

Banking Chatbots: A Study on Technology Acceptance among Millennials in Malaysia

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Abstract. The spread of Covid-19 has caused the prior investment in digital transformation – particularly the utilisation of banking chatbots becomes worthwhile. The utilisation of chatbots in the banking industry helps field the massive influx of customer service requests and frees up bank staff to focus on more detailed, high-value customer needs from the banks. Unfortunately, one of the banking chatbot users' biggest frustration is when the chatbots do not understand their demands. Worst case, banking chatbots may be degrading the bank's image due to a bad customer experience. Hence, bank customers choose not to adopt banking chatbots and prefer to deal with human agents. This study aims to identify the determinants of acceptance of banking chatbots among Malaysian millennials as banking chatbots bring high potential to provide the desired, instantaneous response. Besides, this study uses a convenience sampling method, with a self-administered questionnaire developed based on the Unified Theory of Acceptance and Use of Technology (UTAUT 2), distributed to 150 Malaysians aged 26 to 40. The findings of this study show that performance expectancy, hedonic motivation, facilitating condition, habit, effort expectancy, social influence, and perceived compatibility are significant in explaining the acceptance of the use of banking chatbots in Malaysia. This study generates important insights that enabled banks to create banking chatbots that could help to strengthen customer engagement, supporting highly personalized solutions through an intuitive, seamless, and fast interface.

Keywords: chatbots, banking, technology acceptance, Malaysia

1. Introduction

Banks must embrace the digital revolution. Changing client needs and pressure to save costs and maximise efficiency force banks to incorporate modern technology such as chatbots (The Star, 2021). Generally, chatbots are software powered by rules, artificial intelligence (AI), machine learning (ML), and natural language processing (NLP) to perform their tasks and imitate human communication via voice instruction or text messages (Maher et al., 2020). The Malaysian banking industry is leveraging chatbots in 2016, with CIMB Bank Berhad, the first bank to launch CIMB EVA, the enhanced virtual assistant enabling customers to make inquiries on bank balances, pay bills, and reload prepaid phones day (The Star, 2021). Subsequently, banks like Hong Leong Bank and AmBank launch their banking chatbots. In recent months, EVA, powered by CIMB bank, extended its services even for small and medium enterprise (SME) customers, which support the queries on selecting the most suitable financial loan assistance for their business needs, especially during the pandemic (The Edge Markets, 2018). To thrive in today's competitive banking environment, the adoption of chatbots in the banking industry offers the latest cutting-edge proposition to fulfil bank customers' needs on the go, seven days a week, 24 hours a day (Moysan & Zeitoun, 2019; Sarbabidya & Saha, 2020).

Although banking chatbots facilitate banking information and provide cost and business efficiency to banks, the adoption rate of banking chatbots remains low (Sugumar & Chandra, 2021). Most bank customers prefer to interact with human agents, primarily due to miscommunication with chatbot interaction and other issues such as awkward feelings and privacy concerns (Nguyen et al., 2021). In short, bank customers' dissatisfaction makes them not accept banking chatbots.

This study emphasises the determinants of the acceptance of banking chatbots among Malaysian Millennials (aged between 26 to 40) for several reasons. First, technological innovation is considered a digital transformation. Banking chatbots could provide a brand-new industry ecosystem. Machines and humans coexist in a complementary way to better serve bank customers by providing constructive advice on financial products (Hwang & Kim, 2021). Second, the adoption of banking chatbots is expected to streamline operations by providing cost reduction and reliability as the backbone (blockchain) of chatbots realise a new level of transparency, security, and efficiency (New Straits Time, 2018). Lastly, this study focuses on millennials (born between 1981 and 1996) as this group generation is the first to experience the smartphone era and always requests to have a customised service and instant informal responses to their queries. Hence, a banking chatbot attempts to answer this requirement by providing personalised service available in all places (De Cicco et al., 2020). In light of these considerations, this study is contrasted based on the unified theory of acceptance and use of technology (UTAUT 2), initially developed by Venkatesh et al. (2012) to study the acceptance of banking chatbots in Malaysia. It is critical to examine further how millennials view banking chatbots and the factors that contribute to a positive attitude toward using them, which could be a valuable reference for policymakers and the banking industry.

2. Literature Review

2.1. Acceptance of banking chatbots among millennials

A chatbot is a computer program that uses artificial intelligence technology to imitate human communication in their natural formulation, including language, audio or text (Alt et al., 2021). Alternately, chatbots is also named as 'chatterbox', 'talk bot', "bot", "instant-messaging bot", and "artificial-conversational entity" (Richad et al., 2019). A chatbot is employed in many domains such as healthcare, e-commerce, retail, insurance and customer service. In recent years, chatbots have already impacted different verticals within the financial services industry (Mogaji et al., 2021). Chatbots in banking have huge potential for customer engagement as it is available 24/7 to support and improve customer engagement, enhance the experience, and improve retention. While chatbots play an essential role and have been widely adopted in the banking industry, not all customers are willing or feel comfortable interacting with them (Alt et al., 2021). Hence, it is vital to analyse the main factors that influence customers' adoption of banking chatbots, especially chatbots are the future of digital banking.

2.2. Unified theory of acceptance and use of technology (UTAUT 2)

The unified theory of acceptance and use of technology (UTAUT2) is a theory developed by Venkatesh et al. (2012) and extended from UTAUT. The four constructs shared by UTAUT and UTAUT2 are performance expectancy, effort expectancy, social influence, and facilitating condition. UTAUT2, on the other hand, contains three additional ones for describing consumer behaviour in technology: hedonic motivation, price value, and habit. UTAUT2 has been widely used in many industries such as the mobile-based educational context (Almahri et al., 2020), automated cars industry (Nordhoff et al., 2020) etc. In this study, price value is eliminated from the first proposed model since it is inappropriate for the banking context because the chatbots are free to consumers. However, perceived compatibility is used to replace price value. Measuring the perceived value, needs, and experience is more suitable, which creates a higher adoption rate of banking chatbots (Alt et al., 2021).

2.2.1. Performance expectancy

Performance expectancy is an individual's perception that employing a given technology would help them do a better task (Mogaji et al., 2021). Performance expectancy has a significant positive relationship in explaining behavioural intention and use behaviour towards artificial intelligent products such as chatbots (Sugumar & Chandra, 2021). Richad et al. (2019) examined a positive and significant relationship between performance expectancy and consumers' intention to use banking chatbots. In other words, the greater the chatbots' services to be helpful (seeking information, online transactions, prompt responses, practical solutions), the higher the consumers' intention to use the chatbots (Nguyen et al., 2021).

H1: Performance expectancy is positively related to acceptance of banking chatbots among millennials in Malaysia.

2.2.2. Hedonic motivation

Hedonic motivation is a consumer's enjoyment of using technology to provide financial customer services (Sugumar & Chandra, 2021). Brown & Venkatesh. (2005) finds that hedonic motivation is an important factor in technology acceptance and use in the consumer context—however, past findings by Gümüş & Cark. (2021) argue that perceived enjoyment can only positively influence the customer experience but not behavioural intention to use the chatbots. The perception of improvement in the hedonic element will improve the adoption of banking chatbots. Thus, the following hypothesis is made:

H2: Hedonic motivation has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

2.2.3. Facilitating condition

Facilitating conditions are the extent to which an individual trusts to have the resources to use the technology (Memon et al., 2020). The information technology context consists of organisational and technical infrastructure to support and use the system, such as the user skillset, internet accessibility, smartphones, etc. The sustainability of resources will influence the customers' intention to use the chatbots (Mogaji et al., 2021). Past studies have shown a positive relationship between facilitating conditions and acceptance of banking chatbots, especially when users experience good quality technology infrastructure and availability of requisite user training (Mogaji et al., 2021). Thus, the following hypothesis is made:

H3: Facilitating condition has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

2.2.4. Habit

Habit is described as continuous behaviour from early technology use (Nordhoff et al., 2020). The use of chatbots can become habitual to consumers when they keep using them for various services and find them helpful. When the chatbots become a regular habit, the consumer may utilise the chatbots without struggle and think (Sugumar & Chandra, 2021). Past studies illustrate habit positively influences the acceptance intention of chatbots among consumers. Thus, the following hypothesis is made:

H4: Habit has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

2.2.5. Effort expectancy

Effort expectancy carries the meaning of adopting technology that brings ease to the customers (Sugumar & Chandra, 2021) —the easier using the chatbots, the higher the intention of consumers to use them. However, mixed results are obtained from past studies. It is argued that perceived ease of use can only indirectly affect consumers' desire to use

banking chatbots through perceived usefulness (Richad et al., 2019). Still, research demonstrates that perceived ease of use is essential and positively influences customers' intention to use banking chatbots (Sugumar & Chandra, 2021; Alt et al., 2021). Thus, the following hypothesis is made:

H5: Effort expectancy has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

2.2.6. Social influence

Social influence is an individual's consciousness that their important individual thinks they should use the technology (Sugumar & Chandra, 2021). An individual is believed to trust more the important person to them. Chances for an individual to adopt the technology are high after being recommended by others, as they think they may have more information. Past studies have found a significant positive relationship between social influence and consumers' behavioural intention to use the Chatbot's technology. Thus, the following hypothesis is made:

H6: Social influence has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

2.2.7. Perceived compatibility

Perceived compatibility is described as the higher compatible or well-matched innovation with an individual's lifestyle, leading to a higher adoption rate (Alt et al., 2021). According to the previous study, a significant positive association exists between perceived compatibility and customers' intention to use banking chatbots (Alt et al., 2021). Thus, the following hypothesis is made:

H7: Perceived compatibility has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia.

3. Research Method

Figure 1 illustrates the proposed research framework constructed based on UTAUT2. Seven independent variables are performance expectancy, hedonic motivation, facilitating condition, habit, effort expectancy, social influence and perceived compatibility. The dependent variable of this study is the acceptance of banking chatbots among millennials in Malaysia.

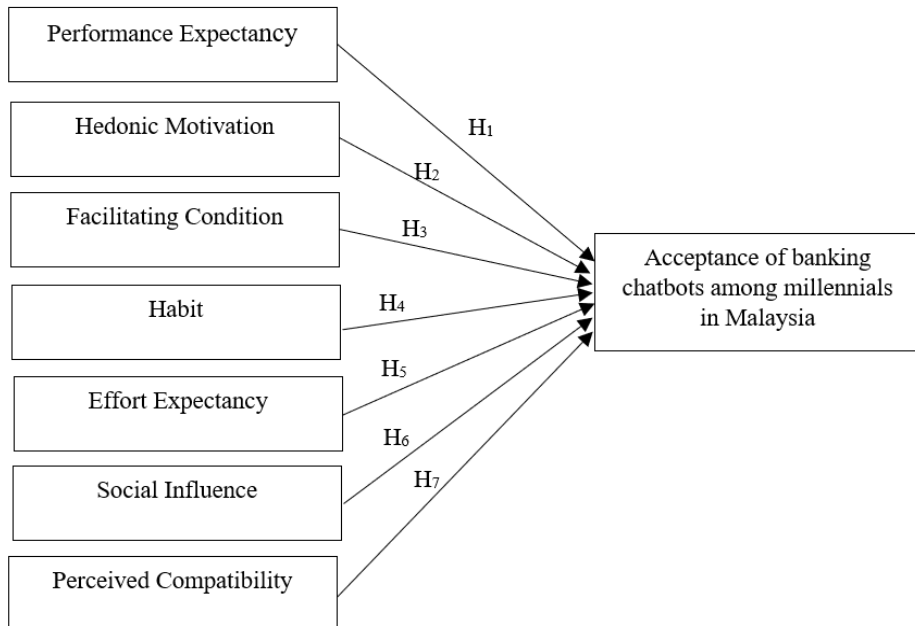


Fig. 1: A proposed research framework.

This study uses a non-probability sampling method. A self-administered questionnaire is distributed to the target respondents aged 26 to 41 years old using Google Forms. The questionnaire is divided into two sections. The first section collects the demographic profile of the target respondents. Meanwhile, the second section is related to the eight primary constructs of this study, namely, performance expectancy (PE), hedonic motivation (HM), facilitating condition (FC), habit (HB), effort expectancy (EE), social influence (SI), perceived compatibility (PC), and acceptance of banking chatbots (ABC). All items are rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The sample size of this study is 150 Malaysian millennials, and the respondents are selected through the filtering question in the questionnaire. In addition, this sample size is determined based on the sample-to-variable ratio's rule, which recommends the ratio for a minimum number of respondents to independent variables between 15:1 and 20:1 (Memon et al., 2020). The data obtained is then analysed with the Statistical Package for Social Science (SPSS), Version 27. The tests performed are descriptive, normality, reliability, and multiple linear regression tests.

4. Results and Discussion

Table 1: Demographic profile.

Demographics	Frequency	Percentage (%)
Gender		
Male	40	26.7
Female	110	73.3
Age		
26-30	78	52.0
31-35	52	34.7
36-41	20	13.3
Working Status		
Full-time employed	100	66.7
Part-time employed	45	30.0
Self-employed	5	3.3
Do you know about Chatbots technology?		
Yes	109	72.7
No	23	15.3
May be	18	12.0
Do you know about banking chatbots?		
Yes	96	64.0
No	54	36.0

Table 1 illustrates the demographic profile of 150 respondents. As presented in Table 1, the female respondents are 110 (73.3%), while male respondents are 40 (26.7%). Most respondents are between 26 to 30 years old, 52% or equivalent to 78 respondents. Then, it is followed by 52 respondents (34.7%) at 31 to 35 years old and 20 respondents (13.3%) at 36 to 41 years old. In addition, 66.7% or 100 respondents are fully employed, 30% or 45 respondents are partly employed, and five or 3.3% are self-employed. Apart from this, 109 respondents (72.7%) mentioned that they know about chatbots technology, while 23 respondents (15.3%) and 18 respondents (12%) stated that they are not sure and do not know about the technology. Last but not least, 96 (64%) of respondents have ever used banking chatbots technology.

Table 2: Descriptive statistics.

	Mean	Standard Deviation	Skewness	Kurtosis
Independent Variables				
Performance Expectancy (PE)	4.1100	0.8149	-0.7740	0.3270
Using banking chatbots can improve the performance of receiving information and doing transactions.	4.1667	0.8144	-0.9210	0.9910
Using banking chatbots can improve my productivity.	4.0933	0.8925	-0.7590	0.1030
Using banking chatbots allows me to do tasks more rapidly.	4.1267	0.9362	-1.0020	0.6650
Using banking chatbots improves my chances of accomplishing important goals.	4.0533	0.9397	-0.7470	-0.1120
Hedonic Motivation (HM)	3.9156	0.9302	-0.4680	-0.4510
Banking chatbots are joyful to use.	3.9000	0.9814	-0.4020	-0.7560
Banking chatbots are entertaining to use.	3.9000	1.0149	-0.5780	-0.2810
Banking chatbots are pleasurable to use.	3.9467	0.9468	-0.5660	-0.1690
Facilitating Condition (FC)	4.1000	0.7785	-0.6820	0.3020
I have the necessary resources to employ banking chatbots.	4.1000	0.8804	-0.6760	-0.0710
Banking chatbots operate the same as online banking.	4.0533	0.9033	-0.6600	-0.1310
Banks have the necessary resources to handle banking chatbots.	4.1333	0.8247	-0.6900	0.2540
I may seek assistance if I am having difficulty utilising banking chatbots.	4.1533	0.9029	-1.0850	1.1000
Habit (HB)	3.4683	1.2149	-0.3220	-0.9160
I have developed a habit of using banking chatbots.	3.5133	1.2464	-0.3360	-0.9210
I am obsessed with banking chatbots.				
I must utilise banking chatbots.				

	Mean	Standard Deviation	Skewness	Kurtosis
I have become accustomed to using chatbots.	3.4467	1.3538	-0.3630	-1.0340
	3.4000	1.3056	-0.3010	-0.9940
	3.5133	1.2247	-0.4420	-0.6740
Effort Expectancy (EE)	4.1583	0.7971	-0.9330	1.1580
I find it simple to learn how to operate banking chatbots.	4.1933	0.8724	-1.2480	2.0970
It is simple for me to become proficient in banking chatbots.	4.1467	0.8699	-0.9100	0.5620
I find banking chatbots to be user-friendly.	4.1400	0.9198	-0.9650	0.6470
Interaction with banking chatbots is clear and straightforward.	4.1533	0.8572	-0.8200	0.3560
Social Influence (SI)	3.6711	1.2231	-0.5870	-0.6600
People who matter to me believe that I should utilise banking chatbots.	3.7133	1.2334	-0.5890	-0.6710
People who influence my decisions believe that I should utilise banking chatbots.	3.6400	1.2600	-0.5560	-0.7270
People I respect prefer that I utilise banking chatbots.	3.6600	1.2788	-0.5680	-0.7810
Perceived Compatibility (PC)	3.9356	0.9536	-0.8260	0.4950
Using banking chatbots is convenient for me.	3.9267	1.0239	-0.8780	0.4700
The use of banking chatbots corresponds to how I prefer to connect with people/businesses.	3.9867	1.0033	-0.6600	-0.3260
I would like to use banking chatbots instead of other types of customer care.	3.8933	1.0877	-1.0220	0.6490
Dependent Variable				
Acceptance of banking chatbots (ABC)	4.0400	0.9017	-1.0440	1.3670
If given the opportunity, I aim to use banking chatbots for financial services in the future.	4.0200	0.9587	-0.9670	0.9310

	Mean	Standard Deviation	Skewness	Kurtosis
Given the opportunity, I expect to use banking chatbots for financial services in the future regularly.	4.0467	0.9647	-1.0490	1.0610
I would advise others to use banking chatbots.	4.0133	0.9830	-0.8430	0.3070
When the need arises, I will always try to use banking chatbots.	4.0800	1.0068	-1.1220	1.0730

The descriptive data for the research instruments used in this study are shown in Table 2. The overall mean point of performance expectancy (PE), hedonic motivation (HM), facilitating condition (FC), Habit (HB), social influence (SI), effort expectancy (EE) and perceived compatibility (PC) are within the range of 3.4000 to 4.1933. The overall statistics also show no severe violation of normality assumptions, as all of the data determined by skewness and kurtosis are within the ranges of 3 (for skewness) and 2 (for kurtosis) (Fuey & Idris, 2017).

Table 3: Reliability results

Variables	Number of Items	Cronbach's Alpha
Acceptance on Banking Chatbots	4	0.941
Performance Expectancy	4	0.929
Hedonic Motivation	3	0.943
Facilitating Conditions	4	0.909
Habits	4	0.961
Effort Expectancy	4	0.927
Social Influence	3	0.971
Perceived Compatibility	3	0.907

Reliability analysis is being used by calculating Cronbach's alpha value. Table 3 performs the reliability analysis for all the variables. All the variables are considered excellently reliable as the values of Cronbach's Alpha are 0.70 and above (Arof et al., 2018).

This study employs multiple linear regression to examine the relationship between independent and dependent variables. The adjusted R-square (in Table 4) implies that 80.6% of the proportion of variance of banking chatbots' acceptance can be explained by performance expectancy (PE), hedonic motivation (HM), facilitating condition (FC), habits (HB), effort expectancy (EE), social influence (SI) and perceived compatibility (PC). All the independent variables are significant ($p < 0.05$) in explaining the acceptance of banking chatbots among Malaysian Millennials. Among the seven independent variables, perceived compatibility is the most influential factor ($\beta = 0.330$, $p < 0.001$) in explaining the acceptance

of banking chatbots, followed by hedonic motivation ($\beta = 0.322$, $p < 0.001$) and then social influence ($\beta = 0.281$, $p < 0.001$).

Refers to Table 4, the first hypothesis (H1), "Performance expectancy has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", is supported, and the result is consistent with previous studies (Sugumar & Chandra, 2021; Mogaji et al., 2021). An individual believes that banking chatbots are helpful and allow them to manage their finances more efficiently and save time, showing a higher willingness to use them (Alt et al., 2021). Furthermore, the second hypothesis (H2), the second hypothesis, "Hedonic motivation has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", is supported in this study. Most of the time, customers use banking chatbots to obtain official information to settle significant financial issues. Customers will begin to draw engaging experiences if interacting with a chatbot is exciting and pleasurable, which may inspire them to use banking chatbots (Sugumar & Chandra, 2021).

Meanwhile, the third hypothesis (H3), "Facilitating condition has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", and the fourth hypothesis (H4), "Habit has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", are significant in this study. However, both results show a substantial relationship with the acceptance of banking chatbots. Resource-depletion approach could probably help to explain this outcome (Yeik et al., 2016). It is mentioned that a person with low conscientiousness and trying to use their willpower to delay gratification can adversely impact the immediate use of technology despite being equipped with organisational and technical skills (Yeik et al., 2016).

The fifth hypothesis (H5), "Effort expectancy has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", is supported in this study. The result is consistent with past studies and is proved by the past studies (Richad et al., 2019). Chatbots are simple to operate, and the only information necessary is to submit an inquiry into the site and communicate naturally with the system (Sugumar & Chandra, 2021). Furthermore, the sixth hypothesis (H6), "Social influence has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", is also supported in this study. It is believed that the stronger the peer group's social influence (friends, superiors), the higher the adoption rate would be (Sugumar & Chandra, 2021). Lastly, the seventh hypothesis (H7), "Perceived compatibility has a significant positive relationship with the acceptance of banking chatbots among millennials in Malaysia", is supported and consistent with previous studies (Alt et al., 2021). The positive scenario is that the better chances of banking chatbots understanding consumers' queries and providing the desired outcome, the higher the probability that the banking chatbots will be used (Alt et al., 2021).

Table 4: Hypotheses results.

Dependent Variable: Acceptance of banking chatbots (ABC)	B	t	p-value	Results
Performance Expectancy (PE)	0.224	2.613	0.010	Supported
Hedonic Motivation (HM)	0.322	4.622	0.000	Supported
Facilitating Conditions (FC)				
Habits (HB)	-0.20	-2.570	0.011	Supported
Effort Expectancy (EE)	-0.23	-2.752	0.007	Supported
Social Influence (SI)	0.279	4.617	0.000	Supported
Perceived Compatibility (PC)	0.281	3.688	0.000	Supported
	0.330	3.883	0.000	Supported

Note: Adjusted $R^2 = 0.806$; $\alpha = 0.05$

5. Conclusion

To conclude, the results depict that Performance Expectancy (PE), Hedonic Motivation (HM), Facilitating Condition (FC), Habits (HB), Effort Expectancy (EE), Social Influence (SI) and Perceived Compatibility (PC) are significant in explaining the acceptance of banking chatbots among millennials in Malaysia. The findings of this study offer impactful implications for various stakeholders associated with promoting technological adoption among Malaysian Millennials. They include researchers, relevant government entities and bank managers.

Researchers are encouraged to access the research framework and test it across varying target groups of audiences or other IT innovation adoptions. Besides, relevant government bodies should cultivate good knowledge on using banking chatbots as a path to promote digital banking and achieve digital financial inclusion. Individuals are more likely and motivated to adopt banking chatbots when they perceive their adoption of them is desirable to their needs and value. In turn, individuals will help promote the use of banking chatbots to others. Lastly, bank managers must ensure the compatibility of the banking chatbots since miscommunication and accuracy remain a concern. Banks should ensure that the chatbots are accurate and trustworthy. The bank managers should also ensure that the chatbots can deliver the same content and result as a phone call. Otherwise, the users might feel hesitant about using it.

The generalisability of the finding may be limited because the online data collection period coincides with the imposed movement control order set in the country following the COVID-19 pandemic. Also, future research may expand the model by including additional variables suitable for this context.

Authors' Contributions

Tao-Jie Toh presented the background, created the framework based on the theory, and gathered the data for this study. Lee-Ying Tay handled the data analysis and study discussion. All authors discussed and contributed to the final manuscript.

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