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## REVOLUTION OF MOBILE BANKING APPLICATIONS TOWARDS BANKING CUSTOMERS IN NORTHERN REGION, MALAYSIA

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### ABSTRACT

Mobile banking services are increasingly common in Malaysia. Many people are drawn to using mobile banking in their daily lives because of its benefits for banking customers. Customers have the option of making online transactions rather than doing so in person at the bank counter. Banking customers are able to make a transaction with just one click from their gadgets in the information technology (IT) era. The term mobile banking applications refers to a mobile service that enables quick and easy money transactions from one account to another account. This paper seeks to study the determinants of the continuous intention of mobile banking applications from banking customers' perspectives in the Northern Region, of Malaysia. A quantitative approach was used in this study. Questionnaires were used to collect the data from all respondents through Google Forms. The respondents were banking customers from the Northern Region, Malaysia who used mobile banking applications with a number of samples of 384 respondents for this study in order to properly reflect the population and they were selected using stratified random sampling. The Partial Least Square (SmartPLS) will be used to evaluate the research data. Finally, this study can be applied and extended to determine the determinants of continuous intention on mobile banking applications in other countries.

## **1. Introduction**

The banking industry significantly contributes to a country's socio-economic growth by lending money to farmers, businesses, and other types of start-ups (Prihadyanti et al., 2023). Furthermore, the banking industry also offers various self-service technologies (SSTs) such as automated teller machines (ATMs), online banking, and mobile banking. According to Baabdullah et al., (2019), mobile banking enables users to execute banking tasks via mobile devices such as smartphones, by transferring money, conducting transactions, and checking bank accounts. Besides that, in the year 2000, Bank Negara Malaysia (BNM) approved local commercial bank facilities to provide online banking services and Maybank is the largest domestic bank which provides online banking services in Malaysia. These services were regarded as cutting-edge technological innovations in Malaysia. The banking system and the non-banking system are basically the two divisions of the financial system. Commercial banks, Islamic banks, and investment banks make up the majority of Malaysian banking sector (Wang et al., 2023). This prompts those in the banking industry to devise strategies and launch networks to serve customers in the form of mobile banking services. Banks have created information technology-based banking transaction service mediums, specifically mobile banking. Moreover, mobile banking services take advantage of the expansion of information technology in banking services. Mobile banking services give customers the ability to execute banking transactions through mobile devices (Shaikh et al., 2023). Furthermore, mobile banking is a type of banking service that may be accessed directly over Global for Mobile Communication (GSM) cellular/handphone networks. Customers must submit a written application to the bank, register their cellphone number, and set a password for transaction security in order to use this service (Sharma et al., 2023).

The expansion of the services offered in internet banking has caused a rise in the use of mobile banking (Singh,2023). Using mobile devices, customers can check their balance, transfer money between current and savings accounts, and remit transactions to third parties. Through their mobile banking app, they may apply for financial goods like loans and credit cards as well as make payments to individuals and businesses (Bull & Klapper, 2023). According to a global poll in 2018, mobile banking has decisively surpassed more conventional internet banking methods. In contrast to 29% who used online banking, the survey indicated that 56% of balance inquiries were made using a mobile banking app (Deloitte, 2018). Statistically, the study by Deloitte (2018) also found that 48% of transactions used mobile banking, compared to 38% that used online banking, for transfers between accounts and third parties.

There are many ways to define mobile banking. Based on earlier definitions, Yang and Yin (2023) defined mobile banking as a service or product delivered by financial institutions that uses portable technologies. It is now referred to as the use of portable devices to access banking information and execute banking transactions using Short Message Service (SMS) messaging services, downloadable applications, and wireless application protocols (Shaikh et al., 2023; Aslan et al., 2023). Furthermore, mobile technology and communication networks are essential to the existence of mobile banking. Mobile banking is described as a channel that allows customers to communicate with banks to conduct financial transactions whenever they want and wherever they are at a lower physical and financial cost. Mobile banking is also a self-service tool that helps both banking institutions and customers where banks can collect information about the behaviours of bank customers and also lower operating expenses through the usage of mobile banking (Saprikis et al., 2022).

Short Message Services (SMS) banking was one of the first types of mobile banking. When the use of mobile phones increased in the late 1990s, SMS was the most popular format for text messages,

and SMS banking took advantage of that format (Peevers et al., 2008). However, the services provided by the banking institutions were quite limited. The SMS banking service is beneficial to customers in terms of the transaction of bank account, credit limit and balance information. The Malaysia Communication and Multimedia Commission (MCMC) has conducted a survey on the usage of Internet users in Malaysia (MCMC, 2021). The results of the study as depicted in Figure 1.1 shows the distribution of smartphone Internet activities by users.

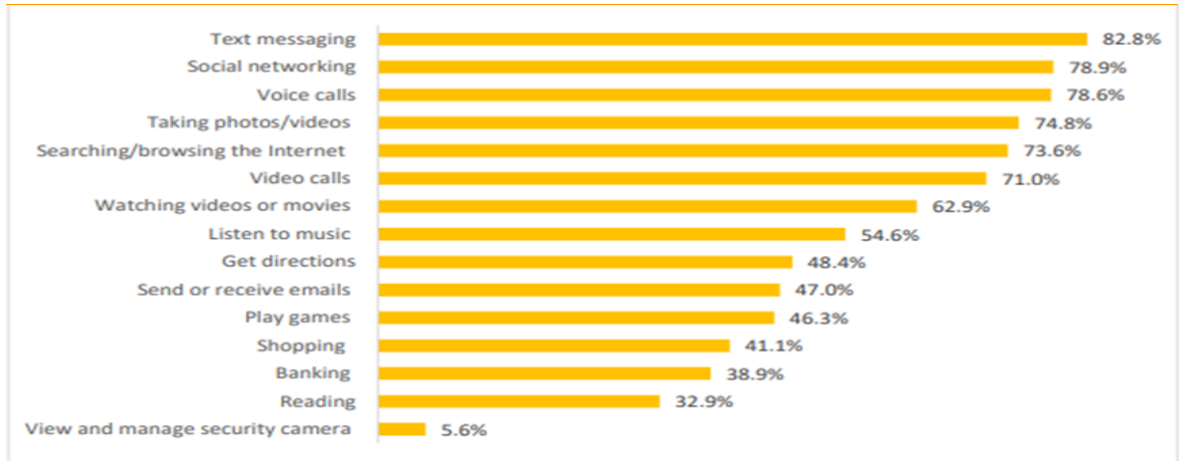


Figure 1.1 Percentage distribution of smartphone Internet activities by users  
Source: Malaysia Communication and Multimedia Commission (2021)

According to Figure 1.1 above, the three highest users of Internet activities are text messaging (82.8%), social networking (78.9%) and voice calls (78.6%) compared to other Internet activities. Meanwhile, the three lowest users of internet activities are viewing and managing security cameras (5.6%), reading (32.9%) and banking (38.9%). The finding shows that most smartphone users use smartphones to text messaging as a platform to communicate with others.

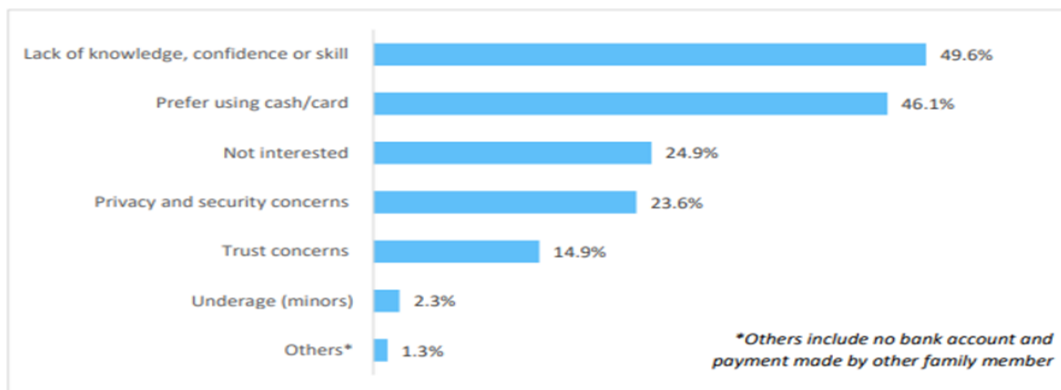


Figure 1.2 Reason not using mobile payment apps  
Source: Malaysia Communication and Multimedia Commission, 2021

Additionally, in the year 2021, a study by the Malaysia Communication and Multimedia Commission (MCMC) found that despite the advantages and usability that mobile payment systems offer, customer adoption was still seen as being rather lower in Malaysia. This finding indicates that 49.6% of smartphone users do not use mobile payment applications because of a lack of knowledge, confidence, or expertise as well as a preference for cash or credit card purchases as the main barriers to utilizing mobile payment applications. Moreover, 46.1% of banking customers prefer to use cards or cash compared to online transfers. Furthermore, other factors also contributed such as not being interested in using mobile payment, privacy and security concerns, trust concerns and underage. This happens especially to a person in a rural area as they would prefer to do traditional banking transactions due to no one giving the exposure knowledge related to the usage of mobile payment.

The issue of banking transactions is increasingly being performed through mobile banking applications. Additionally, there are numerous negative aspects of mobile banking, including privacy problems, mistrust, security risks, financial hazards, and consumer confusion (Zhou et al., 2011; Fall & et al., 2020). Customers, on the other hand, commonly voice their dissatisfaction with problems or inadequate applications that connect to services (Sinha et al., 2020). The key problem comes from the less-than-ideal utilization of mobile banking applications, which is due to the lack of knowledge to manage and use their mobile banking applications to make a transaction in daily use.

According to The Star (2023), there has been a notable surge in internet fraud incidents in Malaysia since 2020. The New Straits Times (2024) reports that 10,348 incidents with losses totalling RM 352.9 were related to telecommunications crime in 2023, with frauds using SMS contests, online impersonation, and phone calls among the most documented cases. For instance, a con artist would run into danger if he suggested to his victim that he transfer funds straight to his own account. If the con artist does this, the authorities will locate him with ease. As a result, a money mule is frequently used by scam artists as an easy victim. Thus, banking institutions must ensure that users remain secure online by raising cybersecurity awareness and knowledge (Bada et al., 2019; Scholefield & Shepherd, 2019).

Besides that, mobile banking application services have revealed various issues while making progress after years of research and technical investment in the banking industry. For example, many banks only see mobile banking application services as an addition to offline services, and the limited selection of goods and services cannot satisfy the diverse needs of the customers. In addition, the environment for implementing risk management policies, laws, and regulations based on conventional offline banking outlets has been weakened by the contactless financial services business model. This compromises the security and privacy of users' personal information, creates a trust crisis, and prevents the further advancement of contactless financial services (Chen et al., 2023).

On the other hand, customers frequently express their displeasure with issues or inadequate applications that involve services. Service providers must be aware of the same related challenges. A previous study by Wu and Ho (2021) found the most effective channel is known as mobile-based live chat (mobile chat). Live chat is utilized in the context of mobile banking as a targeted, private approach for users to handle service-related issues at any time and from any location. However, these mobile banking applications will face some problems related to their applications as it is controlled by the system. This issue will appear especially at midnight as many users use the applications one time to do online transactions. In addition, efficiency, usability, and utility were the examined mobile banking applications' main advantages while a lack of features,

particularly those that would have allowed users to personalize the services they received, and security concerns were their top weaknesses (Orehovaki et al., 2023).

Hence, due to the several issues in mobile banking applications, all parties, such as mobile banking users, banking institutions, and the government, should be aware of the variety of challenges in banking applications. Monitoring action must be taken to solve the issues and make the mobile banking application more effective and efficient in the future.

## **2. Literature Review**

This study focuses on mobile banking applications and the determination of factors that affect the usage of mobile banking applications such as continuous intention, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, perceived technology security and trust.

### **Unified Theory of Acceptance and Use of Technology (UTAUT) Model**

According to Venkatesh et al. (2012), UTAUT is based on the analysis of numerous previous models. The UTAUT model contains four main construct segments which are performance expectancy, effort expectancy, social influence and facilitating conditions. The UTAUT model was initially created to forecast organizational context-specific behavioural intentions to employ new technologies (Ooi & Tan, 2016). By including three new components (namely, hedonic motivation, price value, and habit), Venkatesh et al. (2012) expanded the UTAUT model to analyze behavioural intention and use behaviour in a consumer environment, resulting in the UTAUT2 model. According to the UTAUT2 model, customers' intentions to utilize new technology are influenced by hedonic incentives and price value, whereas habits have an impact on both behavioural intention and actual use. The UTAUT2 model also suggests a connection between enabling circumstances and behavioural intention. Given that most consumer activities are completely voluntary, the UTAUT2 model eliminated this moderating variable to better fit the consumer environment (Venkatesh et al., 2012).

### **Continuous Intention**

The continuous intention of mobile banking is advantageous to banks and clients alike (Wang et al., 2023). For instance, consumers gain from time flexibility, convenience, 24-hour service accessibility, anonymity, security, and avoiding in-person risks, health concerns and transaction costs (Baabdullah et al., 2019). Moreover, mobile banking can optimise money with features related to organizing digital transactions, banks and financial institutions benefit from lower overhead costs, increased availability, and a greater number of customers. While mobile banking has advantages and disadvantages, it is the customer's regular consumption of these services that matters most for continuous intention. (Talukder et al., 2020).

### **Performance Expectancy**

The degree to which a person believes that technology increases effectiveness and efficiency is known as performance expectancy (Wijaya et al., 2022). Performance expectancy refers to the statement that if a person considers implementing a particular technology, their productivity at work will significantly improve (Chen et al., 2023). In a lot of studies, performance expectancy is seen as the factor that directly affects behavioural intention. Additionally, performance expectancy is also described as the degree to which an individual believes that

using the system will help him or her attain gains in job performance (Venkatesh et al., 2003). It refers to the degree to which people think mobile banking technology will be more beneficial than traditional banking. It evaluates a person's perception of the importance of mobile banking for their financial transactions (Venkatesh et al., 2012). Consumers are more inclined to use mobile banking if they perceive it to be preferable to traditional banking (Baaddullah et al., 2019). Numerous earlier researchers have found that mobile banking offers a more practical platform for users to access a variety of banking services whenever and wherever they choose (Almaiah et al., 2022).

H1: The performance expectancy of mobile banking applications has a significant relationship with continuous intention.

### **Effort Expectancy**

According to Venkatesh et al. (2012), effort expectancy indicates how consumers feel about a technology's usability, which has a favourable impact on their behavioural intention to use it. In other words, even if a technology proves to be simple or intuitive, the amount of effort necessary to utilize it efficiently has a large and positive impact on the user's propensity to embrace it (Venkatesh et al., 2003; Venkatesh et al., 2012; Alalwan et al., 2017). When someone has prior experience using the technologies being used, this frequently happens (Chatti et al., 2021). Similar to performance expectancy, effort expectancy is recognized as having a significant influence on the technology use intention. According to Venkatesh et al., (2003), effort expectancy refers to the degree of ease associated with the use of the system. In addition, Thusi and Maduku (2020) define effort expectancy in the context of mobile banking as the degree to which users believe that mobile banking apps are easy to learn and require less effort to use. Previous studies on the intention to utilize mobile financial services highlight the significance of effort expectancy toward the intention to adopt and use mobile banking apps (Alalwan et al., 2017). Even if there are numerous advantages to mobile banking applications, many customers can participate by the time and effort required to acquire new technologies and would rather stick with the traditional banking methods.

H2: The effort expectancy of mobile banking applications has a significant relationship with continuous intention.

### **Social Influence**

The way consumers are affected by society is through the idea of social influence. Venkatesh et al. (2003) defines social influence as the degree to which an individual perceives that important one believes he or she should use the new system. In the context of mobile banking, social influence is defined as the influence of the surrounding and social environment on a customer's intention to adopt mobile banking (Alalwan et al., 2017). Likewise, previous studies indicate that social influence, in the form of reference groups and recommendations from others, can affect the willingness to adopt new technologies (AbuShanab & Pearson, 2007). This has a significant influence, particularly at the start of technological adoption (Alyoussef, 2021). When a person receives societal encouragement to use new technologies, it also affects their intention to do so (Alenezi et al., 2022; Yu et al., 2022). Social influence describes how a person is impacted by the current social situation. Individual choices and actions have some effect on the ideas and views of others (Alatalo et al., 2018). Those in a collectivist nation like India give higher priority to the opinions of their friends, family, classmates, and those in their social circle. Access to information through social environments is crucial for raising customer awareness and influencing



behavioural intentions toward adopting mobile banking. According to Slade et al., (2015), social characteristics and subjective social standards can be used to predict a person's conduct.

H3: The social influence towards mobile banking applications has a significant relationship with continuous intention.

### **Facilitating Conditions**

According to Venkatesh et al. (2003), the facilitation condition is the degree to which an individual believes that organization and technology exist to support the use of the system. In the context of mobile banking, it indicates that users should have the necessary knowledge and infrastructure to conduct banking transactions. Additionally, to use mobile banking applications, a person must possess a certain set of abilities, including the ability to install banking programs and be familiar with mobile operating systems and security features (Baptista & Oliveira, 2015). In addition, facilitating conditions are the level of organizational and technical infrastructure that is expected to support the use of technology (Venkatesh et al., 2003). This facilitating condition has a significant impact on mobile banking adoption (Çera et al., 2020). Additionally, previous research also stated that the condition of the facility has a significant influence on user behaviour (Nguyen et al., 2020).

H4: The facilitating conditions towards mobile banking applications has a significant relationship with continuous intention.

### **Hedonic Motivation**

According to Venkatesh et al. (2003), hedonic motivation is an occurrence that displays the degree of preference or pleasure associated with the use of innovations, such as the availability of a new system. In terms of behaviour, hedonic incentive has a significant impact on mobile banking (Sankaran & Chakraborty, 2021). The most significant addition to the UTAUT2 model is hedonic motivation, which shifts the emphasis from extrinsic to intrinsic motivation in technology adoption (Tamilmani et al., 2019). According to Venkatesh et al. (2012), hedonic motivation is the sense of fulfilment someone gets from utilizing or embracing a specific technology. In addition to the perceived advantages of technology use, the hedonic use of technology has become increasingly common (Tamilmani et al., 2019). Furthermore, research by Shaw and Sergueeva (2019), Beh et al. (2021), Farzin et al. (2021), and Chen et al. (2023) showed that hedonic motivation significantly influences how behavioural intention uses technology in a range of circumstances.

H5: The hedonic motivation towards mobile banking applications has a significant relationship with continuous intention.

### **Habit**

A perceptual construct that mirrors the outcomes of a person's previous experiences is the definition of habit. Habit has both direct and indirect effects on behavioural intention and use behaviour related to modern technology (Venkatesh et al., 2012). As a result, habit exhibited a considerable influence on the personality of mobile banking (Baabdullah et al., 2019). However, Limayem et al., (2007) defined habit as the extent to which people tend to perform actions automatically because of learning, which is another way that habit is built on prior knowledge and through learning. A survey and a perception-based technique are presented for the habit dimension. The study empirically tested the design under the conditions of constant, wilful use of

the information internet. The findings highlighted how habit had been shown to directly affect both the intention to utilize technology and daily technology use. Habit has been found to modulate the influence of purpose on the continuation of innovation and usage in the context of longevity behaviour, making an intention to continue using less necessary while also enhancing habit.

H6: The habit towards mobile banking applications has a significant relationship with continuous intention.

### **Perceived Technology Security**

Perceived security in the context of mobile banking relates to privacy-related issues. The definition given by Hanif and Lallie (2021) is the belief that a user's privacy will not be safeguarded if they use a mobile banking application. Additionally, the study by Flavián and Guinalu (2006) provides evidence that customer perceptions of security have an impact on trust. Furthermore, the degree of trust and confidence in web channels for sending sensitive information is referred to as perceived security. In fact, security flaws are thought to make it far more difficult for customers to obtain important information online (Merhi et al., 2019).

H7: The perceived technology security towards mobile banking applications has a significant relationship with continuous intention.

### **Trust**

The intention of customers to adopt technology-based products or services has been shown in previous studies to be significantly influenced by perceived trust (Singh et al., 2020). Perceived trust refers to the experience of assurance and confidence experienced when utilizing mobile banking (Masrek et al., 2012). According to Hanafizadeh et al. (Hanafizadeh et al., 2014), perceived trust is the conviction that using mobile banking services voluntarily is a good thing. Consumers' worries about security and privacy are reduced by a sense of trust (Slade et al., 2015). Consumers who lack knowledge and awareness are more susceptible to fraud and privacy risks. Customers are more aware of security and privacy issues while implementing new technologies. By adding sufficient security elements to the system, banking organizations can increase consumers' trust in mobile banking services (Singh et al., 2023).

H8: Trust towards mobile banking applications has a significant relationship with continuous intention.

## **3. Methodology**

### **Research Framework**

This quantitative study will use questionnaires and will be distributed to customers of mobile banking applications in the Northern Region, Malaysia. The highest adoption rate is seen in the Northern Region (Perlis, Kedah, Penang, and Perak). Regional distribution figures show that the rate of e-wallets is 94.4% (Liew et al., 2022). At 92.3%, the Central Region (Putra Jaya, Selangor, and the Federal Territory of Kuala Lumpur) comes in second place. During the study period, it was revealed that memorization of the recent e-Tunai (e-cash) launch in Penang had a substantial influence on the desire to adopt an e-wallet. Therefore, there are several opportunities for relevant stakeholders to organise and raise e-wallet acceptability in underprivileged and public communities. In addition, most of the previous studies only focused on the Central Zone

areas such as Putrajaya, Selangor and Kuala Lumpur. Therefore, this study will select respondents using a stratified random sampling method in Perlis, Kedah, Penang and Perak to get a clearer picture of their usage of mobile banking applications. Moreover, a survey form was created using Google Forms and the Google Form link was shared with all respondents via email, WhatsApp and Facebook. The sample size of this study is 384 to accurately represent the population of this study based on the sample size table developed by Krejcie and Morgan (1970).

To measure continuous intention, this study will use a survey question from Al-Maghribi et al., (2011) which contains 5 items. Consequently, performance expectancy is when a person believes that using the system will help them to gain job performance. To obtain performance expectancy data, an instrument from Kim et al., (2011) and four questions from Baabdullah et al., (2019) will be used. The questionnaire from Kim et al., (2010) and Baabdullah et al., (2019) will be used to determine the effort expectancy of mobile banking customers. Social influences consist of 2 questions taken from Venkatesh et al., (2012) and 3 questions from Baabdullah et al., (2019). In addition, facilitating conditions consist of 4 questions from Baabdullah et al., (2019) and 2 questions from Venkatesh et al., (2012). Hedonic motivation consists of 2 questions from Venkatesh et al., (2012) and 3 questions from Lin (2011). Furthermore, to investigate customer habits, five questions from Venkatesh et al., (2012) are used. Perceived technology consists of 5 questions from Venkatesh et al., (2003). Finally, trust is used to know the confidence experienced when the customers utilized mobile banking.

This study consists of 5 questions adapted from survey questions by Baabdullah et al., (2019). Sections A and B represent the two sections of the questionnaire used in this study. In Section A, the respondent will be asked to answer several demographic questions that look at the background information of the sample, such as gender, age, educational background, and others. Meanwhile, information on mobile banking applications is provided in Section B. For all questions asked, respondents will be asked to rate their answers from strongly disagree (1) to strongly agree (5). The questionnaire uses two language mediums namely Malay and English which can provide a better understanding. This study used Smart-PLS analysis to analyze the data and the findings will describe the standardization of items through composite reliability (CR) and the dependability of each individual indicator. Model analysis using Structural Equation Modelling (SEM) starting from the measurement model (outer model), model structure (inner model), and hypothesis testing. Finally, the validity and reliability of the constructs will be ascertained by analysing the data and testing the model's assumptions using Smart-PLS Version 4.0.

#### **4. Conclusion**

This study aims to investigate the effectiveness of mobile banking for banking customers in the Northern Region of Malaysia, examining the relationships between continuous intention, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, perceived technology security, and trust. This study will be beneficial in the decision-making of banking sectors and enable them to improve their mobile banking applications to make the applications more convenient to the customers. Indirectly, the ease of use of these mobile banking applications can make it simpler for the customers of mobile banking applications to conduct daily transactions. In addition, academicians also can expand the framework of mobile banking applications usage. In conclusion, mobile banking applications are beneficial to banking customers as mobile banking applications can save more time and energy as the applications can be browsed anywhere and anytime the banking customers want. Thus, great facility from the Service Provider directly impacts the full potential of mobile banking applications.

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## Authors Contributions

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## Conflict of Interest

No conflict of interest is associated with this publication.

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