



The Social Selection of the Third Party Payment Technology in China on the Social Shaping of Technology Perspective

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Abstract: Compared with QR code payment technology, NFC near-field payment has more advantages of safety and easy using than before; however, QR code payment technology had become the mainstream payment method in China mobile payment market. In this regard, the traditional technological determinism is difficult to fully explain the phenomenon. But, the social shaping theory (SST) could provide a new thinking to expound the historical queries. Based on the research perspective of SST, this paper takes Alipay's QR code payment technology as a case study, analyzed the impact of various social factors on the diffusion of QR code payment technology and explored the strategy of technology commercialization.

Keywords: The social shaping of technology, The social selection, The QR code payment; Market Demand; Technology commercialization; Technology Diffusion.

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1. INTRODUCTION

In past two decades, the QR code payment technology had developed rapidly and become one of the mainstream payment methods in China's mobile payment scene (Gao *et al.*, 2018). From a technical perspective, the security and convenience of QR code payment technology were not as good as the NFC payment technology developed at the same time (Ondrus & Pigneur, 2007); however, QR code payment had gained higher market share in China. The traditional technological determinism is difficult to fully explain this phenomenon (Bijker & Pinch, 1987; Law *et al.*, 1987). Nevertheless, the social shaping theory (SST), starting from the social factors such as environment, demand, policy and culture, investigates the influence of interest appeal cultural orientation and power pattern on the technological development route, provided a new perspective for the problem of technology selection (Latour, 2011). Therefore, this paper takes Alipay's QR code payment technology as a case study, analyzed the

impact of various social factors on the diffusion of QR code payment technology and explored the strategy of technology commercialization.

2. Literature review on the theory of the social shaping of technology

The Social Shaping of Technology (SST) emerged in European and American countries in the 1980s, and its theories come from criticized of technological determinism and inherited of sociological analysis in Sociology of Scientific Knowledge (SSK) (Edge, 1996). In the early stage of development, SSK mainly used constructivism to analyze and explain the causes of scientific knowledge in sociology, and believed that social factors had a decisive influence on scientific knowledge. Recently, the SSK has begun to conduct social research on technology, mainly focusing on the influence of social factors on the formation of technological content and the process of technological diffusion. The SST's criticism of

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technological determinism focuses on the following two aspects, one is that the technological system has no logic of its own, the trajectory of technological development is not preset, and there are different technological paths in the process of technological development; another is that technology is a tool for social change, not a decisive force (Latour, 2005; Monteiro & Hanseth, 2018).

In recent years, with the in-depth study of SST theory, more and more scholars adopt the dynamic perspective to investigate the choice of technology. They divided the growth track of technology into development, innovation, technology transfer, growth, competition, consolidation and other stages, in which a series of factors such as politics, economy, organization and culture have different degrees of shaping effect in different periods of technological development. For example, in the stage of development and innovation, the technology community plays a key role in the development goal, development means and value judgment of invention of the technology system. When technology evolves to the stage of growth, competition and consolidation, it will be deeply affected by consumer behavior (Honcharova *et al.*, 2021). Social design as technology of social management. *Economic Studies journal*. Consumers will determine the degree of acceptance of technology, and then let the technical products be redesigned to completely change the appearance in order to satisfied market demand. Consequently, this paper deeply discusses the influence of various social factors on technology choice, which is of great significance to enrich SST theoretical knowledge and enhance innovation ability.

3. The social shaping of technology: the case of QR code payment technology

3.1 Environmental dimension of QR code payment technology

The development of technology industry is closely related to the perfection of local technology standards (Snyder *et al.*, 2003). The development of NFC payment in China is subject to technical standards. Why is the Chinese government so behind in setting technical standards? First of all, it was entirely because the Chinese government had a technological nationalist mentality, hoping to develop technical standards with independent intellectual property rights as national standards, rather than directly following international standards and thus paying annual licensing fees to international organizations. Secondly, the game between different forces in the state-owned sector had further delayed the formulation of national standards. On the one hand, China UnionPay moved towards internationalization and need to be compatible with the international 13.56MHz

standard; On the other hand, the country hoped to support the 2.4GHz standard led by China Mobile, which has its own intellectual property rights (Lee *et al.*, 2004). The Role of Technological and Social Factors on the Adoption of Mobile Payment Technologies. Americas Conference on Information Systems. The confrontation between two standard camps had increased the uncertainty of the NFC industry in China, resulting in high cost of NFC equipment.

Different from NFC payment industry, remote payment industry had entered a stage of smooth development. The prosperity was partly due to continued government investment in mobile Internet technology infrastructure. As soon as the 2G mobile communication network was launched, the country immediately invested in the development of 3G mobile communication network. The improvement of mobile Internet infrastructure had brought two benefits to the development of remote payment industry: first, with the iterative updating of mobile phone performance and the acceleration of Internet speed, mobile phone remote payment could obtain a smoother sense of experience; Second, the reduction of the cost of mobile Internet access could further stimulate people's demand for mobile remote payment. Because of the great difference in development resistance between remote payment industry and near-field payment industry, private enterprises would prefer to avoid some policy risks, so they preferred to choose remote payment with less development resistance.

3.2 Demand dimension of QR code payment technology

As the domestic NFC payment industry has been slowed down by lagging technical standards, users couldn't use NFC payment quickly. But even if NFC payment reaches Chinese users, they may not want to use NFC payment because of the cost. In terms of the popularity of bank card payment, there was still a big gap between the development level of China's payment industry and that of foreign countries. Although China UnionPay had actively cooperated with commercial banks, issuing bank cards to users and POS machines to merchants to foster the habit of using bank cards for payment. However, because bank card payment brought many costs to merchants, including POS purchase and maintenance fees, as well as fees for swiping cards, many merchants were unwilling to undertake a series of additional expenses, so that card payment had remained a niche market in China, only appearing in urban shopping malls (Heitel *et al.*, 2021).

In addition, the low utilization rate of bank cards is also related to the preference of Chinese

users for cash payment. In fact, in China, cash withdrawal was not more convenient than that in foreign countries, mainly because the average density of ATM or bank was not high. Chinese users would also complain that it was inconvenient for them to withdraw cash, but they have not given up using cash for payment. Because for most Chinese users at that time, there was no cheap and convenient payment method on the market that could replace cash payment. When merchants were unwilling to pay additional costs for the convenience of bank card payment, most users had to choose to continue to use cash payment.

From the performance of merchants, we could observe that Chinese users have very high price elasticity. They were cost oriented, followed by convenience, security and other dimensions that were very important to foreign users; therefore, when QR code payment could appear as a cheap and convenient way to use, it just met the group of consumers who originally insisted on paying in cash. Because QR code payment had almost no extra cost as cash payment, it could even get extra rebate on the subsidy of the platform. Secondly, QR code payment was more convenient than cash payment, and users could save the steps of receiving change and the risk of receiving counterfeit money. Therefore, when emerging technologies can meet the needs of the original market, they can be successfully replaced and obtain a higher market share (Lou *et al.*, 2017). Sustainability, Vol. 9, Pages 1186: Tourist Satisfaction Enhancement Using Mobile QR Code Payment: An Empirical Investigation.

3.3 Policy dimension of QR code payment technology

Government policies had long-term and sustained impact on the diffusion of QR code payment technology, including three large-scale interventions: The first time occurred in April 2013, The People's Bank of China (PBOC) asked third-party payment enterprises to suspend and rectify QR code payment services for safety reasons, and said that QR code payment services could be restored to shelves after the national standards were issued (Yao *et al.*, 2018). Qualitative analysis of new crimes in the field of QR code payment—distinction and definition of larceny and fraud. Journal of Shanghai Business School. Under the pressure of the policy, Alipay began to change the design idea of QR code payment, added dynamic QR code and reverse scanning functions to deal with the government's distrust of the product.

The second time occurred in April 2016. The PBOC issued a clear decision to establish an online payment and clearing platform and

implement a centralized deposit system for reserves to cut off the business model of third-party payment institutions directly connecting with banks (Russell & Williams, 2002). The PBOC asked that all online payment business of third-party payment enterprises must be connected to NetsUnion Clearing Corporation (NUCC). On the premise of ensuring that the business model of third-party payment enterprises was effectively supervised by NUCC, the government gives formal legal recognition to third-party payment enterprises engaged in QR code payment business. On the other hand, it paved the way for state-owned enterprises to launch QR code payment services. Hence, the number of suppliers of QR code payment business had increased greatly and market competition had become fierce.

The third time occurred in August 2019. The PBOC proposed to formulate technical standards for bar code payment interconnection, unified bar code payment coding rules, broken through bar code payment service barriers, and realized mutual recognition and scanning of bar code identifications of different apps and merchants. It directly broken the technical barriers of QR code payment industries and weakened the competitive advantage of large private enterprises. After a series of institutional arrangements, China UnionPay had obtained the right to formulate international standards for QR code payment and bar code interconnection, which had established its unique position of formulating game rules. Thus, when QR code payment technology became the mainstream design of third-party payment, the standardization of government policies would affect the future trend of payment technology (Russell & Williams, 2002).

3.4 Cultural dimension of QR code payment technology

From the formation of QR code payment to the diffusion process, Alipay always focused on the characteristics of price sensitivity and pursuit of convenience, which was used to establish matching marketing strategies. First of all, in terms of pricing, Alipay had adopted a lower price strategy, which did not require merchants to pay the service charge, nor had extra QR code recognizer to ensure that the QR code payment would not cause any financial burden to the merchants. Secondly, in terms of promotion, Alipay had adopted a subsidy strategy, which gave financial incentives to users and promoters to cultivate the habit of using QR code to pay.

In the view of Chinese users, although QR code payment had some disadvantages, for instance, it could only be used when the smart phone had power and with a good mobile communication network. However, its convenience and subsidy

strategy had significant substitutability for the existing payment methods. Therefore, directly introduction of technology may not be recognized in emerging markets. On the contrary, the strategy of localization can gain competitive advantage by understanding the local situation.

4 RESULTS, DISCUSSION AND CONCLUSION

4.1 Different social factors have different influences on technology social selection

The development of QR code payment technology is influenced by a variety of social factors, rather than a single factor. In the formation stage of technology, the environment around technology and market demand are the main influencing factors of technology combination. When technical products enter the diffusion stage, customers become the key influencing factors. They determine the acceptance of technology, promote the redesign of technical products, and completely change the appearance of technical products. In addition, the influence of government also needs to pay attention. It can change the sustainability of technological development through policy-making. To sum up, we can understand that the choice of technology is affected by multiple factors. Therefore, these social factors must not be ignored when formulating technology competition strategy.

4.2 Market efficiency must be considered in the stage of technology commercialization

Technological innovation must go through the process of technology socialization, and the choice of technology socialization must consider the market benefit, that is, the economic affordability of local users. At present, the success of QR code payment technology is a good case to illustrate that although QR code payment is not as secure as NFC payment. However, it does not rely on extra hardware equipment, with low investment cost and simple operation method, which is more in line with the needs of users, so it is easier to popularize in China. Therefore, when introducing technological innovation and transformation, enterprises must fully consider the market benefits of users and formulate strategies in line with the local market needs to obtain core competition in order to achieve competitive advantage.

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