on Germany as a case study, our findings are likely generalizable to similar socio-economic contexts within the EU.

The remainder of the article is structured as follows. In the next section, we review the relevant literature (Section II). Data and methods are described in Section III. We present the results in Section IV and discuss empirical and managerial implications in Section V. Section VI contains the study limitations and recommendations for future research. Finally, concluding remarks are presented in Section VII.

II. LITERATURE REVIEW

A. PREVIOUS STUDIES ON APP ADOPTIONS

Typically, apps are explicitly developed to serve a specific purpose and address a particular need. This can span virtually every aspect of life, from practical tools such as mobile banking [17], [18], [19], mobile payments [7], and travel and mobility booking services [20], [21], [22] to entertainment apps like instant messengers and social media [23], music and video streaming services [24], and mobile games [25], to health and fitness apps [26], [27], [28], [29], [30], and even to educational and mobile learning apps [31]. These apps are tailored to heterogeneous consumer groups, catering to a wide range of needs and preferences. In a very short period of time, smartphone users have thus been flooded with apps, with approximately 9 million available in total [32].

However, it is important to acknowledge that despite the vast array of available apps, only few gain widespread

acceptance and usage. Accordingly, scholars have investigated the adoption factors of diverse types of apps, employing different approaches and a variety of underlying theoretical foundations (Table 1). This literature collectively enhances our comprehension of super app adoption intentions. Fundamentally, the acceptance of super apps signifies consumers' willingness to embrace the diverse functionalities and varied purposes of different apps (such as but not limited to those mentioned above), all within a single interface.

Nevertheless, studies explicitly examining the adoption intention of super apps are currently lacking. Zhu et al. [7] analyzed whether super app users would adopt service extensions within the super app framework. The study looked at existing users (N = 358) of the LINE super app and whether they are willing to adopt its integrated digital wallet functionality (LINE Pay). Another study that looks into existing super app users (N = 472) is Salehi et al. [3], analyzing the continuance intention of Rubika, the most prominent super app in Iran.

A knowledge gap, therefore, exists regarding the potential of super apps in regions where they are still largely unknown such as the U.S. and Europe [13]. The present study aims to address this gap with a comprehensive analysis of smartphone users' super app adoption intention in Germany.

B. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Our analysis primarily builds on the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) [38]. This model extends the original UTAUT framework by incorporating additional factors relevant for the consumer market that influence the behavioral intention to use new technologies such as super apps. Indeed, in recent years, the UTAUT2 model has garnered significant attention across different scientific fields for its proven efficacy in explaining key determinants of consumers' technology adoption and use, as shown in the review by Tamilmani et al. [39]. The extracted latent construct from the original model encompass performance expectancy, effort expectancy, social influence, price value, and habit. Considering the context of super apps, we have chosen to exclude the constructs of hedonic motivation and facilitating conditions, and instead include perceived risk.

As indicated by the taglines of numerous super apps such as LINE's "always at your side", Grab's "The Everyday Everything App", or Alipay's "Simplify Your Life", their value proposition revolves around convenience and practicality, factors that we capture through the construct of performance expectancy and effort expectancy. In contrast, hedonic motivations, which entail experiencing pleasure or joy beyond functional utility, are not expected to be relevant factors for consumers that would explain the switch from single-purpose to multi-purpose apps. We further assume that virtually all potential super app adopters – i.e., smartphone users as detailed in section III-B – possess the necessary

conditions for using a super app (facilitating conditions), such as access to a smartphone and reliable internet connectivity.

In contrast, the construct of perceived risk is included in our analysis, as it is considered a significant factor in Germany when interacting with digital technologies. This is evidenced by the reservations of many Germans regarding digital transactions and their preference for cash payments [40], as well as pronounced concerns regarding consumer data privacy when engaging with online services and digital platforms [15], [41].

1) MAIN EFFECT OF LATENT CONSTRUCTS ON BEHAVIORAL INTENTION

Performance expectancy, a key factor influencing technology adoption, refers to the perceived benefits consumers anticipate from using a new technology [42]. In the case of super apps, a positive performance expectancy suggests that consumers believe that these apps offer greater advantages compared to individual, single-purpose apps. Super apps hold the promise to simplify daily life by enabling a fully integrated consumer experience [2], facilitating access to several online services [6], [7], and potentially automating tasks and routines [1]. This can lead to improved time management and increased efficiency, among other potential benefits.

Based on the above, we deduce the following hypothesis.

H1: Performance expectancy (PE) has a significant positive impact on the behavioral intention to use super apps.

Effort expectancy, according to Venkatesh et al. [42], can be defined as the degree of ease associated with the use of a new technology. When a technology is intuitive and user-friendly, individuals are more likely to adopt it. Consider the example of online brokerage platforms such as Robinhood or Trade Republic, which offer intuitive interfaces and streamlined processes for trading stocks and managing investments. Compared to traditional brokerage services offered by banks, these platforms gained remarkable popularity due to their user-friendly mobile apps and simplified trading mechanisms [43], [44].

Based on the evidence presented above, we postulate the following.

H2: Effort expectancy (EE) has a significant positive impact on the behavioral intention to use super apps.

Social influence has been shown to profoundly affect human behavior including technology adoption [45]. Individuals with high collectivism, who prioritize group norms, tend to consult and seek the opinions of others before deciding to use a new technology [46]. Accordingly, the perception of super apps in social groups or in the media could significantly influence their adoption intention. The role of social influence possibly also explains why communication apps (i.e., WeChat, LINE, and KakaoTalk) emerged as the first and most powerful super apps. Positive experiences within these trusted social networks, often ingrained in daily interactions with friends, family, and close social circles, can significantly influence the adoption intention of other services built upon these platforms.

TABLE 1. Selected studies in the area of app use and adoption intention.

Study	Theory	Dependent variable	Constructs	Key findings
Alam et al. [26]	UTAUT2	Mobile health apps adoption intention and actual usage	Performance expectancy; effort expectancy; social influence; hedonic motivation; price value; habit; privacy; facilitating conditions; lifestyle; self-efficacy; trust	Clear guidelines for healthcare providers and integrating mobile health development into national healthcare schemes are crucial for wider adoption of mobile health apps.
Cho et al. [27]	TAM, IM	Health and fitness apps continuance intention	Perceived ease of use; perceived usefulness; satisfaction; investment size; quality of alternative; commitment	Continuance intention can be strengthened by tailoring the user experience to individual preferences and needs, as well as by introducing innovative features that enhance user engagement with the apps.
Duan and Deng [33]	UTAUT, PCT	Contact tracing apps adoption intention	Effort expectancy; facilitating conditions, perceived privacy risk; perceived value of information disclosure; performance expectancy; social influence	For the adoption of contact tracing apps, key factors include effort expectancy, the perceived value of information disclosure, and social influence.
Hsiao et al. [34]	ISS	Lifestyle apps continuance intention	Information quality; privacy and security concerns; satisfaction; service quality; system quality; utilitarian value	The continuance intention depends upon the perceived utilitarian value and satisfaction.
Hsu and Lin [35]	ECM	Paid apps purchase intention	App rating; confirmation; emotional value; free alternatives to paid apps; habit; performance value; satisfaction; social value; value-for-money	Positive user experiences (confirmation) led to higher perceived value and satisfaction with paid apps. Value-for-money, app ratings, and the presence of free alternatives all directly influence users' purchase intention.
Mohd Suki and Mohd Suki [20]	TAM	Flight ticket booking apps adoption intention and actual usage	Perceived ease of use; perceived trust; perceived usefulness; perceived value; subjective norm	Perceived usefulness is the strongest factor influencing people's intention to use flight ticket booking apps. Additionally, trust in the app's security and perceived value are also important drivers of adoption.
Muñoz-Leiva et al. [18]	TAM	Mobile banking apps adoption intention	Attitude; perceived ease of use; perceived risk; perceived trust; perceived usefulness; social image	Attitude is the main driver of intention to use mobile banking apps, while perceived risk has a minimal impact on user adoption.
Natarajan et al. [36]	TAM, DOI	Mobile shopping apps adoption intention	Perceived ease of use; perceived enjoyment; perceived risk; perceived usefulness; personal innovativeness	Device type and age of users moderate the intention to use mobile shopping apps.
Owusu Kwateng et al. [19]	UTAUT2	Mobile banking apps adoption intention and actual use	Effort expectancy; facilitating conditions; habit; hedonic motivation; performance expectancy; price value; social influence; trust	Habit, perceived value, and trust are the most influential drivers of mobile banking apps adoption intention. Factors like age, education, and user experience moderate the actual use.
Salehi et al. [3]	TAM, SCoT	Super apps adoption and actual usage	Engagement; enjoyment; quality; satisfaction; social benefit; variety of services	Quality impacts the adoption of super apps positively via satisfaction.
Tam et al. [37]	ECM, UTAUT2	Mobile apps continuance intention	Confirmation; effort expectancy; facilitating conditions; habit; hedonic motivation; performance expectancy; price value; satisfaction; social influence	The key factors that influence users' decision to keep using mobile apps are how satisfied they are with the app, how accustomed they have become to using it, their expectations about how well it performs, and how easy they find it to use.
Weng et al. [21]	TCT	Mobile taxi booking apps continuance intention	Attitude; confirmation; perceived ease of use; perceived risk; perceived usefulness; satisfaction; subjective norms	Satisfaction with the app is the strongest predictor of the continuance intention. Subjective norms influence user attitudes but not necessarily the continuance intention.
Ye et al. [22]	UTAUT	Mobility as a Service (MaaS) apps adoption intention	Performance expectation; perceived risk; effort expectancy; social impact; individual innovation; facilitating conditions	Individual innovation is the strongest driver of MaaS apps user adoption, while perceived risk has a significant negative impact, especially due to the complexity of MaaS.

Yuan et al. [30]	UTAUT2	Health and fitness apps continuance intention	Performance expectancy; effort expectancy; social influence; facilitating conditions; price value; hedonic motivation; habit	Performance expectancy, hedonic motivation, price value, and habit influence the continuance intention for health and fitness apps, while the remaining constructs were not significant.
Zhu et al. [7]	SOR	Mobile payment adoption intention within super app framework	Trust; habit; inertia; relative advantage; perceived fit; perceived entitativity; positive synergy; privacy concern	Trust, user habits with the core app, and the relative advantage of the extension itself all contribute to positive user attitudes. A strong synergy and good fit between the core app and the extension are key for user acceptance, while privacy concerns can be a deterrent.

Note: DOI=theory of diffusion of innovations; ECM=expectation confirmation model; IM=investment model, ISS=information systems success model; PCT= privacy calculus theory; SCoT=social construction of technology theory; SOR=stimulus–organism–response model; TAM=technology acceptance model; TCT=Technology Continuance Theory; UTUAT=unified theory of acceptance and use of technology; UTUAT2=extended unified theory of acceptance and use of technology
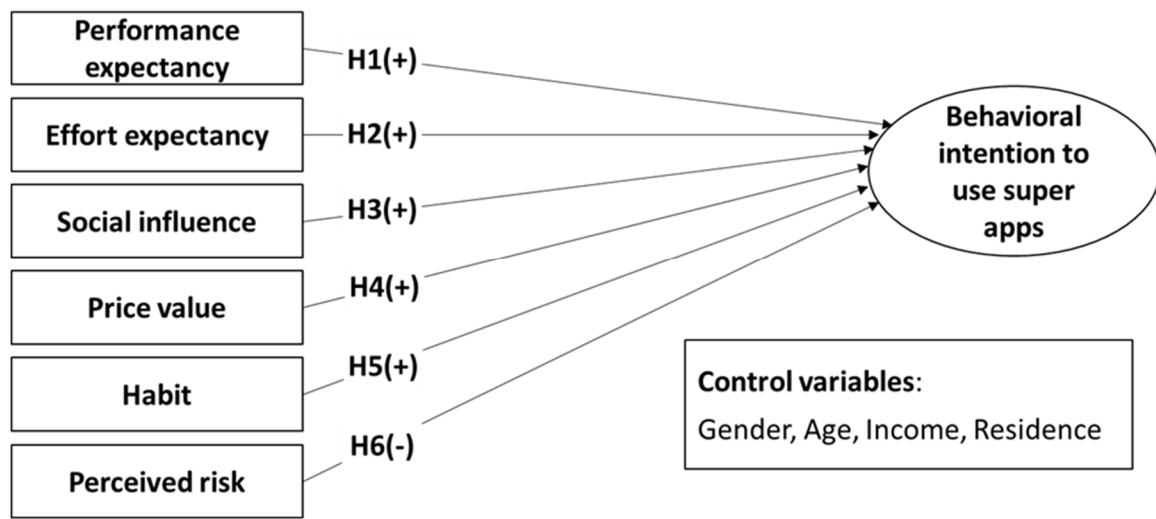
FIGURE 1. Research model and hypotheses.

We therefore postulate the following.

H3: Social influence (SI) has a significant positive impact on the behavioral intention to use super apps.

In line with Venkatesh et al. [38], who emphasized cost and pricing structures as crucial factors in technology adoption, a positive price value perception is likely to significantly influence super app adoption intentions. Price value, in this context, refers to the consumer's cognitive trade-off between the perceived benefits of a super app and the monetary cost associated with it.

Based on the above insights, the hypothesis we posit is as follows.

H4: Price value (PV) is positively correlated with the behavioral intention to use super apps.

Habit refers to the tendency to perform actions automatically due to repeated learning [38]. In the context of mobile apps, prior research has established habit as a significant predictor for both the initial decision to adopt an app as well as the continued use of an app (e.g., [19], [30], [37]). The repetitive use through habits can create switching costs,

locking consumers into a system over others [47]. For super apps, this could be particularly relevant if consumers are already accustomed to using their smartphones for booking, ordering, payments, and completing daily tasks. Indeed, the ability to become embedded in consumers' daily routines is precisely what scholars attribute to WeChat's remarkable success [1].

These arguments led to the formulation of the following hypothesis.

H5: Habit (HA) has a significant positive impact on the behavioral intention to use super apps.

While the potential for super apps is manifold, consumers must also carefully consider the trade-offs between benefits and risks before adopting this new technology. In Asian markets, this consideration has not significantly hindered adoption, as these apps are widely accepted and integrated into daily life. However, in Germany and other Western countries, such trade-offs could prevent consumers from adopting super apps. Indeed, previous research suggests that online alternatives are often perceived as riskier than conventional

offline businesses [45], [48]. Existing data sharing concerns [15] will likely reinforce with super apps due to the need to collect and store larger amounts of personal data. This could discourage consumers, especially considering the increased risk of severe data breaches [49], [50]. Moreover, loosing access to one's super app account signifies losing access to multiple real-life services at the same time [51]. The dominance of a single super app in the market could be a cause for concern, potentially limiting competition and consumer choice. Dominant super apps could also disrupt local businesses and traditional commerce, similar to Airbnb and Uber [52], due to consumer reliance on their all-encompassing services.

Hence, based on the findings of previous research, we propose the following hypothesis.

H6: Perceived risk (PR) has a significant negative impact on the behavioral intention to use super apps.

2) BACKGROUND FACTORS

Additionally, we expect that the intention to use super apps depends on various background factors, encompassing socioeconomic and demographic characteristics. Previous studies found that young males often serve as early adopters of emerging technologies as observed in instances such as cryptocurrencies [53], shared e-bikes and e-scooter [54], as well as for different app types and functionalities (e.g., [15], [55], [56]). We also control for the effects of income and the residential area. Existing literature underscores income disparities in adoption intentions, with higher-income demographics exhibiting a greater propensity/ability to try out new technologies [57], [58]. Residential area types (i.e., urban vs. rural settings) influence both the availability and usage of pivotal super app services such as deliveries, mobility solutions, and marketplaces. While these services could be in higher demand in rural areas due to the lack of offline alternatives, providers of these services rather target dense urban areas, which offer greater financial prospects [59].

C. RESEARCH MODEL

Following the literature review, the derived research model and hypotheses are depicted in Fig. 1.

III. DATA AND METHODS
A. QUESTIONNAIRE AND MEASUREMENT

For the purpose of this study, a questionnaire with multiple choice and Likert scale questions was developed. It was initially drafted in English and subsequently translated into German by the authors, both of whom are native speakers, using double translation technique to ensure linguistic accuracy and maintain the integrity of the survey instrument [60]. To address common method bias, we assured respondents that their responses are anonymous and confidential. Additionally, we applied temporal separation for independent and dependent variables and used reverse coding for certain items

to prevent respondents from developing a pattern in their responses (e.g., straightlining).

The questionnaire comprised four distinct sections. Due to the quota sampling approach, the socio-economic characteristics of the respondents were surveyed first.

Eligible respondents were then asked questions about their current smartphone and app usage patterns and attitudes. This encompassed aspects such as the purchase time and price of their smartphone device, as well as information about the number of installed apps and the frequency of their usage.

The third section was dedicated to questions aligned with the theoretical framework. Based on the literature review, the respective constructs were operationalized with at least two items each, all measured on a 5-point Likert scale (Table 2). In both the introduction to the online survey and the question addressing the behavioral intention to adopt super apps, participants were provided with a comprehensive explanation of super apps, clarifying their functionalities and potential usage scenarios. Additionally, participants were informed about the widespread adoption of super apps in various global regions, and specific examples of successful super apps were cited to enhance their understanding.

B. SAMPLING AND DATA COLLECTION

An online survey was conducted in December 2023, with participants recruited and incentivized through an online panel managed by a private market research firm. Online surveys are widely utilized in social science research for their cost-effectiveness, efficiency, and rapid data collection, along with reduced data entry errors and streamlined data coding and cleaning processes [61].

While online surveys have the main disadvantage of potentially excluding individuals without internet access [61], this concern was not applicable to our study. The study population was defined as smartphone users in Germany aged 18 to 69. Given the inherent internet engagement of smartphone users, our approach ensured the inclusion of all segments within the target demographic. It is worth noting that smartphone penetration in Germany is remarkably high across all age groups, estimated at approximately 87% [62].

To guarantee the representativeness of our sample, quotas were established for respondents' gender, age, and household net income based on the latest available German census data. Additionally, we gathered information on respondents' highest level of education and residential area type. The sample fallout in these aspects was comparable to the census data, further enhancing the robustness of the dataset.

A total of 1,019 valid responses were recorded. The socioeconomic characteristics of the sample are shown in Table 3. Table 4 indicates the smartphone and app usage patterns and attitudes of respondents, revealing the overwhelming popularity and significant role of smartphones and apps in Germany. Approximately 95% of respondents purchased their devices within the last five years, with a substantial portion spending €500 or more. The vast majority of the

TABLE 2. Overview of constructs and associated items.

Construct	Item	Question
Performance expectancy	PE1	Using super apps would simplify my life by offering various services in one app.
	PE2	Using super apps would help me better organize my daily activities and meet my daily needs.
	PE3	Using super apps would make it easier for me to get an overview of my online purchases and bookings.
	PE4	Using super apps would improve my productivity and save me time.
Effort expectancy	EE1	Learning how to use super apps would be easy for me.
	EE2	I expect that interacting with super apps would be effortless and intuitive.
	EE3	I expect to become skillful at using super apps including all its functionalities in a short time.
Social influence	SI1	I am willing to use super apps if people who are important to me use them.
	SI2	I am willing to use super apps if everyone uses them.
	SI3	I am willing to use super apps if the reviews from people whose opinions I value are good.
	SI4	I am willing to use super apps if the reviews in the media are good.
Price value	PV1	I can save money when using super apps.
	PV2	I think that super apps offer better services compared to offline alternatives.
Habit	HA1	I am used to book, order, and pay things on my smartphone.
	HA2	I frequently use apps to get daily chores done.
Perceived risk	PR1	I am concerned about the potential risks associated with sharing personal data while using super apps.
	PR2	I have concerns about the reliability and trustworthiness of the services provided through super apps.
	PR3	I fear that a single super app could dominate the market, which could limit competition and consumer choice.
	PR4	I fear that the use of super apps can have a negative impact on local businesses and traditional commerce.
Behavioral intention	BI1	I would very likely use super apps if they become available in the near future.
	BI2	I would very likely use super apps and discontinue the use of single-purpose apps.
	BI3	I would always try to use super apps in my daily life.

sample are frequent app users, with a quarter reporting that they use apps throughout the entire day. This intensive app usage indicates a strong foundation for the potential adoption of super apps, highlighting an already established engagement with mobile and app technology that super apps could capitalize on.

C. DATA ANALYSIS AND VALIDATION

We perform a quantitative data analysis using the primary data collected from the online survey. To explore respondents' adoption intention of super apps, a two-step process involving confirmatory factor analysis (CFA) and structural equation modeling (SEM) is employed. This approach is well-established in social science research and commonly used to analyze behavioral intentions (e.g., [63], [64], [65]).

The purpose of the CFA is to test for common method bias [66] and validate the efficacy of the measurement model including the number of items and their relationship with the theoretical constructs based on internal reliability, convergent validity, and discriminant validity [67]. SEM allows us to test the hypothesized relations between the latent constructs. The variables GENDER, AGE, INCOME, and RESIDENCE are included in the structural model to control for their effect on the behavioral intention.

The R package lavaan and IBM SPSS Statistics 26 were used to perform the analyses.

IV. RESULTS
A. MEASUREMENT MODEL
Before estimating the relationships between the composites, the reliability and validity of the measurement model was assessed. As shown in Table 5, all latent constructs exceeded the recommended threshold values for Cronbach's α ([0.80; 0.93] > 0.7), construct reliability ([0.80; 0.93] > 0.7), and

average variance extracted (AVE) ([0.65; 0.82] > 0.5) [68]. The same was observed for the standardized factor loadings of all items ([0.67; 0.92] > 0.5) [68]. Discriminant validity was evaluated using the heterotrait-monotrait (HTMT) ratio of the correlations. Due to the conceptual similarity of the UTAUT2 model's constructs, we rely on the more liberal threshold of 0.90, as recommended by Henseler et al. [69]. Table 6 shows that all values are below this threshold ([−0.07; 0.89] < 0.90). Hence, we conclude that the measurement model demonstrates satisfactory reliability and validity, providing a robust foundation for examining the relationships between the composites.

B. STRUCTURAL MODEL
This section presents the results of the SEM analysis, which explores the hypothesized interrelations among the latent constructs identified in the measurement model. Despite the significant χ^2 statistic ($\chi^2 = 1143.786$, df = 272, $p < 0.05$), the model fit indices indicate that the model adequately fits the data (RMSEA = 0.06, CFI = 0.95, TLI = 0.94, SRMR = 0.06, GFI = 0.90, AGFI = 0.88) (Table 7). This suggests that while there may be some discrepancies between the model and observed data, overall, the model provides a satisfactory representation of the relationships among the latent constructs.

The final structural model is shown in Fig. 2. The results of the hypothesis testing are summarized in Table 8. The paths PE → BI ($\beta = 0.309, p < .001$), SI → BI ($\beta = 0.078, p < .01$), PV → BI ($\beta = 0.424, p < .001$), HA → BI ($\beta = 0.154, p < .001$), and PR → BI ($\beta = −0.129, p < .001$) were statistically significant. Therefore, H1, H3, H4, H5, and H6 were supported. H2, however, is not supported, since the EE → BI path ($\beta = 0.027, p > .05$) is not significant. Among the latent constructs, the results further

TABLE 3. Socioeconomic profile of the sample.

Variable	Description	Sample (n=1,019)	Census
SEX	Female	.51	.51[a]
	Male	.49	.49[a]
	Diverse	.00	n/a
AGE	18-29	.18	.18[b]
	30-39	.19	.19[b]
	40-49	.19	.19[b]
	50-59	.24	.25[b]
	60-69	.19	.19[b]
INCOME	< 1,500€	.18	.18[c]
	1,500€ ≤ 2,600€	.25	.25[c]
	2,600 ≤ 5,000€	.35	.35[c]
	> 5,000€	.21	.22[c]
EDU	Abitur (comparable to A levels)	.33	.32[d]
RESID	Rural Area (< 5,000 inhabitants)	.18	.14[e]
	Small Town (5,000 ≤ 20,000 inhabitants)	.19	.27[e]
	Medium-Sized Town (20,000 ≤ 100,000 inhabitants)	.25	.28[e]
	Large City (100,000 ≤ 500,000 inhabitants)	.18	.15[e]
	Metropolis (> 500,000 inhabitants)	.21	.18[e]

[a] Data for 2023 (Source: Federal Statistical Office, Population by nationality and gender [quarterly figures]. Available at https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/liste-zensus-geschlecht-staatsangehoerigkeit.html?nn=208632)

[b] Data for 2018 (Source: Federal Agency for Civic Education, Population by age group and gender. Available at https://www.bpb.de/kurz-knapp/zahlen-und-fakten/soziale-situation-in-deutschland/61538/bevoelkerung-nach-altersgruppen-und-geschlecht/)

[c] Data for 2018 (Source: Federal Agency for Civic Education, Income of private households. Available at https://www.bpb.de/kurz-knapp/zahlen-und-fakten/soziale-situation-in-deutschland/61754/einkommen-privater-haushalte/)

[d] Data for 2023 (Source: Federal Statistical Office, Press release no. 055 from February 18, 2019. Available at https://www.destatis.de/DE/Presse/Pressemitteilungen/2019/02/PD19_055_213.html)

[e] Data for 2022 (Source: Federal Statistical Office, Municipalities by federal state and population size class on 31.12.2022. Available at https://www.destatis.de/DE/Themen/Laender-Regionen/Regionales/Gemeindeverzeichnis/Administrativ/08-gemeinden-einwohner-groessen.html?nn=212328)

TABLE 4. Overview of smartphone and app usage patterns and attitudes.

Question	Category	Observations (percentage)	Mean (standard deviation)
When was the purchase time of your current smartphone?	Within the last 6 months	176 (.17)	-
	Between 6 and 12 months	206 (.20)	
	Between 1 and 2 years	287 (.28)	
	Between 2 and 5 years	303 (.30)	
	More than 5 years	47 (.05)	
What was the purchase price of your current smartphone?	Less than €250	225 (.22)	-
	€250 to under €500	320 (.31)	
	€500 to under €750	192 (.19)	
	€750 to under €1,000	175 (.17)	
	More than €1,000	107 (.11)	
How many apps do you have installed on your smartphone?	-	-	44.0 (48.6)
How many of them do you use at least once a week?	-	-	14.0 (13.0)
How would you describe your current app usage?	Rarely (*I use apps only rarely, e.g. once a week or less.*)	50 (.05)	-
	Occasionally (*I use apps occasionally, e.g. once a day or less.*)	114 (.11)	
	Regularly (*I use apps regularly, e.g. multiple times a day.*)	412 (.40)	
	Very regularly (*I use apps very regularly, e.g. multiple times an hour.*)	192 (.19)	
	Constantly (*I use apps constantly, e.g. all day long.*)	251 (.25)	
Do you have the feeling that you have too many apps installed on your smartphone?	Yes	490 (.49)	-
	No	519 (.51)	
When it comes to installing new apps, how would you assess your behavior?	Rather unconcerned (*You install new apps without thinking much about it.*)	424 (.42)	-
	Rather hesitant (*You think carefully about whether you really need a new app and often refrain from installing it.*)	585 (.58)	

indicate that PV and PE are the strongest determinants of the behavioral intention to use super apps, suggesting that these factors serve as the main levers to support super apps' widespread adoption. Among the control variables, only SEX

TABLE 5. Confirmatory factor analysis for construct validation.

Construct	Item	M (SD)	Alpha	SFL	CR	AVE
Performance expectancy	PE1	3.26 (1.20)	0.92	0.86	0.92	0.74
	PE2	3.08 (1.22)		0.89		
	PE3	3.06 (1.27)		0.81		
	PE4	3.08 (1.21)		0.87		
Effort expectancy	EE1	3.71 (1.14)	0.85	0.77	0.85	0.65
	EE2	3.98 (1.08)		0.81		
	EE3	3.86 (1.11)		0.85		
Social influence	SI1	3.18 (1.20)	0.89	0.80	0.89	0.66
	SI2	3.18 (1.20)		0.84		
	SI3	3.40 (1.17)		0.83		
	SI4	3.22 (1.19)		0.80		
Price value	PV1	2.90 (1.08)	0.80	0.78	0.80	0.67
	PV2	3.14 (1.10)		0.85		
Habit	HA1	3.65 (1.34)	0.82	0.81	0.82	0.70
	HA2	3.51 (1.23)		0.86		
Perceived risk	PR1	3.56 (1.15)	0.85	0.87	0.85	0.59
	PR2	3.53 (1.10)		0.86		
	PR3	3.40 (1.16)		0.67		
	PR4	3.44 (1.13)		0.65		
Behavioral intention	BI1	3.17 (1.15)	0.93	0.90	0.93	0.82
	BI2	3.16 (1.18)		0.92		
	BI3	2.98 (1.16)		0.90		

Note: M=mean; SD=standard deviation; Alpha=Cronbach's α; SFL=standardized factor loading; CR=construct reliability; AVE=average variance extracted.

TABLE 6. Heterotrait-monotrait ratio (HTMT) matrix.

	PE	EE	SI	PV	HA	PR	BI
PE							
EE	0.55						
SI	0.65	0.44					
PV	0.89	0.47	0.66				
HA	0.67	0.64	0.48	0.55			
PR	-0.07	0.15	0.12	-0.06	-0.02		
BI	0.86	0.51	0.63	0.86	0.63	-0.17	

($\beta = 0.054, p < .01$) was significant, being positively correlated with the BI. This suggests that male smartphone user exhibit a higher interest in super apps.

V. DISCUSSION

A. EMPIRICAL CONTRIBUTION

This research makes several empirical contributions. To the best of the authors' knowledge, our study is the first attempt to quantify the acceptance of super apps in Western countries, revealing that the level of interest is comparatively lower than that observed in Asia.

To this end, we adapted existing models, notably UTAUT2, from the technology acceptance literature to suit the study context. We extracted relevant theoretical constructs from the original model (i.e., PE, EE, SI, PV, and HA) and included additional constructs and control variables to predict the adoption intention. The effectiveness of our approach was validated through the results of a CFA and SEM, demonstrating strong model fit. The study results have identified key driver (i.e., PE and PV), inhibitor (i.e., PR), and

non-significant constructs (i.e., EE), as well as significant control variables (i.e., SEX).

These findings provide valuable insights into enhancing our understanding of the acceptance of emerging technological innovations within the specific socioeconomic context of Western countries. Furthermore, this study establishes a solid foundation for future research and opens numerous avenues to create additional knowledge in a virtually unexplored field.

B. MANAGERIAL IMPLICATIONS

The results of this research carry significant managerial implications for digital platforms aspiring to become super app providers. First, in addition to prioritizing practical advantages and utility, which is emphasized by existing super app providers in Asia and valued by existing users [3], their counterparts in Western countries should also highlight and facilitate economic benefits, particularly price value. This encompasses strategies that enable cost savings (item PV1, significant weight: 0.78) and offer a better service compared to offline alternatives (item PV2, significant weight: 0.85). Therefore, offering discounts, special pricing, bundling different services, and providing subscription plans can be effective in attracting and retaining consumers. Collaborating with popular brands and local businesses to offer exclusive deals and discounts can further enhance the perceived value.

Second, given the significant negative impact of PR related to personal (items PR1 and PR2, significant weights: 0.86 and 0.87) and societal matters (items PR3 and PR4, significant weights: 0.68 and 0.65), it is crucial for super app providers to adhere to privacy standards and prioritize transparency. Facilitating easy access to customer services through various channels, including personal interactions (opposed to

TABLE 7. Model fit indices.

Fit statistics	Model results	Recommended values as summarized in [63]
Chi-square p value	0.00	< 0.05
RMSEA	0.06	< 0.10
CFI	0.95	> 0.90
TLI	0.94	> 0.90
SRMR	0.06	The smaller the value, the better the fit
GFI	0.90	> 0.90
AGFI	0.88	> 0.80

Note: RMSEA=root mean square error approximation; CFI=comparative fit index; TLI=Tucker-Lewis index; SRMR=standardized root mean square residual; GFI=goodness of fit index; AGFI=adjusted goodness of fit index.

TABLE 8. Hypothesis testing results.

Hypothesis	Path	β	SE	p value	Result
H1	PE → BI	0.309	0.068	0.000	Supported
H2	EE → BI	0.027	0.034	0.345	Not supported
H3	SI → BI	0.078	0.031	0.006	Supported
H4	PV → BI	0.424	0.088	0.000	Supported
H5	HA → BI	0.154	0.030	0.000	Supported
H6	PR → BI	-0.129	0.021	0.000	Supported
	SEX → BI	0.054	0.018	0.002	Supported
	AGE → BI	0.030	0.013	0.075	Not supported
	INCOME → BI	-0.010	0.018	0.579	Not supported
	RESID → BI	-0.021	0.013	0.096	Not supported

chatbots etc.), is essential for fostering trust in super apps. This has also been highlighted in previous studies focusing on actual super app users [7]. Additionally, collaborating with local partners, especially small and medium-sized enterprises (SMEs), can effectively mitigate perceived risks and bolster positive consumer perceptions.

Finally, recognizing the significant gender differences in super app adoption intentions, providers should explicitly address the needs and preferences of female consumers to broaden their user base and maximize market penetration. Developing targeted marketing campaigns that address safety features, family-oriented services, and convenience, as well as collaborating with women-centric organizations and social media influencers, can be particularly effective in attracting female users and increasing acceptance [70].

C. POLICY IMPLICATIONS
The findings of this study also provide crucial guidance for policymakers seeking to regulate the emerging phenomenon of super apps to address potential challenges while ensuring responsible practices. Most importantly, there is a pressing need to prioritize consumer data privacy within the regulatory framework [15], [41]. It is imperative to update data protection laws to effectively address the complexity inherent to super apps and safeguard consumers' personal information from unauthorized access or misuse. Policymakers should consider implementing measures such as mandatory encryption standards, regular audits, and stringent consent protocols to ensure robust data protection. Additionally, offering incentives for companies that adopt higher data protection standards could further enhance compliance and trust, and reduce the risk of data breaches.

Moreover, fair competition should be a cornerstone of regulatory efforts within this digital ecosystem [16].

Policymakers must enact antitrust measures to prevent monopolistic practices and ensure a level playing field for both established super app providers and emerging players. Specific policies could include capping market share for dominant players, encouraging interoperability between different platforms, and imposing penalties for anti-competitive behavior. By promoting fair competition, policymakers can stimulate innovation and diversity within this ecosystem while protecting consumer choice and welfare. In the context of the EU, it is crucial to monitor the ongoing implementation of the DMA and DSA, as these regulations may significantly alter the competitive dynamics among digital platforms and influence business model strategies.

Lastly, policymakers should explore proactive measures such as public-private partnerships (PPPs) to facilitate the bottom-up planning and development of super apps within local contexts [71]. Initiatives like the Jakarta Kini (JAKI) app by the Jakarta Government showcase the potential for collaborative efforts to foster innovation and digitalization, and address specific societal needs effectively [72]. Policymakers could provide grants or tax incentives to local businesses and startups to collaborate on developing super app functionalities tailored to local needs. Furthermore, establishing innovation hubs and providing funding for research can encourage experimentation and development of new services within a controlled environment, ensuring they meet regulatory standards before broader implementation.

VI. LIMITATIONS AND FUTURE RESEARCH
While this study enriches both theoretical understanding and practical applications, it is essential to recognize its limitations, which provide opportunities for further research. For example, our analysis has shown that socioeconomic
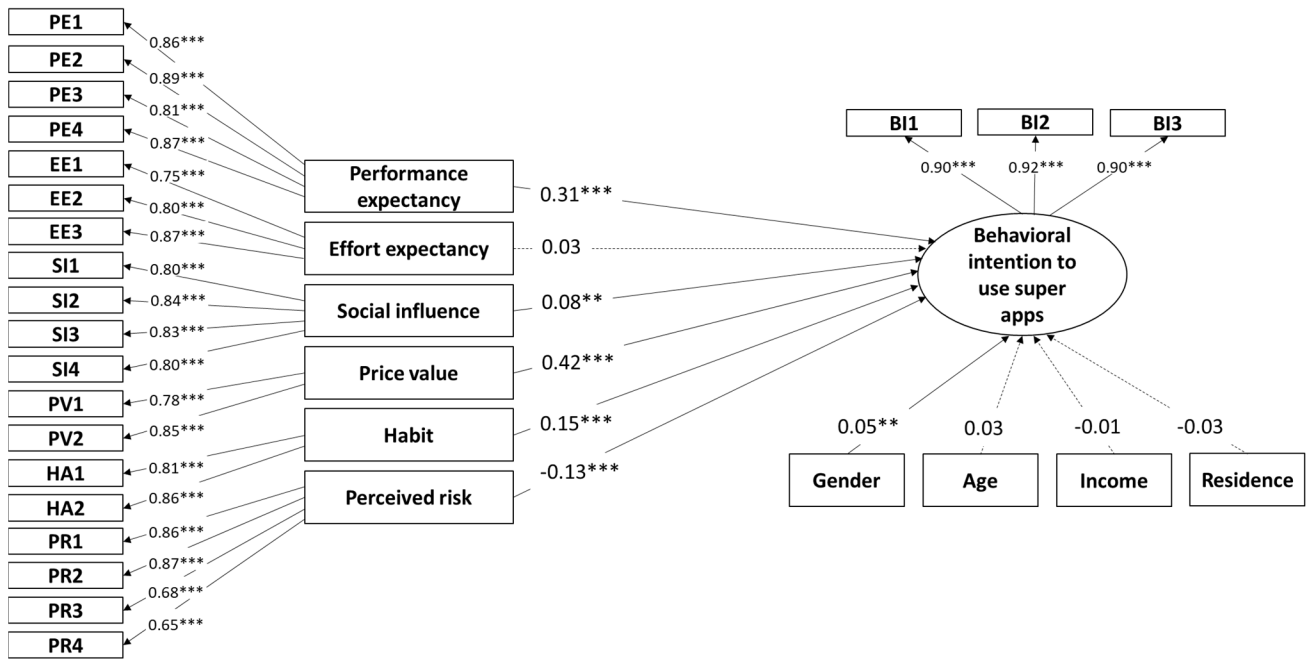
FIGURE 2. Standardized path coefficients and item loadings.

differences influence adoption intentions, with males being more likely to use super apps. Scholars could aim to conduct a more comprehensive investigation into the varied preferences for super apps across different socioeconomic groups and minority communities [71]. Exploring reasons behind disinterest and uncovering specific needs within these demographics could provide invaluable insights for designing inclusive super app experiences that cater to a broader spectrum of consumers. Although additional quantitative evidence from other Western countries is needed, we also specifically recommend the use of qualitative research methods such as interviews and focus groups to gain a richer understanding of the factors influencing adoption and non-adoption behaviors.

Notably, future research should specifically target underrepresented communities and peripheral groups to gather a holistic and unbiased picture of super app adoption patterns. This includes focusing on women, individuals with disabilities, low-income groups, and those living in areas with relatively poor access to essential infrastructures. By the same token, we need to acknowledge differences between various cities, regions, and rural areas, as consumer needs are significantly heterogeneous along these dimensions.

While our approach relies on stated intention data, it is essential to acknowledge the imperfect correlation between intentions and actions. As large-scale super apps become more prevalent in Western countries, additional research is needed to investigate this gap between intention and action through the use of data from actual super app users. Understanding the dynamics of consumer behavior in relation to these intentions can inform the development of more

accurate predictive models and enhance our understanding of adoption patterns in this evolving market landscape. A promising approach would be to implement real-world living labs, where super apps are piloted in monitored environments within specific cities or regions. This method actively engages users and gathers revealed preference data, allowing for a direct comparison between stated and revealed preferences, while triangulating the results with other city or region-based data. Such an approach would enable researchers to derive more robust conclusions about usage patterns and provide deeper insights into consumer behavior.

Last but not least, this research was carried out prior to the EU's enactment of the Digital Services Act (DSA) and Digital Markets Act (DMA). Future studies must observe how these innovative regulatory frameworks impact business operations and consumer engagement with super apps, with the goal of validating or expanding upon the empirical findings and insights this study offers. This could include investigating novel governance models that suggest a tailored design of super apps for city or regional contexts, referred to as "Local Super Apps" by Hasselwander et al. [71]. The latter offers local authorities an opportunity to leverage the positive effects of platform economics while mitigating the negative impacts. Additionally, examining monopolization dynamics known from digital platforms, often termed the Matthew effect [73], is crucial, as these could negatively impact consumer acceptance. Collectively, understanding these factors will provide a comprehensive view of how regulatory changes and market dynamics shape the adoption and evolution of super apps.

VII. CONCLUSION

This study has explored the potential of super apps in Western countries, where widespread adoption lags behind other world regions. Using data collected in Germany, it provides the first quantitative insights on whether consumers are willing to adopt super apps in these markets. Our findings indicate that prospective super app providers should focus on integrating features that offer both utility and economic value to consumers, with careful consideration of demographic factors. Establishing trust through transparency and forging partnerships with local businesses are essential strategies for thriving in markets such as Germany, where data security is a high priority. Moreover, to achieve substantial market penetration and enhance consumer acceptance, it is imperative to explicitly address the needs and preferences of female consumers. In this light, our study serves as an initial step towards a better understanding of the emergence of super apps in Western countries. However, it also highlights the need for a deeper investigation into the drivers and barriers behind their slower adoption compared to countries with more mature super app markets. In this context, this study also provides detailed insights into potential avenues for future research.

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