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Reconfigure and evaluate consumer satisfaction for Open API in advancing FinTech

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ABSTRACT

With the rise of FinTech, Open API (application programming interface) is essential in advancing FinTech applications in the future, but its customer satisfaction is a concern. Therefore, this study uses the technology acceptance model (TAM) to reconfigure and evaluate customer satisfaction of Open API in advancing FinTech by applying extended variables. This study initially applies the decision making trial and evaluation laboratory (DEMATEL) approach with the analytic network process (ANP) technique to reconfigure the modified TAM. Finally, we use VIse Kriterijumska Optimizacija I Kompromisno Resenje (VIKOR) analysis to evaluate customer satisfaction for examining the acceptance of Open API.

The results of DANP point out 'perceived privacy' (0.179), 'customer use intention' (0.158) and 'perceived usefulness' (0.147) are the three most influential variables for Open API in advancing FinTech. Furthermore, VIKOR analysis indicates online security or cryptocurrency trading (0.536) performs best in which Open API can satisfy customers in advancing FinTech and online banking (0.438) has the most space for improvement. This study also indicates that privacy protection plays a very important role in consumer satisfaction of Open API. The influences of the variables demonstrate that Open API compared to conventional APIs, is more convenient and relatively beneficial in advancing FinTech.

1. Introduction

The explosive growth of mobile electronic devices and the introduction of FinTech applications are forcing traditional banks to increase the flexibility of their businesses to meet the challenges of new business pipelines and business models (Bhat et al., 2023). Complex efforts to balance the interests of all parties have resulted from the efforts of banks and FinTech relative companies to moderate the relationship among privacy, convenience and security, and they are being forced to change their thinking on security issues (Wodo et al., 2021; Carranza et al., 2021; Svetlošák et al., 2023). Because almost every FinTech application deeply involves data sharing, thus they must apply reliable mechanisms to improve fraud monitoring and user experience (Wang, 2023). In recent years, the concept of Open API (application programming interface) has swept all over the world, and the Basel Committee on Banking Supervision released a report that it has become a trend (Basel Committee on Banking Supervision, 2018; Omarini, 2018). Through Open API, an increasing number of FinTech companies and large technology companies use their own technological advantages to develop solutions based on data analysis, trying to connect with financial application APIs to provide consumers with more innovative services (Gupta et al., 2023). The essence of Open API is to share bank information with third-party service providers (TSPs) (Basel Committee on Banking Supervision, 2019; Thakor, 2019; Tzavaras et al., 2023). The list of abbreviations in this study is shown as Table 1 at the end of this section.

However, there are still risks in the process of data sharing, such as the use of new types of information that will cause banks or FinTech to violate laws and compliance risks (Nicholls, 2019). These risks may cause consumers to be unwilling to accept Open API (Premchand and Choudhry, 2018). Briones de Araluze and Cassinello Plaza (2022) addressed Open API would be the transfor-

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Table 1
The List of Abbreviations.

Abbreviations	Definitions
ANP	the analytic network process
apps	applications
C.R.	consistency ratio
CA	customer attitude
CS	customer satisfaction
CUI	customer use intention
DANP	the DEMATEL-based analytic network process
DEMATEL	the Decision Making Trial and Evaluation Laboratory
FinTech	financial technology
ICT	information and communication technology
MCDM	multiple criteria decision-making
NRM	the network relation map
Open API	open application programming interface
PE	perceived ease to use
PP	perceived privacy
PT	perceived trust
PU	perceived usefulness
RFID	radio frequency identification
TAM	the technology acceptance model
TPB	the theory of planned behaviour
TRA	the theory of reasoned action
TSPs	third-party service providers
USI	the utility satisfaction index
VIKOR	Vlse Kriterijumska Optimizacija I Kompromisno Resenje analysis

mation approach of the conventional financial sectors business model toward a secure platform leveraging FinTech and fostering innovation. Besides, customers are generally preparing to embrace FinTech innovations through Open API which aims to bridge the gap between traditional financial services and online applications (Imerman and Fabozzi, 2020; Norma and Farah, 2020; Iman et al., 2023). For FinTech application providers, Open API is the ideal technical solution because it can collect rich data to further strengthen security, something that is difficult to achieve in traditional networks (Kröner, 2018; Cheh and Chen, 2021; Gupta et al., 2023).

On the other hand, many studies have pointed out that FinTech companies' diversified financial services using Open API are generally considered more convenient and highly integrated (Sivathanu, 2019; Wang et al., 2020). Therefore, currently, both FinTech companies and traditional financial institutions are glad to use their own financial applications and services applied Open API. Because of the advocacy of Open API, consumers could think the process of using products and services is more transparent, and the consumer experience is improved (Neyer, 2017; Yang et al., 2019; Tajimi, 2021). Considering customer experience, this technique should be well suited to the collaboration of various and even the future of security in advancing FinTech sector. Most of studies focused on the Open API technical field. Cheh and Chen (2021) analysed Open API specifications for security design issues. Serbout et al. (2022) presented an empirical study to determine the potential composability of different Open APIs by verifying their schemas' compatibility. Tzavaras et al. (2023) proposed Open API framework for applications to design and implement. Therefore, this study tried to reconfigure how consumers view the openness of information, while their personal information can also be used safely and effectively.

The technology acceptance model (TAM) was often extended to research customer issues in FinTech. Wang (2023) compared verification techniques in FinTech based on TAM. Alnemer (2022) reasoned determinants of digital banking adoption in the Kingdom of Saudi Arabia. Bajunaied et al. (2023) explored behavioral intention to adopt FinTech services. In view of the above, this study uses TAM to construct a research framework for reconfiguring and evaluating customer acceptance of Open API in FinTech applications. Considering rigorousness of the study, we use a hybrid multiple criteria decision-making (MCDM) research approach that combines the Decision Making Trial and Evaluation Laboratory (DEMATEL) with the analytic network process (ANP) to establish the network relation map (NRM) in order to confirm the relationships among the variables (Lin et al., 2022). Bijaniaram et al. (2023) also applied DANP with TAM to research user adoption efficiently. In addition, we apply VIKOR (Vlse Kriterijumska Optimizacija I Kompromisno Resenje), which is commonly applied for evaluating and reducing the performance gaps to satisfy the consumers' needs for continuous improvement and sustainable development (Liu and Han, 2020; Bera et al. 2022), to discuss the research variables and analyze which FinTech applications are most acceptable for Open API applied scenarios. Finally, this analysis can provide recommendations for the future inclusion of Open API in advancing FinTech sector to increase adoption.

2. Literature review

2.1. Open API for the FinTech

As far as the financial industry is concerned, Open API may be an effective automated method that allows licenced third-party technology providers, FinTech companies, and other banks to not share accounts (Neyer, 2017). It connects directly to the bank in a secure manner, minimizing the possibility and extent of exposing sensitive information (Coste and Miclea, 2019). The number of Open APIs created by the financial industry proves that Open API related to financial services has recently received much attention (Laplante and Kshetri, 2021). Open API is a fast, safe, economical and reusable method of data convergence (Premchand and Choudhry, 2018). Through the use of Open APIs, financial-related companies can reduce development costs, expand the scope of innovation and expand the target market at the same time based on the bank's own consumer data, public data and other external data (which may include financial institutions and nonfinancial institutions) (Kröner, 2018; Ünsal et al., 2020). According to data analysis, banks can construct new value propositions in response to rapidly changing consumer needs, reconsidering sales channels, partners, revenue and cost models and other key elements related to the business model (Mishra and Tripathi, 2021; Bhat et al., 2023).

Open API allows financial institutions to expand existing service content (Nicholls, 2019). In addition to existing products and payment services, they can also provide digital identity services (Laidroo et al., 2021). In the financial industry, because cash flow and information flow are operated and managed by different departments, finance sectors have incomplete customer information (Iman et al., 2023). Therefore, finance sectors can also take advantage of Open API that shares information to aggregate customer information from different accounts or even strategic partners in different industries, enrich their database, and analyze the data to make the products and services provided by financial institutions more closely align to the actual preferences and needs of consumers (Anagnostopoulos, 2018; Sibanda et al., 2020; Hunke et al., 2021).

As far as consumers are concerned, they can obtain complete financial information by applying artificial intelligence investment and big data analysis, comparing the interest rates and discounts of multiple bank accounts at the same time, and choosing whether to continue using the original bank services (Owusu Kwateng et al., 2020). In personal asset allocation and financial planning, it is more efficient for FinTech companies to directly share their account information with accountants to reduce time costs (Svetlošák

et al., 2023). However, the security of personal information is the basis for customers to trust financial institutions, and the reputation of financial institutions depends on the level of trust customers place in financial institutions (Kröner, 2018; Nicholls, 2019; Wang et al., 2020). Therefore, the financial supervision agency must establish a governance control model to ensure that when using Open API to provide related services, the negligence or security accident of an external third party will not lead to a loss of the trust of its customers (Farrow, 2020; Laplante and Kshetri, 2021).

2.2. Scenarios of FinTech applications with open API

Open APIs are most used in the following four FinTech enabling scenarios (Lai, 2020):

2.2.1. Online security or cryptocurrency trading

Currently, mobile device screens have become the major channel through which security brokers or cryptocurrency exchanges interact with customers (Nguyen et al., 2020). The past business model will inevitably need to be adjusted. Some security brokers or cryptocurrency exchanges choose to create digital brands, redesign the operation process and interface, and use digital accounts so that investors can trade securities and cryptocurrencies cross-border at the same time (Khan et al., 2020). These are all good examples of Open API introduction (Fernández Vilas et al., 2021).

2.2.2. Mobile payment

Mobile payments are often considered the unique combination of financial services and ICT technologies and as a kind of 'financial service innovation'; it has been observed that people widely use new technologies when financial consumer goods are first introduced (Milian et al., 2019; Acker and Murthy, 2020). Mobile payments claim to open financial business to nonfinancial industries under the precondition of risk control, that is, to allow the ICT industry to enter the financial sector by using its research to develop innovations in financial goods and services (Wolf et al., 2018; Muthukannan et al., 2020). As mobile payments become a leader in the development of FinTech services, the time required for Open API is becoming more important (Tounekti et al., 2020).

2.2.3. Online banking

Some studies defined online banking as follows: the bank can share the number of customer data which licenses with third-party service providers, and use data to build applications and services (Singh and Srivastava, 2020). From this narrative, we can see several important concepts of online banking, including client permission, sharing data, and establishing application services (Barbu et al., 2021). The official agency of the British Open Bank believes that online banking applying Open API means 'giving service providers the authority to obtain consumer finance data in a safe manner'. This agency points out that the data sharing of Open API must be done in a secure way (Liyanaarachchi et al., 2021). Therefore, adopting Open API, online banking can return the dominance of financial data to consumers in order to maximize the interests of consumers and society (Wewege, 2020). Through the sharing of financial data between banks and third-party service providers such as FinTech companies, consumers can obtain more diverse financial services (Tripathy and Jain, 2020).

2.2.4. Personal finance

Many FinTech apps work on managing customers' financial assets, which is not an easy task for them to do. Now that many people no longer balance a check book, tracking and expenses and keeping up with the bank balance can become slightly difficult (Angel, 2018). Personal finance apps can connect with their bank account and help them keep up with their spending. Additionally, personal finance apps can help people pinpoint areas where they have been spending, track upcoming bill payments (some allow people to pay your bills directly through the app), and keep up with their credit scores and investment portfolios (Gomber et al., 2018). Innovative personal finance apps provide several different features (email reminders, bill due dates, track subscriptions, shared wallets, etc.) for managing personal overall finances (Weichert, 2017; Tohang et al., 2021). Hence, these apps are suitable for adopting Open API.

2.3. Modified TAM and its definition to the research question

2.3.1. Technology acceptance model

Many models have been used to explain the systematic adoption of emerging technologies. The technology acceptance model (TAM) developed by Davis (1989) is the most commonly used analytical and representative model. The TAM includes the most influential arguments in the theory of reasoned action (TRA) and the theory of planned behaviour (TPB) by using the relevant variables of user attitudes and behaviours to assess the acceptance of new technologies (Schierz et al., 2010).

The TAM is a reliable research method with excellent measurement ability, simplicity and empirical stability. Compared to alternative models, the TAM can explain the main differences in usage intentions (Schierz et al., 2010), so it is widely used to the introduction of many emerging technologies, such as the application of RFID in specific fields (Cheng and Yeh, 2011) and the promotion of health care information systems (Pai and Huang, 2011), etc. In addition, it is also used to infer the role of new variables in the acceptance of an emerging application (Chang and Chen, 2018). For instance, Iman et al. (2023) used extended TAM to argue FinTech applying in financial services.

Although the TAM is very useful in explaining behavioural intention, Venkatesh and Davis (2000) also suggested that the TAM is relatively simple, and relevant explanatory variables should be added to the model when performing specific technology assessments. Many studies have successfully validated this argument by modifying the basic model and adding relevant explanatory variables and mediating variables; in this way, the TAM has remained popular in research (Venkatesh et al., 2007; Cheng and Yeh, 2011; Pai and Huang, 2011; Wang, 2023). Integrating the variables of relevant research arguments, TAM provides researchers with a deeper understanding of issues related to user acceptance (Chang and Chen, 2018). Therefore, we believe that some variables can be added to the TAM and may help to evaluate behavioural intention and explanatory variables in Open API when applied to FinTech applications.

Researchers evaluated the variables that influence customer intention to use FinTech services and considered 'perceived trust' was one of the critical variables that affect satisfaction (Yildirim and Ali-Eldin, 2019; Imerman and Fabozzi, 2020). Patil et al. (2020) stated 'perceived trust' that brings customers positive financial service experience. When people perceive trust in FinTech applications, people can be convinced to increase their intention to use (Choi et al., 2020). Other studies also supported that the positive influence of trust on online financial services (Shao et al., 2019; Kang and Namkung, 2019). In addition, we consider 'perceived privacy' with the TAM, as many scholars have pointed out that 'perceived privacy' could indicate a deeper and more predictable intention to adopt FinTech applications (Norma and Farah, 2020). Considering the sensitivity of FinTech applications, the digitization and virtualization of financial services has frequently been met with privacy concerns (Merhi et al. 2020). Studies evidenced people use FinTech applications online, so they are worry that this privacy information may be lost or stolen (Yildirim and Ali-Eldin,

2019; Carranza et al., 2021). Hence, 'perceived privacy' can specifically measure user attitudes toward the topic. The modified TAM is shown in Fig. 1.

We use TAM as the basic research structure and add the two explanatory variables of 'Perceived Trust' and 'Perceived Privacy,' which might be highly relevant to this research topic. In addition, we replace 'user adoption' with 'customer satisfaction', as many scholars have noted that 'customer satisfaction' could indicate a deeper and more predictable intention to adopt new technologies in financial service industries. Furthermore, this variable can specifically measure user attitudes towards the topic (Seyed-Hosseini et al., 2006; Shin, 2009; Neyer, 2017; Rahia et al., 2018; Tajimi, 2021; Tohang et al., 2021; Liyanaarachchi et al., 2021). Accordingly, this study expects to fully explain the concepts central to this research, construct new research arguments, and make new contributions to the field.

2.3.2. Perceived ease to use (PE)

With proper guidance and instruction, users can easily manage financial data in mobile devices and FinTech systems through Open API. During this process, the user experience is theoretically simple and fluent, and it does not cause too much confusion or negativity for the user (Shin, 2009; Weichert, 2017; Rahia et al., 2018; Kang, 2018; Coste and Miclea, 2019; Tohang et al., 2021; Barbu et al., 2021). We develop two indicator questions to evaluate the weight of 'Perceived Ease to Use' in the research model.

1. Customers perceive that Open API applied in FinTech applications is convenient to use (PE1).
2. Customers perceive that Open API applied in FinTech applications is workable (PE2).

2.3.3. Perceived usefulness (PU)

Ideal Open API provides accurate information. Although traditional APIs have the same function, Open API characteristics are more efficient, and customers can intuitively manipulate them (Shin, 2009; Weichert, 2017; Rahia et al., 2018; Coste and Miclea, 2019; Ünsal et al., 2020; Tohang et al., 2021; Barbu et al., 2021). We develop two indicator questions to evaluate the weight of 'Perceived Usefulness' in the research model.

1. Customers perceive that Open API applied in FinTech applications is effective (PU1).
2. Customers perceive that Open API applied in FinTech applications could improve the integration of financial data (PU2).

2.3.4. Perceived trust (PT)

Through the adoption of Open API, not only will banks and TSPs have more potential to create new financial services but consumers also will be able to control the dominance of personal data. The transmission, processing and application of personal data can be tracked and controlled more appropriately. Under the premise of ensuring safety, Open API realizes consumer trust (Lee and Rha, 2016; Kang, 2018; Wang et al., 2020; Farrow, 2020; French et al., 2020; Khan et al., 2020; Barbu et al., 2021). We develop two indicator questions to evaluate the weight of 'Perceived Trust' in the research model.

1. Customers perceive that Open API applied in FinTech applications is secure (PT1).
2. Customers perceive that Open API applied in FinTech applications is reliable (PT2).

2.3.5. Perceived privacy (PP)

In general, Open API provides the empowerment of personal data. Therefore, users should not be seriously concerned about privacy. Most Open API architectures include complete solutions to privacy issues. In the future, we believe that these solutions will become even more robust (Lee and Rha, 2016; Kang, 2018; Yang et al., 2019; Thakor, 2020; Singh and Srivastava, 2020; Barbu et al., 2021; Svetlošák et al., 2023). We develop two indicator questions to evaluate the weight of 'Perceived Privacy' in the research model.

1. Customers perceive that Open API applied in FinTech applications will not invade privacy (PP1).
2. Customers perceive that Open API applied in FinTech applications will strengthen privacy protection (PP2).

2.3.6. Customer attitude (CA)

Many researchers agree that customer attitude is one type of psychological cognition that can be expected of customers in a specific situation. When FinTech applications use Open API as a means of service innovations, the customer has a pre-existing attitude towards the procedure resulting from previous knowledge about Open API. After using the technique, they might compare their experience with their previous assumptions. Thus, customer attitude is also a very important variable in this model (Seyed-Hosseini et al., 2006; Shin, 2009; Rahia et al., 2018; Farrow, 2020; French et al., 2020; Singh and Srivastava, 2020; Tripathy and Jain, 2020). We develop two indicator questions to evaluate the weight of 'Customer Attitude' in the research model.

1. Customers perceive that Open API applied in FinTech applications is easy to comprehend (CA1).
2. Customers perceive that they can clearly understand the implications of Open API applied in FinTech applications (CA2).

2.3.7. Customer use intention (CUI)

FinTech applications apply Open API not only because it is a breakthrough in technology but also because it accounts for innovations in software, hardware and services. Customers' intentions to accept Open API result from their own experiences and subjective consciousness, and customers' assessments will influence the research structure (Belk et al., 2017; Wu and Chen 2017; Wang et al. 2020; Farrow, 2020; Tripathy and Jain, 2020; Mishra and Tripathi, 2021; Singh and Srivastava, 2020). We develop two indicator questions to evaluate the weight of 'Customer Use Intention' in the research model.

1. Customers perceive that Open API can strengthen the security of FinTech applications (CUI1).
2. Customers perceive that Open API is more advantageous than private APIs with regard to the security of FinTech applications (CUI2).

2.3.8. Customer satisfaction (CS)

According to a previous literature review, the adoption of Open API is an innovation and improvement in FinTech applications; it can provide added value, such as by meeting or exceeding customer expectations and offering good experience and satisfaction to customers. In this way, FinTech applications adopt Open API to increase customer satisfaction (Wu and Chen, 2017; Rahia et al., 2018; Ünsal et al., 2020; Farrow, 2020; Nguyen et al., 2020; Tripathy and Jain, 2020; Mishra and Tripathi, 2021). We develop two indicator questions to evaluate the weight of 'Customer Satisfaction' in the research model.

1. Customers are satisfied with the functions of using Open API as applied in FinTech applications (CS1).
2. Customers perceive that there are no errors or mistakes when using Open API, as applied in FinTech applications (CS2).

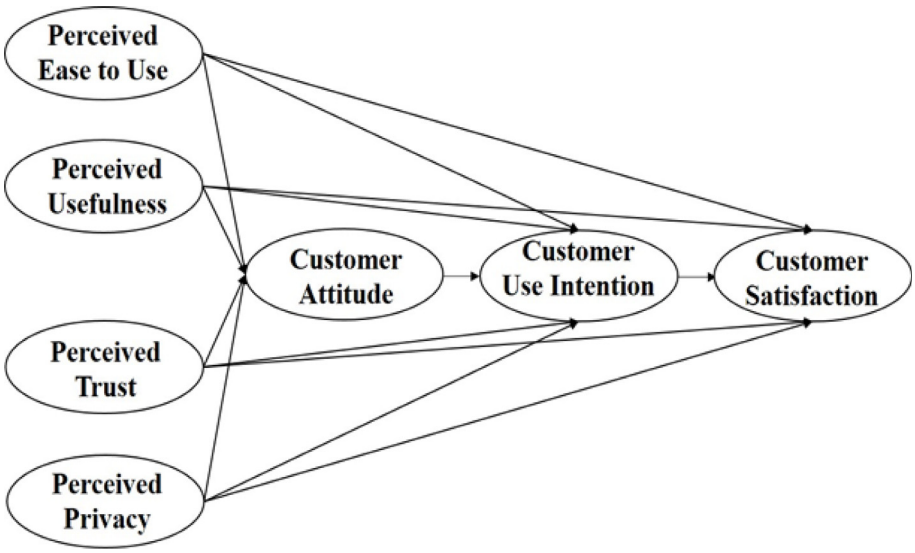

Fig. 1. The Modified TAM of Open API in FinTech Application Acceptance.

3. Methodology design

Tzeng and Huang (2011) addressed multiple criteria decision-making (MCDM) research methods that could help researchers evaluate various factors or criteria within a limited research structure to determine the optimization solution (Liu and Han, 2020). Therefore, we first use the Decision Making Trial and Evaluation Laboratory (DEMATEL) to confirm the relationship between the influences of each variable and explore the correlation of indicators of the belonging variables (Chang and Chen, 2018). Next, we use the result of DEMATEL analysis to integrate the analytic network process (ANP) as the DEMATEL-based ANP (DANP) approach to evaluate the weights of the variables and indicators in the network relation map (NRM) developed by DEMATEL (Govindan et al., 2016; Lin et al., 2022). Finally, based on the DANP analysis results, we apply the preference selection model VIKOR to discuss the research variables and analyze which scenario Open API applied in FinTech applications is most acceptable. The research design is as Fig. 2.

3.1. Questionnaire collection

Customer acceptance of Open API as applied in the FinTech sector is an area of exploratory research. This study used purposive sampling which is defined for a purpose that is relevant to the study and carried out based on specific criteria in selecting respondents (Nuryakin and Maryati, 2022). When a study conducted on purposive sampling was methodologically sound, the internal and external validity are explained (Andrade, 2021). Therefore, the collection of data is based on the opinions of professionals who can readily understand the topic, who are also earlier customers at the first stage of the product life cycle, such as workers in the information security departments of the financial sector, information technology companies and FinTech-related companies. We designed an investigation of the study constructs, variables and indicators based on DANP and expected to fulfil the purpose of the study. The data from the expert questionnaire were collected using a 5-point scale. The options ranged from 0 (not influential) to 4 (very influential). The data collection period was from June 2022 to November 2022. The background of respondents is as follows: 127 persons are in the information security departments of the financial sector, 89 persons are from information technology companies, and 102 are from FinTech-related companies. The total sample includes 318 persons as Table 2 shown.

3.2. DANP analysis

In section 2.3, we summarize the variables and relevant indicators for the design of the questionnaire and the framework of DEMATEL, as shown in Table 3. DEMATEL is generally applied to research topics in multivariable analysis. DEMATEL derives the direct or indirect influence between variables and the criterion indicator of the analysis. The influencing relationships are explored through matrix calculation results and visualized as NRM. NRM can display the relationships and influence levels that make research topics easy to describe and understand, and it further develops the framework of the DANP model (Lin et al., 2022; Bijaniaram et al., 2023).

Saaty (1996) designed the analytic network process (ANP) to address the deficiencies of the analytic hierarchy process (AHP), which does not analyze the relationships among factors. Unlike the simple linear analysis of the AHP, the ANP can complete network correlation analysis. ANP uses the extreme process method to calculate the supermatrix to avoid possible dependencies and effectively correct problems (Lin et al., 2016). Although ANP could theoretically modify the dependencies of factors, with NRM described by DEMATEL, ANP can more effectively solve the problem of dependencies, the so-called DANP research approach. This hybrid type of MCDM approach has been successfully applied in many research projects, especially exploratory studies (Liu and Han, 2020). Hence, we use DANP and evaluate the weights of the variables and indicators. In addition, the DANP results can be used in VIKOR to select the most acceptable Open API solution. First, we will discuss the importance and priority of the variables and indicators based on the DANP results.

3.3. VIKOR analysis

Opricovic and Tzeng (2007) developed VIKOR (Vlse Kriterijumska Optimizacija I Kompromisno Resenje) analysis for exploratory studies to select solutions that are not comparable and may be contradictory (Ou Yang et al., 2009; Lin et al., 2016). Many studies have applied VIKOR analysis in empirical research on topics such as information security (Ou Yang et al., 2008), software platform selection (Lin et al., 2016), evaluation of smart office buildings

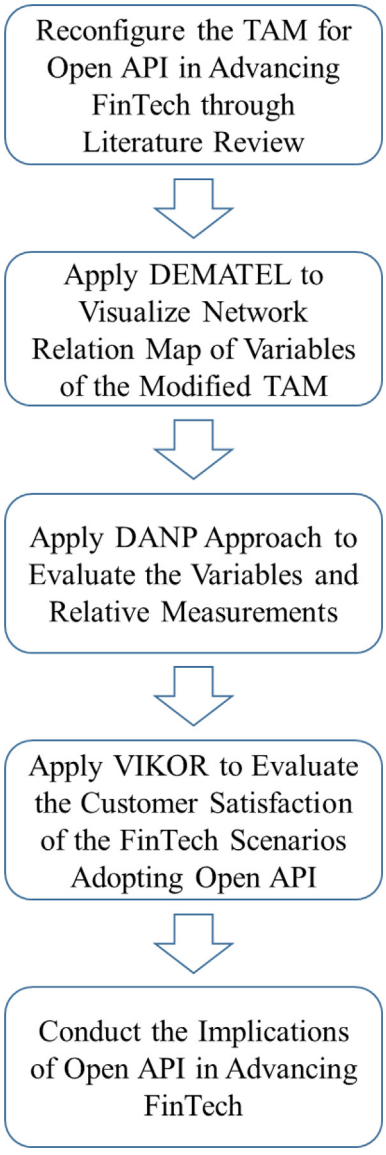

Fig. 2. The Research Schematic Flow.

Table 2
The Statistical Distribution of the Questionnaire.

Field	Number	Ratio
Information security departments in the financial sector	127	39.93%
Information technology companies	89	27.99%
FinTech related companies	102	32.08%
Total	318	100%

(Lin et al., 2022), and key factors of wearable devices (Liu and Han, 2022).

VIKOR analysis can use the previous DANP calculation results to infer the multivariable factor ordering and select the acceptable solution (Ou Yang et al., 2008). This solution is a compromise between positive/ideal solutions and negative/worst solutions (Opricovic and Tzeng, 2007). VIKOR analysis can rank, select, and replace all variable indicators and find alternative indicators for each indicator in the same model, resulting in a minimum gap (i.e., best) compromise solution (Liu and Han, 2022; Lin et al. 2022). In this study, we used VIKOR analysis to sort the indicators that were not clearly different after DANP analysis. Evaluating Open API as applied in FinTech applications is a forward-looking

Table 3
The Definition of Variables and Relevant Indicators.

Variable	Item	Definition
Perceived Ease to Use (PE)	PE1	Customers perceive that Open API applied in FinTech applications is convenient to use.
	PE2	Customers perceive that Open API applied in FinTech applications is workable.
Perceived Usefulness (PU)	PU1	Customers perceive that Open API applied in FinTech applications is effective.
	PU2	Customers perceive that Open API applied in FinTech applications could improve the integration of financial data.
Perceived Trust (PT)	PT1	Customers perceive that Open API applied in FinTech application is secure.
	PT2	Customers perceive that Open API applied in FinTech application is reliable.
Perceived Privacy (PP)	PP1	Customers perceive that Open API applied in FinTech applications will not invade privacy.
	PP2	Customers perceive that Open API applied in FinTech applications will strengthen privacy protection.
Customer Attitude (CA)	CA1	Customers perceive that Open API applied in FinTech applications is easy to comprehend.
	CA2	Customers perceive that they can clearly understand the implication of Open API applied in FinTech applications.
Customer Use Intention (CUI)	CUI1	Customers perceive that Open API can strengthen the security of FinTech applications.
	CUI2	Customers perceive that Open API is more advantageous than private APIs with regard to the security of FinTech applications.
Customer Satisfaction (CS)	CS1	Customers are satisfied with the functions of using Open API as applied in FinTech applications.
	CS2	Customers perceive that there are no errors or mistakes when using Open API as applied in FinTech applications.

exploratory type of research, and it is highly probable that similar situations will occur. In the course of questionnaire analysis, we set the indicator performance scores from 0 to 10 (very poor ← 0, 10 → excellent), so the highest degree of influence will be 10, and the least likely influence score is 0. This is different from other general decision analysis methods (Lin et al., 2022). This model is mainly used to avoid selecting the best solution from the inferior factors/options/indicators.

The steps of VIKOR analysis are as follows (Liu and Han, 2020; Lin et al. 2022; Bera et al., 2022):

1. Determine the best score level and worst score level

$$f_i^* = \left\{ \left(\max_k f_{ik} | k \in I_1 \right), \left(\min_k f_{ik} | k \in I_2 \right) | \forall k = 1, 2, \cdots, m \right\} \quad (1)$$

or set the desired level for i indicator f_i^*,

$$f_i^- = \left\{ \left(\min_k f_{ik} | k \in I_1 \right), \left(\max_k f_{ik} | k \in I_2 \right) | \forall k = 1, 2, \cdots, m \right\} \quad (2)$$

or set the worst level for i indicator f_i^-.

In the above equations, k is the alternative, and i is the evaluation indicator. f_{ik} is the performance evaluation value of evaluation indicator i of alternative k obtained by means of a questionnaire. I_1 is the set of benefit evaluation indicators, and I_2 is a set of cost evaluation indicators. f_i^* is the positive ideal solution or the desired level value set by the decision maker. f_i^- is the minimum ideal solution or the minimum level set by the decision maker.

2. Calculate S_k and R_k

$$S_k = \sum_{i=1}^{n} w_i (f_i^* - f_{ik}) / (f_i^* - f_i^-) \forall k = 1, 2, \cdots, m \quad (3)$$

$$R_k = \max_i \left[w_i (f_i^* - f_{ik}) / f_i^* - f_i^- \right] \forall k = 1, 2, \cdots, m \quad (4)$$

In the above two equations, w_i is the relative weight between the evaluation indicators. That is, the relative weights of the indicators derived from the DANP in this research.

3. CalculateQ_k

$$Q_k = v(S_k - S^*)/(S^- - S^*) + (1 - v)(R_k - R^*)/(R^- - R^*) \forall k = 1, 2, \cdots, m \quad (5)$$

$$S^* = \min_k S_k; S^- = \max_k S_k; S^* = 0; S^- = 1 \quad (6)$$

$$R^* = \min_k R_k; R^- = \max_k R_k; R^* = 0; R^- = 1 \quad (7)$$

In the above equations, $\boldsymbol{v}$ is the coefficient of the decision mechanism. When ν is greater than 0.5, the decision is made according to the majority of the resolution. When $\boldsymbol{v}$ is approximately 0.5, the decision is made according to the approval. When ν is less than 0.5, the decision is made according to the refusal. We set $\boldsymbol{v}$ as 0.5 in VIKOR analysis to simultaneously maximize group utility and minimize individual losses. The value obtained by $\min_k S_k$ is the maximum of the majority rule, and the value obtained by $\min_k R_k$ is the smallest individual loss. The meaning of Q_k is the ratio of benefits that can be generated by the k solution.

4. Rank the order of solutions

To rank solutions in this study, we use the value of Q_k as $\boldsymbol{v}$ as 0.5 to establish the utility satisfaction index (USI). We calculate the value of Q_k as $\boldsymbol{v}$ as 0.5 to consider the maximum group utility and the minimum individual loss to set up the USI table to understand the satisfaction of solutions. However, the value of Q_k is a type of small index, which means that the smaller is, the Q_k better the value is, and its range is between 0 and 1. Therefore, we turn this into a large index that means the value of $1 - Q_k$ the larger the better. Overall, when the $\boldsymbol{v}$ value of satisfaction is 0.5, the USI will become $1 - Q_k$. In this way, we can obtain the USI of different solutions for further discussion.

4. Empirical research results

4.1. NRM analysis of DEMATEL

We use the DEMATEL approach to calculate the matrixes for the comparison of the total influence of the proposed model of this research, and we describe the NRM in Excel (see Table 4 and Fig. 3). Briefly, the principle used to calculate the total influence of DEMATEL is as follows (Lin et al., 2022; Bijaniaram et al., 2023). Add the columns (variables) of the total influence matrix to obtain the sum vector ($\boldsymbol{d}$) of the columns, adding the rows (variables) of the total influence matrix to obtain the vector of the transpose of the sum of the rows ($\boldsymbol{r}$). Add the sum vector of columns ($\boldsymbol{d}$)to the vector of the transpose of the sum of the rows ($\boldsymbol{r}$) to obtain the sum of vector of columns and rows ($\boldsymbol{d_i + r_i}$). The sum vector of column ($\boldsymbol{d}$) minus the vector of the transpose of the sum of the rows ($\boldsymbol{r}$) is the vector difference of columns and rows ($\boldsymbol{d_i - r_i}$). The sum of the vectors of columns and rows represents the total influence relationships of the total influence matrix ($\boldsymbol{T}$). If the value of ($\boldsymbol{d_i + r_i}$) is higher, it means that the variable or the indicator i affects others more. The value of ($\boldsymbol{d_i - r_i}$) represents the net influence relationships of the total influence matrix. If ($\boldsymbol{d_i - r_i}$ ***greater than 0***), this indicates that the variable (indicator) affects other variables (indicators) to a greater extent than the variable (indicator) is affected by other variables (indicators). In contrast, if ($\boldsymbol{d_i - r_i}$ ***less than 0***), it means that the variable (indicator) affects other variables (indicators) to a lesser extent than the variable (indicator) is affected by other variables (indicators).

According to the NRM, we concisely explain the influence of the relationships of each variable from top left to bottom right for further DANP analysis.

4.2. DANP analysis of the proposed model

4.2.1. The framework of DANP analysis

We apply DANP to the proposed model of Open API in FinTech applications using the NRM of the seven variables and other NRMs of indicators of each variable that were also calculated per DEMATEL. These NRMs can confirm the dependencies of the analytic network, as shown in Fig. 4. Each variable and each indicator are also externally and internally dependent (Lin et al., 2016; Lin et al., 2022; Bijaniaram et al., 2023). In this study, we use Super Decisions (statics software sponsored by Creative Decisions Foundation of University of Pittsburgh) to perform DANP calculations. The results are shown in Table 5.

4.2.2. The discussion of DANP analysis

The results of DANP show that in descending order, the weights of the variables are ‘perceived privacy’, ‘customer use intention’, ‘perceived ease to use’, ‘perceived usefulness’, ‘customer satisfaction’, ‘perceived trust’, and ‘customer attitude’. This order is similar to the influence relationships of NRM. However, the effectiveness of ‘customer use intention’ is promoted, allowing the influence of other variables to decrease in DANP analysis. Analysis of indicator rankings might help to identify some reasons for the difference.

Based on the DANP results, the top six indicators are ‘customers perceive that Open API applied in FinTech applications will strengthen privacy protection’, ‘customers perceive that Open API applied in FinTech applications is effective’, ‘customers perceive that Open API applied in FinTech applications is convenient to use’, ‘customers perceive that Open API can strengthen the security of FinTech applications’, ‘customers perceive that Open API is more advantageous than private APIs with regard to the security of FinTech applications’, and ‘customers perceive that there are no errors or mistakes when using Open API as applied in FinTech applications’.

According to the data in Table 5, we can use the weight of the individual indicator to further explain the proposed model and focus our discussion on the variables. In addition, in not considering individual customers’ viewpoints, this model differs from the typical TAM, which might be ignored when reconfiguring and evaluating consumer acceptance of Open API as applied in FinTech applications. In this way, we could also explore effective suggestions and management implications corresponding to the weights of variables and indicators. We continue this discussion according to the order of the weights of the variables.

1. Perceived privacy and its indicators

The top-ranked variable in perceived privacy is ‘Customers perceive that Open API applied in FinTech applications will strengthen privacy protection’. Surprisingly, this is the first of the 14 indicators and shows that Open API could make FinTech applications more private, as it potentially plays an extremely important role in personal data control. Currently, customers have high awareness of personal privacy. Open API compared to private APIs with embedded unique mechanisms to enhance authenticating personal data accessibility in FinTech applications will undoubtedly be a trend in the future.

Table 4
The DEMATEL Total Influence of Variables of the Proposed Model.

Variables	The sum of columns (***d***)	The sum of Rows (***r***)	The sum of vectors of columns and rows (***d + r***)	The difference in vectors of columns and rows (***d-r***)
PE	3.210	2.918	6.127	0.292
PU	3.661	2.815	6.476	0.846
PT	2.993	2.686	5.679	0.306
PP	3.865	2.878	6.743	0.987
CA	2.541	2.930	5.471	−0.389
CUI	2.689	3.058	5.747	−0.369
CS	2.031	3.705	5.736	−1.673

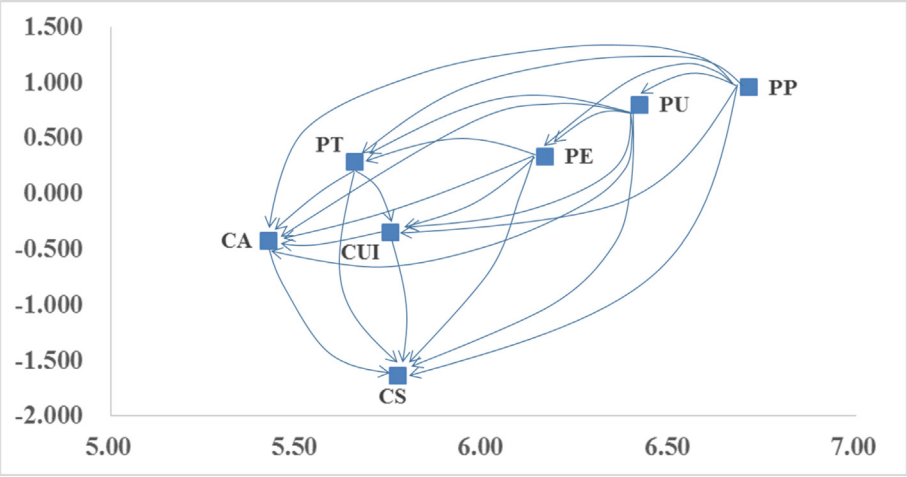

Fig. 3. NRM of Consumer Acceptance of Open API in FinTech Applications.

2. Customer use intention and its indicators

'Customers perceive that Open API can strengthen the security of FinTech applications' ranks first in customer use intention. Open API has been advocated in FinTech sector in recent years. Most people are reluctant to let the personal information assets stored in financial institutions be shared with others in a nontransparent method. However, through Open API collaboration, this helps to strengthen personal information assets in data transformation and mining. Financial industries, information technology vendors and FinTech-related companies could collaborate to consolidate data security. This will be one of the keys to increasing the customer acceptance of Open API in FinTech applications.

3. Perceived ease to use and its indicators

'Customers perceive that Open API applied in FinTech applications is convenient to use' is the more significant indicator of this variable. In the literature review, we find that the level of Open API technology has improved in recent years. In addition, Open API can be incorporated into FinTech applications and combined with the apps of many financial institutions. This result is consistent with the fact that since the concept of Open Banking launched, many FinTech applications or software vendors have sought to increase their competitiveness or upgrade their service value by cooperating with various Open API architectures. In using these FinTech applications, customers affirm the ease to use of Open API technique.

4. Perceived usefulness and its indicators

According to Table 4, we find that 'customers perceive that Open API applied in FinTech applications is effective' is the most important indicator for usefulness, and it is also the second highest ranked among all indicators. Its weight is much higher than that of 'customers perceive that Open API applied in FinTech applications could improve the integration of financial data'. This means that experts view Open API as a strategic technology that can maintain or even improve the benefit of FinTech services. Therefore, it is clear that the use of Open API in FinTech applications is increasing. In the future, users will be increasingly accustomed to using FinTech applications embedded in Open API.

5. Customer satisfaction and its indicators

'Customers perceive that there are no errors or mistakes when using Open API as applied in FinTech applications' is the most valued indicator of this variable. The difference between Open API and other private APIs is that the former rigorously prevents others from stealing accounts or personal data assets per standard protocols. As FinTech applications gradually become a major part of people's personal lives, compatibility and connectivity between FinTech applications are necessary. At first, many people are reluctant to use FinTech applications because personal information can be easily used by others. Thus, when Open API can demonstrate its superiority in data sharing and ensure confidentiality during the sharing process, customer satisfaction will be higher. In this way, the more relevant vendors will serve more customers. Hence, the importance of improving customer satisfaction cannot be ignored.

6. Perceived trust and its indicators

'Customers perceive that Open API applied in FinTech application is secure' plays a more important role in trust than does customer perception. With competition among different kinds of APIs, Open API is gradually gaining customer trust. However, it takes a long time to establish trust, which may be why this variable receives less weight in the model. The weights of the two indica-

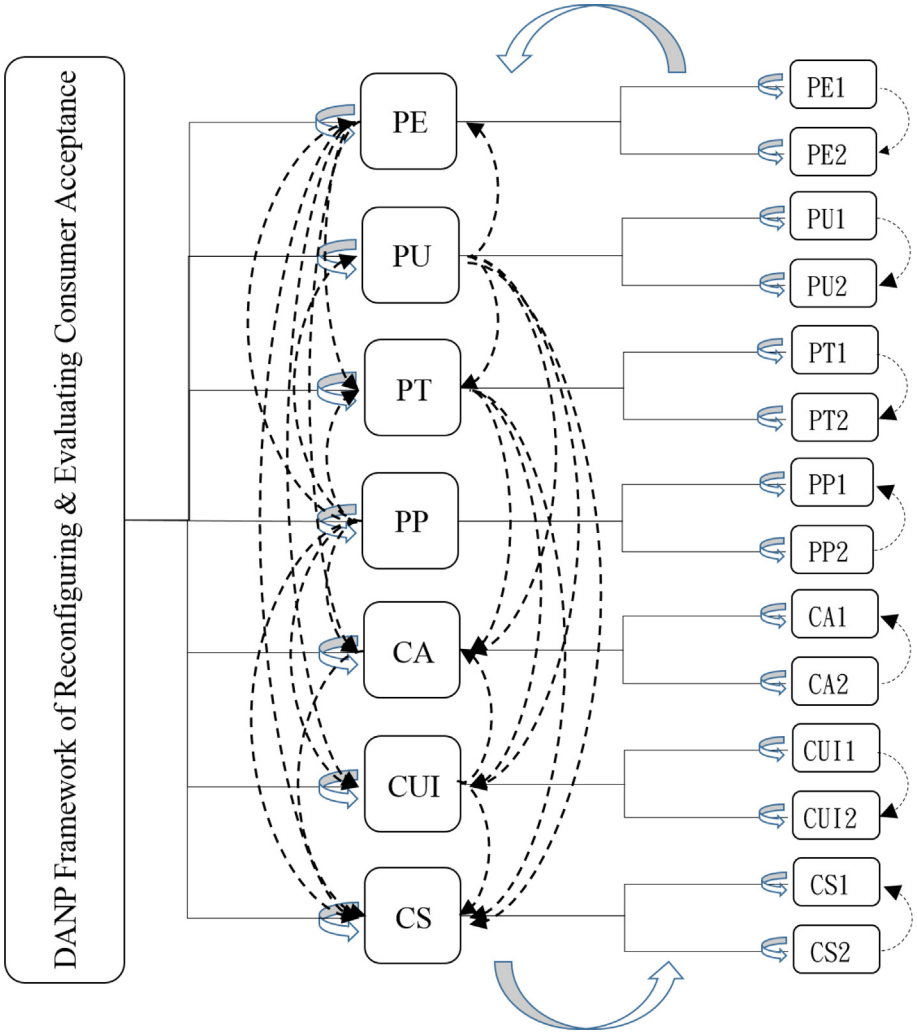

Fig. 4. DANP Framework of Reconfiguring and Evaluating Customer Acceptance of Open API in FinTech Applications.

Table 5
The Weights of DANP analysis.

Variable	Weight	Indicators	Original Weight	Final Weight	Ranking
PE	**0.147**	**PE1**	0.542	0.08000	**3**
		PE2	0.458	0.06755	**9**
PU	**0.140**	**PU1**	0.599	0.08390	**2**
		PU2	0.401	0.05610	**12**
PT	**0.125**	**PT1**	0.603	0.07512	**7**
		PT2	0.397	0.04943	**14**
PP	**0.179**	**PP1**	0.391	0.06984	**8**
		PP2	0.609	0.10863	**1**
CA	**0.116**	**CA1**	0.428	0.04973	**13**
		CA2	0.572	0.06639	**10**
CUI	**0.158**	**CUI1**	0.504	0.07959	**4**
		CUI2	0.496	0.07818	**5**
CS	**0.136**	**CS1**	0.427	0.05789	**11**
		CS2	0.573	0.07765	**6**

Saaty (1996) considered that the consistency ratio C.R. measurement of DANP analysis is consistent with a C.R. measurement below 0.1, so the elements and determinants of this study are consistent with the consistency test and have validity.

tors are also lower than those of the others. However, reviewing them separately, we can still recognize the strengths of the Open API applied to FinTech applications. As customer trust increases over time, the advantages of Open API will become one of the important core competencies of FinTech applications.

7. Customer attitude and its indicators

Finally, although customer attitude is not very influential in this model, this variable is still significant to acceptance. 'Customers perceive that they can clearly understand the implication of Open

API applied in FinTech applications' is the more important indicator of this variable. It explains that if the implication of Open API is to be widely accepted by customers, vendors should design it to be easy for users to understand to effectively establish customer attitudes about FinTech applications.

4.3. VIKOR analysis for open API in the FinTech sector

4.3.1. VIKOR analysis

1. Calculate the scores of positive/ideal and negative/worst solutions.

Based on the review of section 2.2, we select the scenarios of FinTech applications with Open API, which are 'Online Security or Cryptocurrency Trading', 'Mobile Payment', 'Online Banking', and 'Personal Finance', to proceed with VIKOR analysis according to the steps introduced in section 3.3. We apply the indicators as score criteria of VIKOR analysis from 0 to 10 to assess the solutions. The most positive score f_i^* is 10, and the most negative score f_i^- is 0. The investigation results of VIKOR analysis are shown in Table 6.

2. Calculate S_k and R_k

In Eqs. (3) and (4), w_i is the original weight of the indicators deducted from DANP analysis. We use the weights to multiply by the scores in Table 6 to obtain Table 7. Online security or cryptocurrency trading has the lowest value of S_k, which is 0.411. Online banking has the highest value of S_k, which is 0.532. With regard to R_k, the lowest is mobile payment (0.499), and the highest is also online banking (0.592).

3. Calculate Q_{vk} and Q_{pk}

We calculate the values of $Q_{vk}(Q_k)$ and $Q_{pk}(1-Q_k)$ based on Eq. (5), which is deducted in different values of $\boldsymbol{v}$, from 0 to 1. In our VIKOR analysis, while $\boldsymbol{v}$ is 0.5, the methods simultaneously maximize group utility and minimize individual losses, which is defined as the utility satisfaction index (USI) (Lin et al., 2016; Liu and Han, 2020). Eq. (6) and Eq. (7) shows that the value of $\min_k S_k$ is the maximum of group utility, and the value of $\min_k R_k$ is the minimum of individual loss. Q_{vk} and Q_{pk} are the satisfaction ratios of the method, as shown in Table 8.

4.3.2. Discussion of VIKOR analysis

As shown in Table 7, when $\boldsymbol{v}$ is 0.5, the value Q_k of 'Online Security or Cryptocurrency Trading' is 0.464. In contrast, the USI is 0.536. This indicates that the Open API with the highest utility is 'Online Security or Cryptocurrency Trading', followed by 'Mobile Payment', 'Personal Finance', and 'Online Banking', which has the lowest satisfaction, with a USI of only 0.438. Through the DANP and VIKOR approaches, we could concisely reconfigure and evaluate customer acceptance of Open API in FinTech applications and comprehend how the variables and indicators influence the proposed model.

5. Conclusion

5.1. Summary

This study initially applies the DEMATEL technique to determine the NRM and then combines it with the ANP analysis approach to conduct an empirical analysis of expert questionnaires. First, through DEMATEL analysis, this study confirms the influence relationships of the variables of modified TAM and describes the NRM. The NRM shows that the influence of variables in order are 'perceived privacy', 'perceived usefulness', 'perceived ease to use', 'perceived trust', 'customer use intention', 'customer attitude', and 'customer satisfaction'. We also discuss the results of the influence relationships of each variable of the proposed model and examine the framework of customer acceptance of Open API in FinTech applications.

Second, we combined the NRM with ANP as a DANP research approach to analyze and discuss the weights of variables and their indicators. The weights of DANP analysis also indicate that 'perceived privacy' and 'perceived usefulness' are the two most influential variables that affect customer attitude and customer use intention. The more significant indicator of 'perceived privacy' is 'customers perceive that Open API applied in FinTech applications will strengthen privacy protection'. Its weight is 0.10863, and it is the highest ranked of all indicators, showing that privacy protection plays a very important role in consumer acceptance of Open API in FinTech applications. 'Customers perceive that Open API applied in FinTech applications is effective' has a weight of 0.08390, indicating that Open API will be the more potential technique in advancing all types of FinTech applications in the future. The third and fourth indicators are 'customers perceive that Open API applied in FinTech applications is convenient to use,' weighted 0.08000, and 'customers perceive that Open API can strengthen the security of FinTech applications,' weighted 0.07959. Both demonstrate the advantages of Open API in advancing FinTech applications compared to other latent functions, namely, that it is more convenient and helpful. The fifth indicator, 'customers perceive that Open API is more advantageous than private APIs with regard to the security of FinTech applications,' had a weight of 0.07818, indicating that customers believe the use of Open API could certainly upgrade the security of FinTech applications. The weight of the sixth indicator, 'customers perceive that there are no errors or mistakes when using Open API as applied in FinTech applications', was 0.07765. This obviously indicates that customers ensure that Open API is a safer functional technique. Therefore, FinTech applications embedded in Open API are likely to increase use intentions and adversely affect customer attitudes. Although the above discussion focuses on the top six indicators, the rest are also meaningful of the research model.

Finally, we use the seven variables of the modified model to perform VIKOR analysis to select the more advantageous Open API applying scenarios. According to the USI, the ranking results from high to low are online security or cryptocurrency trading, mobile payment, personal finance, and online banking. Researchers could further improve the functions of Open API based on the variables and indicators of this model, helping to increase customer satisfaction with Open API in advancing FinTech applications.

5.2. Key findings

This study highlighted the key findings to address the comprehensive significances in this section.

1. Reconfigure the TAM with customer satisfaction for Open API in advancing FinTech

The finding is to modify the TAM to specifically suit the implementation and acceptance of Open API technique within the services of FinTech. This modified model aims to assist information security departments in the financial sector, information technology companies and FinTech related companies well develop Open API in FinTech applications.

2. Extend variables, 'perceived privacy' and 'perceived trust' to evaluate

Table 6
The Scores of Open API Applied in FinTech Applications.

Variable	Indicator	Online Security or Cryptocurrency Trading	Mobile Payment	Online Banking	Personal Finance	f_i^*	f_i^-
PE	**PE1**	6.513	7.252	3.323	6.472	10	0
	PE2	5.281	7.987	3.734	6.138	10	0
PU	**PU1**	7.216	6.217	5.671	4.915	10	0
	PU2	6.661	5.413	4.378	4.854	10	0
PT	**PT1**	6.071	4.012	5.129	5.453	10	0
	PT2	6.982	5.417	5.794	5.706	10	0
PP	**PP1**	5.134	4.108	4.119	4.468	10	0
	PP2	4.658	4.092	5.196	4.972	10	0
CA	**CA1**	5.634	5.783	4.721	5.029	10	0
	CA2	5.327	6.815	4.227	4.671	10	0
CUI	**CUI1**	5.446	6.091	5.687	4.412	10	0
	CUI2	6.215	6.106	5.271	3.868	10	0
CS	**CS1**	5.903	6.715	6.215	5.634	10	0
	CS2	6.096	6.643	6.048	5.451	10	0

Table 7
Acceptance Evaluation of Open API in FinTech Applications.

Variable	Indicator	Original Weight	Online Security or Cryptocurrency Trading	Mobile Payment	Online Banking	Personal Finance
PE	**PE1**	0.542	0.028	0.022	0.053	0.028
	PE2	0.458	0.032	0.014	0.042	0.026
PU	**PU1**	0.599	0.023	0.032	0.036	0.043
	PU2	0.401	0.019	0.031	0.032	0.029
PT	**PT1**	0.603	0.030	0.045	0.037	0.034
	PT2	0.397	0.015	0.033	0.021	0.021
PP	**PP1**	0.391	0.034	0.041	0.041	0.039
	PP2	0.609	0.058	0.064	0.052	0.055
CA	**CA1**	0.428	0.022	0.021	0.026	0.025
	CA2	0.572	0.031	0.021	0.038	0.035
CUI	**CUI1**	0.504	0.036	0.031	0.044	0.034
	CUI2	0.496	0.030	0.030	0.048	0.037
CS	**CS1**	0.427	0.024	0.019	0.025	0.022
	CS2	0.573	0.030	0.026	0.035	0.035
S_k			0.411	0.430	0.532	0.463
R_k			0.518	0.499	0.592	0.576

Table 8
Utility Satisfaction Index of Different ν Value.

v	Online Security or Cryptocurrency Trading	Mobile Payment	Online Banking	Personal Finance
0	0.518	0.499	0.592	0.576
0.1	0.507	0.492	0.586	0.565
0.2	0.496	0.485	0.580	0.554
0.3	0.486	0.478	0.574	0.542
0.4	0.475	0.471	0.568	0.531
0.5	**0.464**	**0.465**	**0.562**	**0.520**
0.6	0.454	0.458	0.556	0.508
0.7	0.443	0.451	0.550	0.497
0.8	0.432	0.444	0.544	0.486
0.9	0.422	0.437	0.538	0.474
1	0.411	0.430	0.532	0.463

By including 'perceived privacy' and 'perceived trust' as variables in the evaluation of Open API adoption, people gain a more comprehensive understanding of the factors influencing user acceptance. Moreover, it will allow businesses and developers to design FinTech applications that prioritize user privacy, security, and trust, fostering a more positive reception and widespread adoption of Open API.

3. 'Perceived privacy' and 'perceived usefulness' are two more influential variables.

By identifying 'Perceived privacy' and 'Perceived usefulness' as two influential variables, it implies that understanding and addressing these factors are crucial for the successful implementation and growth of Open API in advancing FinTech. When designing Open API based applications, relevant companies and developers need to emphasize the practical benefits and advantages of using Open API can attract more users and businesses to adopt, and then advance FinTech innovations.

4. Online security or cryptocurrency trading and mobile payment are the top two applications in which Open API enables

In essence, the goal of this study is to develop a tailored TAM that will help analyze and predict the variables influencing the adoption and success of Open API tin advancing the FinTech landscape. This can be crucial for guiding businesses in making informed decisions about leveraging Open API to drive innovation and efficiency in the financial services.

5.3. Implications

We derive the implications of four main independent variables in the proposed model to suggest directions for future research about consumer acceptance of Open API in advancing FinTech applications.

1. A suggestion derived from the implications of 'perceived privacy'

Open API is a new technique of the architectures of FinTech applications that respond to data security. One of the most compelling features of Open API is privacy protection while data sharing. Open API is consistent with the enhancement of FinTech application security, which is increasingly required to avoid the possibility of user privacy breaches. If, in the future, Open API solution providers can help customers further understand how their techniques can achieve optimal privacy protection, this will help to strengthen consumers' positive attitudes towards Open API in FinTech applications and popularize FinTech applications.

2. A suggestion derived from the implications of 'perceived usefulness'

Although customers have some understanding of Open API, they still have concerns. Because the Open APIs embedded in FinTech applications have become the standard specification, whenever a FinTech application is turned on and an account is registered, Open API encourages customers to share their data to enrich consumer finance information for further mapping the knowledge domain. While Open API is becoming increasingly popular, consumers will only gradually become aware of its usefulness. In this way, Open API may increasingly replace conventional APIs, which will be helpful for the security of FinTech applications.

3. A suggestion derived from the implications of 'perceived ease to use'

The empirical results show that customers will consider ease to use when they acknowledge Open API. When a new type of data sharing technique is introduced, it is clear that ease to use will help encourage customer use intentions. Making consumers more aware of the ease to use of Open API in FinTech applications will help to increase the popularity of FinTech applications.

4. A suggestion derived from the implications of 'perceived trust'

It is generally believed that Open APIs are more secure than traditional private APIs. Because Open API is a type of knowledge-based architecture, perceived trust plays an important role in exploring the application of Open API to FinTech application security. In addition, there is room for improvement in perceived trust, which can be enhanced by promoting use intention. For example, FinTech applications could provide relevant knowledge showing that Open APIs can increase data safety and security while processing personal information. This strategy would help customers trust FinTech applications.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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