

The Impact of Automation on Employee Productivity in the Banking Sector

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ABSTRACT,

Technological advancement has impacted business operation in virtually all industries. In particular, the operation and business models of financial institutions have undergone serious disruption due to technology. The automation of banking has impacted banks positively by saving time and elevating employee workload. The influence of automation on workload has enabled banks to reduce errors and frauds which contributes to productivity. Berger (2003) has argued that the impact of automation on employee productivity cannot be ignored given the importance of superior customer service delivery and efficient automated processes. Thus, this study explores the impact of automation on employee productivity in the banking sector and how it contributes to profitability. A designed semi-structured interviews were employed to gather realistic perceptions of the impact of automation from bank employees in different positions. It is projected that automation due to ATM, internet banking, and mobile banking has a positive impact on employee productivity. However, automation could limit the utilization of skills of employees, which could translate to wastage of resources to some extent.

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1. INTRODUCTION

Banking business involves processes and activities that facilitate collection and transfer of funds manually or electronically. On that note, banking is defined as the business that involves establishment of a common fund to facilitate lending. For a long time banking processes have been conducted manually. However, automation has changed the tradition of doing business with approximately 90 percent of banking services being conducted on online platforms (Ojeka and Ikpefan, 2012). The banking systems have evolved significantly with the introduction of electronic operations. The invention of different forms of automation alter the way business processes are conducted from time to time. The notable automated devices employed in the banking sector include mobile banking, automatic teller machine (ATM), and banking via the internet (Camara et al., 2019). Markedly, the customers access real time services via the automated devices. According to Kamath et al. (2003), it is essential for banks to adopt automated services to enhance service delivery and have the capacity to deal with the growing number of customers. The growing demand for the banking services coupled with technological changes has necessitated the adoption of automated services which has tremendously changed the process and procedures of banking systems. The traditional banking system is disappearing progressively due to increased adoption of technology. Apart from reducing time required for processing requests from customers, technology enhances staff specialization in the banking sector (Kamath et al., 2003). Camara et al. (2019) found that virtually all players in the banking sector offer improved customer services besides achieving better work efficiency by adopting automation, greater returns are achieved through branches that are centrally operated. The progressive addition of new products on top of traditional ways of doing business have enhanced efficiency of banking services globally. It is essential for the banking industry to adopt new technologies to increase productivity, reduce the costs of production, and increase profitability.

In developing countries, the buyer and the seller communicate electronically, electronic communication also applies in money exchange and purchase ordering. The growth of E-banking and credit economic institutions is a clear indication that new technologies are introducing productive changes in the banking industry. Mutuku and Nyaribo (2015) state that the increasing acceptance of technology driven banking systems is primarily attributed to strong automated services by the consumers. The banking industry has undergone major disruptions with the application of automation and artificial intelligence and these changes have the capacity to influence the state of all banking operations. Automation increases the quality of information systems which allows the user to achieve better accuracy with minimal input; thus, expanding service delivery (Barowy et al., 2012). The focus of the customer is on the level of convenience and quality of delivery. In other words, the customer seeks for work surety, and this can be achieved by having consistency in quality performance (Moutinho and Smith, 2000). The shift of focus from the transfer of branch records to the main server to business automation has been necessitated by the need to assure service delivery to the customers. The customers are now used to banking services available at any location, anytime, and within a short time. In addition to increased productivity, automation is also associated with reduced mistakes and vulnerability to fraud (Joudaki et al., 2014). Moreover, technologies allow employees to handle various closely related tasks other than the original tasks. A qualitative study by Nui and Ekin (2001) involved that the commercial banking business relies on branches which are the major facilitators of business. There is increasing competition in the banking sector that has necessitated inevitable changes in

the utilization of branches. An online network is mandatory for any bank to facilitate communication for both the staff and clients. Owing to this, banks have created numerous delivery channels via automation to enhance working and service delivery. According to Berger, A. (2003), given the importance for great customer service delivery and efficient automation processes, the influence of automation on the productivity of employees cannot be ignored. This is because employee productivity is an important measure of organizational performance. Thus, this study explores the impact of automation on employee productivity in the banking sector. It is projected that automation due to ATM, internet banking, and mobile banking has a positive impact on employee productivity. The access to firsthand information facilitates delivery of quality services to customers. Research shows that the performance of banks has improved due to the adoption of automation systems; however, the benefit is not significant in some of the banks (Lin, Lucas and Bailey, 2011). The employee needs efficient processes to facilitate better service delivery to customers (Bontis, Richards and Serenko, 2011).

Banks have utilized technology-driven strategies to benefit from the changing information technology trends for better customer services. The application of automation allows banks to take advantage of technological innovations to enhance the productivity of employees. Employee productivity is an important measure of the performance of a firm besides enhancing competitive sustainability (Marimuthu, et al., 2009). The impact of automation on employee productivity has been analyzed in several studies and most affirm a positive correlation (Mutuku and Nyaribo, 2015). However, the actual impact of automation differs from one bank to another and it is necessary to base research on the banking sector in a specific region. On that note, the relationship between employee productivity and organizational performance, including innovation performance is complex. As analyzed in previous studies (Berger, 2003) automation and employee productivity lead to better banking services. Hence, understanding employee productivity and how the variables effecting the construct of employee productivity interrelate and are influenced by technology is critical in order to improve banking services.

The aim of this research is to understand the relationship between banking automation technologies and employee productivity. Moreover, mainly focusing on how knowledge-intensive automation of banking services impacts the productivity of employees in the banking sector. In more detail, to determine how ATM, internet banking, and mobile banking impact the productivity (value produced and input hours) of bank employees. The study will contribute knowledge by identifying the impact of automation and how it relates with employee productivity, banking innovation, and acceptance. Current literatures support that automation technology can promote the productivity of employees in general (Berger, A, 2003). However, there is a research gap that refers to specific effects of ATM, internet banking and mobile banking on employee productivity. From this perspective, this paper focuses more on the influence of these three knowledge-intensive automations on employee productivity. Moreover, this paper may provide bank managers with advice on choosing automation technologies that increases employee productivity.

Therefore, we propose the following research question: what is the effect of automation in the form of ATM, internet banking, and mobile banking impact the productivity of bank employees?

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter provides an overview of relevant literatures on the three-mainstream knowledge-intensive automation technologies ((ATM, Internet banking, Mobile banking) in the banking industry. The literature review mainly covers the following three aspects: 1, recent technology applications; 2, functional characteristics; 3, impacts on employees. All documents are selected from Google Scholar and FINDUT (the digital library of the University of Twente), which guarantees the academic and reliability of the information and data sources.

2.1 Automation

2.1.1 ATM

The automated teller machine (ATM) allows clients of financial institutions to transact with the bank without any physical interaction with the bank staff. The transactions achieved through ATM include deposits, fund transfer, withdrawals, and balance enquiry. Bik et al. (2016) stated that the modern ATMs are equipped with programs that read and identify the customer details after the insertion of the ATM card. The modern banks rely heavily on ATMs to enhance service delivery to customers. It is important to note that ATMs are accessible 24 hours of a day to minimize hindrance to transactions. Moreover, the automation increases payment flexibility besides enhancing access to personal accounts. Other than increasing accessibility of customers to services, ATMs enable banks to offer additional services without increasing the personnel. At full capacity, passbook accounts withdrawal is provided at the ATM. Hota (2013) argues that the number of customers waiting for services in the banking halls reduces significantly when a bank installs ATMs at strategic locations. Therefore, the employees have less workload, thus they have more time to handle important tasks in their line of duty (MacDonald, 2003). The customers can make any transactions provided by the ATMs at any time of the day and week at their convenience without waiting for the bank to open. Fekede (2018) argue that banks save money via ATMs since processing withdrawals and deposits is cheaper compared to human teller based on development of manpower and continuous training. Nevertheless, proper positioning of ATMs attracts customer utilization thus eliminating the long queues of clients seeking for withdrawal and deposits services at the main counter (Kisore et al., 2015). A reduction in transaction costs is notable with ATM dominated transactions compared to teller transactions. Therefore, the bank saves more with optimal utilization of the ATM, thus improving profitability (Sanda, 2011).

Moreover, the introduction of ATM leads to a reduction in the number of customers visiting the banks for physical services (Sanda, 2011). The clients only need to visit the ATM branches and make withdrawals or deposits at their convenience. ATMs have increased the availability of money to the customers at any time of the day. Mutuku and Nyaribo (2015) established that employee productivity has a positive correlation to ATMs. The positioning of ATMs at strategic location improves accessibility to the client, reducing the number of customers visiting banks. Markedly, a reduction in queues' length reduces the workload on the employee offering physical services, which lowers stress levels leading to higher productivity. Mutuku and Nyaribo (2015) determined via a regression analysis showed that the employee productivity in commercial bank changed by 2.1 times in response to a unit increase in the automated teller machine level. Notably, this indicates that commercial banks' productivity is positively correlated to automatic teller machine. Therefore, this research proposes the following:

Hypothesis 1: Automation due to the use of ATMs has a positive effect on productivity of employees.

2.1.2 Internet Banking

Same as ATM, internet banking through electronic check payment, and Visa card payment modes have a significant influence on the overall performance of a financial institution. The transaction platforms enhance profitability, quality of management, growth of bank and expansion, as well as management quality. Further, Worku and Tilahun (2016) hold that e-banking has promoted customer satisfaction, reduction in client waiting time, and customers' control on their personal accounts. The bank manages clients' accounts effectively through intranet, the intranet also allows the bank to offer services and facilitate the client to transact regardless of where they are located. The internet also allows clients to access and make similar transactions as those accessible via ATM and using mobile banking. It is important to note that with the internet any client with a valid bank account can access and make transactions via their accounts at the comfort of their homes or offices. The internet provides communicational solutions amidst globalization that has transformed the world into an information intensive village. However, free information flow has created a new security challenge which is a major concern for governments (Ndou, 2004). Apart from lowering the costs of communication, the internet allows quick and easy exchange of information between clients and financial institutions.

The slow incorporation of internet banking in the banking sector is attributed to infrastructural limitations and inadequacy in legislative support for the services to function. Nevertheless, the limited application and use of internet banking have improved efficiency and productivity in the banking industry. Ngari and Muiruri (2014) identified the following major positive impacts of internet banking on bank operations. Firstly, the emergence of this technology provides banks with a innovative method of financial transactions. In addition to this, the online channel of financial information exchange over the Internet is more convenient and reliable than traditional methods. Real-time communication and synchronization of information between bank headquarters and branches is also ensured. Mutuku and Nyaribo (2015) investigated the relationship between e-banking and employee productivity. Their findings concluded that employee productivity is influenced by internet banking, mobile banking, and automated teller machine. Despite indicating a weak relationship, the two variables are still positively correlated. The value coefficient of internet banking against employee productivity was 0.7. The implication is that unit increase in internet banking and electronic fund transfer led to a substantial increase of 0.6 and 0.7 times of employee productivity. Therefore, internet banking and electronic fund transfer have a positive correlation with the productivity of employees. These results indicate a positive relationship between Internet banking and employee productivity. Therefore, this research proposes the following:

hypothesis 2: Automation due to the use of internet banking has a positive effect on productivity of employees.

2.1.3 Mobile Banking

One of the latest enablers of banking service automation is mobile banking technologies (Zhou, 2018). Despite the efficiency of other automations such as ATMs and online banking, mobile banking are touted to hold the most disruptive impact on the financial markets (Lee and Shin, 2018). There is a significant increase in the number of people owning smartphones

that has led to an increase in the demand for banking services using mobile phones. Consequently, banks have been compelled to adjust their strategies to include innovative products that utilize new applications for banking transactions. Shaikh and Karjaluo (2015) conclude that the attraction and retention of customer is positively associated with mobile banking. Moreover, they argue that the impact of mobile banking on common people is more pronounced compared to any other modern technology. As a result, mobile banking has opened a wide pool of opportunities for individuals from all walks of life. Notably, financial institution clients can access services such as bill settlement, balance enquiry, transfer of funds, and management of account. Mobile banking is not influenced by constraints of space and time which bedevil internet banking. Apart from the portability of mobile devices, the client has real-time access to information and can conduct any transaction, anywhere. In such a case, the banks can offer services at enhanced quality without incurring extra costs.

With regards to the detailed analysis of Mutuku and Nyaribo (2015), the regression analysis showed that the employee productivity in commercial bank changed 1.3 times in response to a unit increase in the level of mobile banking. It implies that an increase in liquidity risk's value leads to 1.3 times increase in employees' productivity. On the other hand, the value coefficient of internet banking against employee productivity was 0.6. This indicates that the productivity of employee of commercial banks is positively correlated to mobile banking. Therefore, this research proposes the following:

hypothesis 3: Automation due to the use of mobile banking has a positive effect on productivity of employees.

2.2 Impact on employee

2.2.1 Productivity

Bharathi and Gupta (2018) hold that productivity's simple, classic view measures inputs against the actual output. On that note, productivity is the measure of the actual output obtained within a particular length of time. It is important to note that productivity is measured using a broad approach where various factors are considered, this includes workload, and quality of output, turnover, and satisfaction of customers. Llewellyn (1992) argues that the ultimate criterion for judging financial innovation is the extent to which it increases the efficiency of financial organizations. As in other industries, banks can implement innovative technologies (financial automation tools and management systems) to improve existing work processes or combine the characteristics of several different technologies, thus increasing the productivity of bank employee. However, the approach for measuring productivity may vary from one sector to another depending on identifiable factors that affect the work. As mentioned above, many scholars (Mutuku, Nyaribo, Berger, Joudaki et al.) have researched the effect of automation and new technology on the efficiency of service delivery in financial institutions. The common conclusion by the scholar is that automation facilitates service reliability and time saving for both the staff and the customers (Hananu et al. 2015). Organization operations are majorly aimed at offering quality service and this is achievable by eliminating service variations. The employees cannot deliver consistent and quality service without an efficiently networked banking system.

$$\text{Labor Productivity} = (\text{Value Produced}) / (\text{Input Hours})$$

Formula 1. Labor productivity formula. Gordon, J., Zhao, S., and Gretton, P. (2015).

As the Labor productivity formula showed, value produced (workload) can be referred to as work output and this research will mainly consider employee work time as work input. Memarian and Mitropoulos (2016) define workload as the system's energy output for a person handling a difficult task over a certain length of time. It is important to note that workload is not only person specific but also associated with personal capabilities and motivation. Andre (2001) argued that the mental workload of a person defines the difference between an individual's capability to process information necessary to perform a specific task to meet expectation and actual capability to perform the tasks at a specific time. Siswanto et al. (2019) found that workload (through motivation variables) has a significant effect on employee performance. Any increase in the workload of employee in corporate sector leads to a decline in productivity with the assumption that workload is constantly high in large institutions. It is important to note that the pressure of increasing workload is notable in both genders. Kotteswari and Sharief (2014) found that workload influences the performance of employees regardless of their age. Abbas et al. (2014) studied the effect of technology on employee performance working for Allied Bank Ltd, Pakistan. They interviewed 32 employees working for the bank, the workers were from different specialization. The results showed that Allied Bank employees' performance was strongly impacted by technology. On that note, it was indicated that the productivity of employees as automated systems increased the efficiency of performing regular tasks (Kumar et al., 2018). For example, the application of computerized database enables the teller to retrieve the information and serve the employees within five minutes compared to manual records where it took more than 10 minutes (verified in the interview). Abbas et al. (2014) noted that most employees at Allied Bank were enthusiastic about handling different tasks and function regardless of the workload using automated systems which are user friendly. The functions are performed by clicking the button or selecting the appropriate menu on the screen of the computer without having to go through laborious inspection of manual files. Additionally, the workers can perform several tasks simultaneously with the help of computers. On that note, the user can perform several functions while others are running as long as the system can support it. In addition, automated systems provide predictable and consistent information decision support. Due to individual human variability, human behavior may be influenced by emotional and motivational factors. Therefore, the reliability and accuracy of automated systems can significantly reduce the human error rate (Haight and Kecojevic, 2005).

2.2.2 Technology Acceptance Model

Technology Acceptance Model (TAM) is a theoretical model used to analyze the related factors that influence the acceptance of innovative technologies by users. TAM was introduced by Davis et al. in 1989 and is a precious concept in the MIS (Management Information System). Using TAM as a basic theoretical model, various complex user behavior models can be extended to analyze human behavioral intention regarding the use of new technologies. The direction of this research is highly inspired by the TAM.

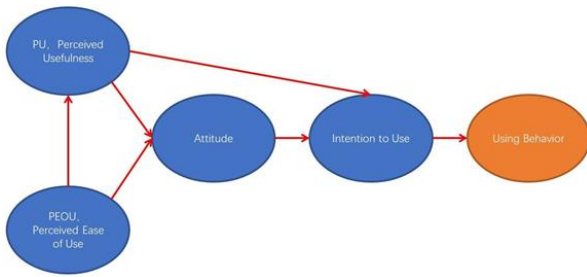


Figure 1. TAM Model (Davis et al., 1989)

As figure 1 showed, the usage behavior is influenced by all other factors represented above. Among them, PU refers to the "perceived usefulness" of the technology, while PEOU refers to the "perceived ease of use" of the technology. The greater the degree of these two elements, the more motivated users will be towards the new technology, which in turn will contribute to the willingness of users to accept the technology, resulting in more active usage behavior. In addition, it has also been suggested that the level of "perceived ease of use" of a technology can contribute to "perceived usefulness", and that "perceived usefulness" can also directly influence users' willingness to accept the technology (Lai and Li, 2005). Nath et al. (2013) applied Technology Acceptance Model (TAM) in the banking industry and asserted that positive perceived attitudes of bank employees from PU and PEOU result in increased frequency of usage of automation technology, while also significantly contributing to employee efficiency and productivity. This is in accordance with the expected hypothesis of this research, thus perceived usefulness and ease of use as influencing factors, are considered in our research model and build the starting point for the construction of our semi-structured interview guide. (Details of the interview list can be found in Appendix A).

2.3 Research model

The goal of the study is to examine the impact of automation on bank employees' productivity and how actual automation factors affect the productivity of employees. As figure 2 showed, the level of employee productivity is determined by two main elements: the value of production and the number of hours of input. As mentioned in the literature review section, the three main automation technologies can directly affect the work output and work input time of bank employees. Moreover, employees' perceived usefulness and ease of use of different technologies can further affect labor productivity by influencing technology use behavior. The figure 2 describes the research methods for the research question based on the theoretical framework.

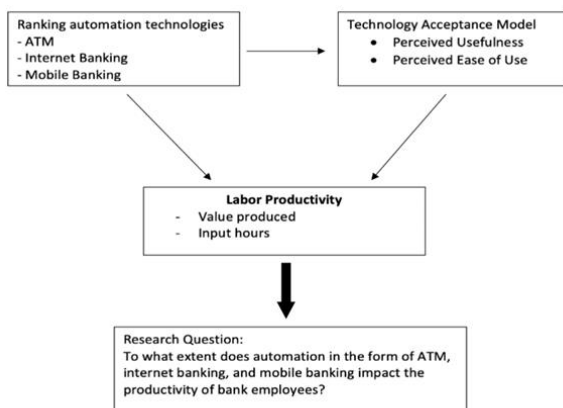


Figure 2. Research model

3. METHODOLOGY

3.1 Research design

Flick (2014) stated that qualitative research is a kind of exploratory research. It aims to obtain information about people's thought and feelings and is mainly used to analyze the target population's attitudes, beliefs, motivations, behaviors and other related issues. Therefore, this study will apply qualitative research approach to facilitate the respondents' description of view on automation's impact on employee productivity and the performance of their organizations. As Rahman (2016) determined that qualitative research designs allow for the utilization of a flexible structure to conduct a behaviorally influential problem appropriate analysis, since the participants have sufficient freedom to determine what is consistent for them. This research offers an in-depth explanation of the interaction between employees' productivity and automated banking processes. The study relies on qualitative research design, as specifically, it employs semi-structured interviews to answer research questions and test hypotheses for this report.

3.2 Data collection

Since the question in this research is highly practical, the real feelings of the actual practitioners in the banking industry are important to consider. For this reason, we designed an interview questionnaire as shown in appendix A. Bartholomew (2000) is truly right that semi-structured interviews can help participants answer open-ended questions as freely as they wish. It has a more flexible structure and higher responsiveness than a structured interview, due to the fact that the questions in a semi-structured interview are flexible and adjustable to different interviewees and interview situations. McIntosh and Morse (2015) concluded the following four functional characteristics of semi-structured interviews: 1, specifying the effective stimulus; 2, summarizing the difference between expected and actual results; 3, analyzing the impact of the difference between the two effects; 4, explaining the causal factors that induce differentiation. All these characteristics support the semi-structured interview is more suitable for this research than other interview methods.

3.2.1 Interview structure and interviewee selection

As appendix 9.1 showed that the interview questions can be divided into three parts. The first part was designed to investigate the employee's personal opinions about the current application of automation systems in the organization and how they feel about their work environment. The second part was designed to collect the perceived impact of each of the three technologies from the employees' view, and the issues are all related to the key points mentioned in the previous literature review part. The last part is to expand on the perceived importance of these impacts by employees and the disadvantages of the technology. The target population constitutes the group that is relevant to the objective of the study. The study targets 6 interviewees, including counter clerk, financial product sales manager and credit risk assessor. Their nationalities were all Chinese and their average age was 38 years. The same nationality of the interviewed group could eliminate to some extent the possible influence of perceptions caused by cultural differences (Mor Barak et al., 1998). Moreover, the interviewed group was composed of three females and three males, which ensured the gender equivalence of the interviews. These employees are selected as they are most likely to have a vast understanding of the utilization of automation systems in the banking industry. Due to the limitations of the geographical distance, the interviews are conducted by Wechat voice call and the interview process will be recorded by Voice Memos after obtaining the consent of the interviewee. The regulations on data safety will be followed and private

information of employees will be protected. Therefore, all respondents are anonymous and will be identified by letters only (e.g. respondent A) in order to distinguish them in the following.

3.3 Data analysis

This research utilized HuoDong Audiovisual Master to perform automated text conversion of the interview recordings. It was also categorized and summarized by analyzing different interviewees' answers to relevant questions. In more detail, bar charts were employed to visually compare the differences in time invested and to derive average time differences; frequency charts were used to show the perceived usefulness of respondents; and the study also ranked and assigned values to the perceived importance of the four main influences by different respondents and presented the visual results using pie charts. Moreover, in order to guarantee a high level of credibility of the interviews, the respondents were clearly informed to provide truthful information before the interviews and consent was obtained from the interviewees for the calls to be recorded. At the end of the interview, the respondents reviewed the interview transcripts and verified that they were correct. This ensured that the research was a true record of the feedback they wanted to express.

4. FINDINGS AND RESULTS

4.1 Interview Results

The first part of the interview was aiming to gather the general background information and application situation of the automation technologies. Although the group of respondents came from three different job positions (counter clerk, financial product sales manager and credit risk assessor), all six participants indicated that automation technologies are already ubiquitous in their daily work environment. As shown in Chart 1, Bank employees have provided sufficient positive feedbacks on the existing automated system (four interviewees indicates a very great extent and two interviewees indicates great extent).

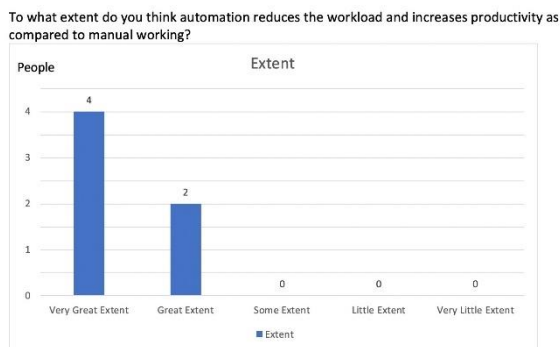


Chart 1. Perceived usefulness of automated systems

More specifically, all six bank employees expressed with varying degrees that automation reduces the workload and increases productivity as compared to manual working. For example, financial product sales manager A mentioned that he uses Internet banking technology when providing analysis and purchase advice services related to financial products for his corporate clients, because Internet banking has a unique digital channel for transferring large amounts of capital, which has special features such as real-time money transfer and additional security for information recording. At the same time the quick screening and comparison of financial products features are useful to help customers to choose the most profitable portfolio and calculate the final expected ROI (Return on Investment ratio) on the financial portfolio. As illustrated in the following quote:

"I think the above-mentioned automation technologies are very helpful to my daily work. This is because from the most basic purchase of financial products for customers, if they do not need to purchase a particularly high risk, like our own online banking system and mobile banking payment system can basically be used. [...] it also reduces the workload of our financial product sales." (Respondent A)

Moreover, for bank tellers, the advent of smart teller machines has greatly reduced their traditional daily tasks, such as depositing and withdrawing money. In the past, these daily and highly repetitive tasks took up most of the bank tellers' working time. Now the combined system of ATM and smart teller machine has dramatically reduced the work pressure of the staff with its great convenience. As illustrated in the following quote:

"My day-to-day job is to provide consulting services and card opening services to customers, especially older users over 50 years old. [...] Our bank has recently developed smart teller machines, which are different from ATMs in that customers can use them to open their own cards, which reduces some of our workload." (Respondent F)

In discussing about how their jobs would have changed if ATMs had not been introduced, all three bank tellers indicated that their workload and work pressure would have increased significantly. More visually, in the case of withdrawals, the most commonly used function of ATMs, a customer who chooses to do this at the counter would have to perform a 5-step process of checking the authenticity of the card; entering the PIN; confirming and signing the personal information; and the employee checking the amount of money. However, if the customer uses the ATM to accomplish the same goal (e.g. withdrawing 2,000 euros), the process requires only three steps: 1) inserting the savings card into the automatic reading port; 2) entering the PIN; and 3) confirming the amount. As illustrated in the following quote:

"If there is no ATM, it will definitely take longer for the customer to come to our counter to withdraw money than if there is an ATM. [...] For example, it takes about two minutes to process a withdrawal at an ATM, but it takes about three or four minutes for us to do it manually at the counter." (Respondent B)

More visually as shown in Chart 2, ATM technology is able to reduce input time by an average of 49% compared to having a human help the customer through the withdrawal process (in the case of a 2,000 Euro withdrawal, without authorization). It is worth noting that Respondent E has argued that for bank employees who are not familiar with teller work, manually completing a record sheet and a series of identity verification tasks can take about 10 minutes. This is another validation of the extent to which the perceived ease of use factor has an impact on employee productivity.

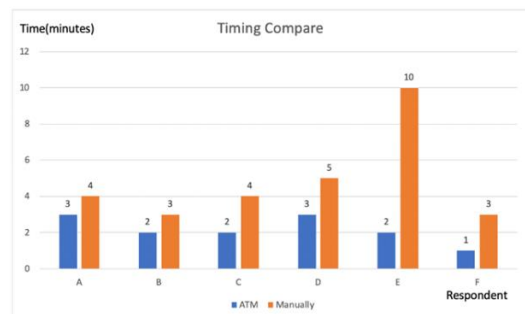


Chart 2. Timing compares between ATM and human labor

As mentioned in the literature section, the advent of Internet banking has significantly increased the integration and

transparency of big data information, which further reduces the error rate and the risk of information fraud for employees, thus contributing to increased employee productivity (Haight and Kecojevic, 2005). Nowadays, major banks transfer the financial assistant from traditional banking to online, providing customers with various solutions for financial management, consulting advice, or assistance with financial services technology through the Internet. This has considerably expanded the range of services offered by commercial banks. Moreover, it reduces the related service costs. The other impact is the convenience and speed. Due to the online information transmission feature of Internet banking, it is able to achieve instantaneous arrival and purchase at will. For instance, if a customer requires an interbank remittance service locally, this is difficult to achieve at a physical counter. However, through Internet banking, the additional time and cost investment caused by inter-banking can be eliminated. As illustrated in the following quote:

“For corporate users of the investment business, companies will open their own corporate online account when the background information needed to enter all into the system, and then the company legal person in their own computer operation can be completed quickly, about ten minutes. [...] If there are not many customers, it will take at least half an hour, generally speaking, it takes about 45 minutes.” (Respondent D)

Internet banking is also capable of automatically reviewing customer information including customer identity and business details. In typical counter operations, customers communicate their business information by filling out a form or dictating it, and the teller enters the business details into the system. Then the customer submits the identification information proof media such as ID card and bank card to the teller, who carries out the identification information confirmation on his behalf. Only entering the password is operated by the customer himself. In other words, most of the customer information in the traditional counter operations are not entered by the customer directly interacting with the system, but by the teller on their behalf. Obviously, this way of filling out orders by customers and entering by tellers is not only prone to operational risks, but also cumbersome and inefficient business processes. During the process of filling out the customer's order, it is likely to be filled out incorrectly, resulting in a waste of time in refilling the order. This process entails a substantial risk of information accuracy for bank employees. However, the online system of commercial banks has the function of overall coordination and programming of information. Employees have the flexibility to switch between systems to meet a wide variety of customer business processing needs. As illustrated in the following quote:

“The accuracy of banking has also been clearly improved. This is because when entering account numbers for large transfers, the individual customer is the most knowledgeable about his or her account information, and online banking has an automatic identity matching and review system. However, it is not always possible to make a mistake if we do it manually, but there is always one mistake out of 1000, and in this case, a small mistake can often lead to very serious consequences.” (Respondent E)

Mobile banking differs from internet banking in that it is geared more towards the individual user. There are numerous positive impacts of mobile banking, the most noticeable of which is its high degree of popularity and ease of use. This is because the current mobile banking system has completely replaced most of the traditional counter basic functions, such as small transfers, deposit and spending history inquiries, etc. This has significantly reduced the number of customers visiting offline banks. Respondents reported an average of 65% reduction in the number of customers they receive on a daily basis compared to the past,

which further decreases their work pressure and allows them to spend more time and effort on special tasks (such as serving the disabled and VIP customers). On the other hand, their work is more clearly divided than before due to a significant reduction in highly repetitive tasks such as checking balances and printing account spending records. This has also had a significant positive impact on efficiency and productivity. As illustrated in the following quote:

“In the case of our bank, the amount of work handled by our tellers is about 100 cases a day. Without mobile banking and other intelligent systems to take up those repetitive tasks, that would leave us with a minimum of 300 customers to serve each day. This would pose a great challenge to our work productivity.” (Respondent F)

“While older people may not be familiar with these digital operating systems, beginners can generally spend about 10 minutes getting familiar with how to do some basic operations.” (Respondent C)

In combination with the literature analysis and interview results, four main influential elements of automation technology were selected for this research. Namely, work output (value produced); work input (input time); perceived feelings (perceived usefulness and ease of use); accuracy (work quality). By asking the question: What is the ranking of the significance of these four impacts from your opinion? Respondents claimed that the aspect most affected by automation technology was work output, and the least significant perceived impact was work input. The results from respondents are as appendix table 1:

In an effort to gain a clearer understanding of the perceived importance of each impact element by bank employees, this research recorded the first ranking element as a 5, the second as a 4, and so on. A larger percentage of the indicator means that employees perceive this influence to be more significant. The results are represented in a pie chart as following chart 3:

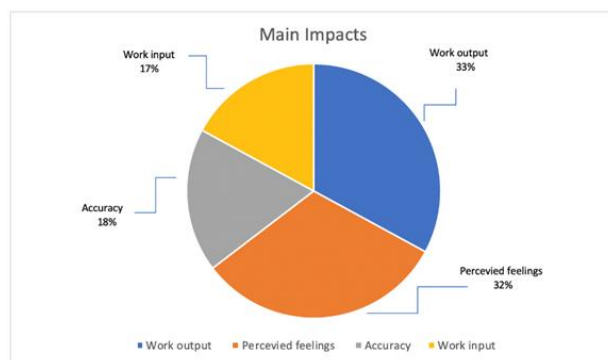


Chart 3. The main impact of automation technologies

The result means that in terms of respondents' perceptions, the most significant aspect of the impact of automation technology on the work of bank employees is the increase in value output (33%). This is followed by the reduction of psychological perception factors related to work stress (32%).

However, it is worth noting that automation of banking services does not always give a positive experience. In particular, both customers and bank employees experience issues associated with the network's slow speed, which hinder the processing of transactions. The problem derails the delivery of services as long as the network is slow or has failed to work. Often, the customer could be turned away or forced to wait longer in queues while awaiting the reinstated systems. As illustrated in the following quote:

“Our bank has recently applied the tablet computer intelligent customer service machine, but due to the technology and the device itself is not perfect. There are often customers experiencing problems such as system lag or program flashback. We have received many negative comments about these machines in the last month.” (Respondent C)

“Some customers do not know much about the new technology because they are in farming areas. For example, we had a customer who used an ATM for the first time and was not familiar with the operation process, resulting in entering the wrong password too many times. [...] It took me four hours to calm the elderly customer down.” (Respondent F)

On the other hand, for some specific positions, the online communication features of digital systems may not be conducive to building personal and emotional connections with customers. As respondent A (financial product sales manager) mentioned below, due to the specific nature of financial product sales, the prerequisite for a successful transaction is to establish an emotional connection and thus mutual trust through face-to-face communication. In other words, if product information is presented to customers only by phone or online chat, potential customers will tend to question the credibility of the information and consider other alternatives (buying other products themselves via mobile banking). This information reflects the negative impression that this aspect can reduce the work output of sales managers to some extent. As illustrated in the following quote:

“It is a bit negative for the financial product sales manager. Because some products must communicate face-to-face with customers. [...] Because the communication is not smooth, customers may purchase wealth management through mobile banking, which resulted in my personal sales mission not being fulfilled. Virtually increased workload and reduced efficiency.” (Respondent A)

We were surprised to find that half of the respondents mentioned the pressure of unemployment caused by the replaceability of mobile banking for manual labor when discussing the impact of automated systems on psychological factors. They emphasized that their traditional jobs are increasingly being replaced due to the growing functionality of mobile systems, which aggravates their reduced sense of being in demand. They are forced to accept or actively expand some additional business to realize their self-worth. The pressure from unemployment makes bank employees often in a state of anxiety to cope with the organization's employee performance requirements, and this negative psychological factor can even reduce their final work output. As illustrated in the following quote:

“Mobile banking has brought a sense of crisis that will reduce the number of operational staff at the counter. We used to have 6 front desk positions, now we are down to 4. I even feel like I'm going to be laid off, now that people at the counter are going out to do marketing, there is pressure on us as employees.” (Respondent C)

It's even more stressful because I can't see customers, can't communicate with them, and don't know what services they need. [...] People will be more intimate when they have more contact with each other. Now mobile banking restricts face-to-face communication. (Respondent F)

4.2 Discussion

As the above interview results established that automation of banking process elevates workers' productivity apart from reducing the time of offering services. This finding is consistent with that of Mutuku and Nyaribo (2015) whose survey results of

a sample of 150 Kenyan bank employees showed that automation had a positive and statistically significant impact on bank employee productivity (the increase in IT applications clearly increased employee productivity). Furthermore, handling of tasks with the help of automated systems increases the control of the worker, thus reducing the likelihood of making errors. This conclusion was confirmed in the interview, which also corroborates the ideas of Barowy et al. (2012) that automated systems are available to help individuals calculate and schedule tasks until the required confidence level is reached. Manual tasks are monitored and restarted when necessary. It also maximizes parallelism between employees and reduces employee error rates without exceeding budgets.

Moreover, the respondents emphasized most of the tasks handled by an employee at certain level are performed by the automated system, thus the employee has less workload. The automated systems can perform calculation within a short and retrieve client data quickly. The storage of data in digital form other than paperwork reduces the burden of the worker looking for data. The digital data allows the computerized systems to perform automatic calculations, which increase accuracy besides reducing errors. The workers can easily access accurate information in a timely manner, which quickens delivery to the concerned client. Automation reduces the need for employees to peruse manual records in looking for information, which improves the efficiency of record keeping. These results corroborate the findings of the previous research work with Sanda (2011), the researcher concluded from a questionnaire survey of managers from 16 banks in South Africa that 81% of respondents believe that ATMs are effective in improving bank efficiency while reducing the duplication of work for tellers providing services in the banking hall. The significant improvement in work accuracy was also confirmed by the results of the job satisfaction analysis.

In addition, the employee can perform tasks faster and save some time (for repetitive basic work, time is reduced by 49% on average) for other activities thus increasing work output and efficiency. The reduction in employee turnaround time enables the teller to serve more customers within a specific time. Automated systems make work more streamlined as the employee is able to gather adequate information required to serve employee without moving from one office to another thereby offering quality customer services. There is an assurance of quality performance which translates to an increase in overall productivity. These findings reflect those of Ngari and Muiruri (2014) who determined that the Internet system can provide banks with efficient information processing methods by virtue of its information integration and efficient delivery, thus enhancing the productivity of employees. The findings of Mutuku and Nyaribo (2015) are also in high agreement with their study.

Similarly, the interview shows that automation enhances transaction accuracy, cross checks and security, thus reducing frauds and errors. The automation systems have the capability of checking the provided information automatically and validating it via cross verification. Markedly, the information is barred from proceeding to the next stage if found to conflict standard data. The strong cross checks deter income leakage as employees lack the ability of making fraudulent charges and imposing it on the bank. This find was also reported by Joudaki et al. (2014) that automation technology enables employers to extract helpful knowledge from thousands of data sheets and identify smaller subsets of relevant targets for further assessment and review of potential risks such as fraud. The digital systems make working processes more user friendly which improves the morale of the employee regardless of the workload. But this requires the

prerequisite of ensuring that everything runs smoothly with the network and the system. Because some respondents also mentioned that the current technology is not perfect, both customers and bank employees have experienced problems related to slow network speeds and system lags, which hinder the processing of transactions. The system could fail due to the overloading of the server beyond the designed capacity. The issues of slow transaction could be attributed to inadequate infrastructure to support the technology in use.

In general, the interviews result indicates a positive relationship between commercial banks' employee productivity and e-banking technologies, including mobile banking, internet banking, ATM, and electronic funds transfer. This conclusion supports evidence from previous studies (Mutuku, Nyaribo, Barowy, Ngari et al.).

However, these quantitative studies above mainly focus on objective factors such as workload, work time, accuracy and profitability when measuring the impact on employee productivity, while neglecting the impact of perceptual factors on employees' perceptions of automated systems. We found that it is precisely these psychological perceptions that have a negative impact on actual employee productivity. In relation to the perceived feelings of employees, it is possible for employees to encounter information overload when grabbing to understand and internalize information to provide an appropriate answer to the customer. This is because workload is the measure of the work that an employee can handle within a specific time without compromising own safety and health. With the consideration of workload characteristics, an employee is required to multi-task within a certain period. According to the interview transcript (appendix 9.2), the bank employees often strain with different work situations that impairs flexibility and actual productivity at work. Moreover, the employees may create the perception that they are underutilizing their capabilities since the machine tends to dictate the role that they play. Automation introduces qualitative controls that deters the autonomy of the workers at different levels. The workers may experience intense stress which could lead to conflict as they have to work under a limited time frame while quality delivery is mandatory. As a result, the workers could be compelled to quality or productivity as it is impossible to meet certain expectations.

Additionally, the issue of derailed service delivery due to network speed delays and system failures is also of concern. Respondents indicated that the stability and usefulness of existing automated systems are being challenged due to the proliferation of system users and stored customer information. Apart from impacting negatively on user performance, nonfunctional systems make an institution unattractive to prospective clients. Derailment of automated services can lead to long waiting times and even irreversible systemic errors, which not only reduces customer satisfaction but also creates additional workload for bank employees, thus having a series of negative effects on employee productivity in the end. Online systems can also limit the face-to-face interaction of bank employees (especially for sales and counter positions) with customers. Digital text expressions tend to be problematic in conveying emotional information, which makes it more difficult to establish emotional relationships between employees and customers. In more detail, for employees it is difficult to perceive potential customer needs and real service feedback through digital communication, while for customers it is difficult to build the necessary trust with service providers through online systems. These negative impressions can ultimately lead to a decline in successful transactions.

5. RESEARCH LIMITATIONS

The present study exhibited several limitations that potentially have a negative impact on the validity of the findings and could be improved in future studies. The research results are limited to the data obtained from restricted interview sources and within the scope of the respective researchers' conclusion. A study that uses other materials could arrive at a slightly different conclusion depending on the study's time. The first and foremost limitation is that of interview sample (size and demographics). The analysis of the research findings was obtained from interviews with six bank employees. Due to the limited nature of the sample size, the study information cannot be provided comprehensively. It is also statistically insufficient to exclude cognitive information bias in some samples. Moreover, compromises are also made on the nationality factor of the sample (respondents were all from China). Traditional perceptions, social environment characteristics, and organizational culture gaps between countries have potential impacts on the study results, so the present findings may not be applicable to studies in other countries.

On the other hand, humans are complex, so the research regarding the impact of technology on human behavioral intentions has to consider numerous factors that can be explored, and only a limited number of effects are summarized in this study. There is limited research in the current research, and future research could unravel other unknown factors about the relationship between employee productivity and automation of banking services.

6. RECOMMENDATIONS

The application of e-banking is pretty dynamics due to constant changes in technology and automation systems. Therefore, financial institutions need to adopt continuous employee training to ensure they align skills, technological demands, and market changes. Markedly, the business environment in the 21st century is purely dominated by information technology, and any player in the banking sector cannot survive in business without offering technology-driven services. The banks should also be at the forefront of implementing secure and efficient transaction platforms and encouraging the customer to internet banking and mobile banking to access any banking services from any location. The approach is beneficial to both the customers and financial institutions as it minimizes the need of spending long hours in queues for automated services. Commercial banks' executives should focus their efforts on improving automation capabilities to increase the competitive advantage in the financial markets.

Moreover, in terms of employee resistance to automated systems, financial institutions should periodically train their employees to acquire industry-relevant IT skills through professional systems education. It is crucial to train the employees to develop the IT system's skills to improve the productivity of employees and services delivery to the customers. We also recommend that commercial banks proactively deploy sufficient infrastructure to support the technology being used to avoid system delays or service delivery derailments due to server compliance exceeding design capacity. This will contribute to reducing customer and employee churn caused by low satisfaction and system errors.

For future researchers, a prospective study should investigate the relationship between the internet and mobile banking as the areas have not been studied explicitly—an analysis on the impact of internet banking on employee products during the covid-19 pandemic. Currently, covid-19 has forced organizations to allow employees to work from home. It is worth to summary knowledge of automation's effect on employee productivity while working could help banks restrict their business model to suit hard times like during a pandemic.

7. CONCLUSION

In summary, it has been explored the impact of automation on employee productivity in the banking sector. Markedly, automation allows employees to access information that helps them deliver accurate and quality services. Banks' increasing adoption of automation systems is attributed to an increase in efficiency compared to manual methods. We established that employee productivity is positively impacted by ATMs, mobile banking, and internet banking. Moreover, automation reduces the workload for employees, thus allowing them to concentrate on other vital activities.

Additionally, the findings of this study provide a theoretical contribution regarding the specific impact of ATM, Internet and mobile banking on employee productivity. In view of the existing literature, which mainly considers workload, time commitment, and accuracy in quantitative studies, an original research model (considering technologies usefulness and ease of use as perceived factors affecting bank employees' productivity) is innovatively proposed by referring to the TAM Model (Davis et al., 1989). The bank employees agreed that the existing automated systems are highly user-friendly and that beginners are able to be familiar with the basic operation of the system in a short period of time. However, in relation to perceived usefulness, respondents presented a variety of negative effects of automated systems on productivity. They mentioned that the current bank automation systems are not well developed that the sensors are in some cases overloaded, which can cause problems such as network delays and system errors. This limitation on the one hand brings a negative experience to the users and on the other hand may increase the additional workload for employees. The spread of automated technology has also noticeably reduced the number of people visiting traditional banks looking for help, which has caused bank employees to perceive a certain lack of necessary face-to-face communication with customers. Respondents emphasized that offline communication tends to be more effective in sending emotional signals and creating a good relationship of mutual trust. Meanwhile, bank tellers have a sense that they are being progressively replaced due to the increasing sophistication of cell phone functions, which places them in a crisis of being layed off. Disturbed by the psychological pressure of chronic anxiety, they are forced to take on additional work output to meet the company's performance requirements. These negative perceptions have reduced employee enthusiasm for system use and work productivity.

As mentioned in the previous paragraphs, the study provides beneficial insights to employees and managers in various banking institutions. In addition, the negative influences of automation technology on the perceived psychological factors of employees were also identified, which offers valuable analysis for the direction of improvement of digital systems in the banking industry. In general, it provided practical evidence of the applicability of automation technologies for improving employee productivity to boost customer service and lower the operational costs. Essentially, bank managers will be encouraged to invest resources on innovation activities to enhance efficiency, digital competencies, and productivity of employees.

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9. APPENDIX

9.1 A interview Questionnaire on Effect of Automation on Employee Productivity

The research topic of this interview is the impact of information automation technology on the productivity of bank employees. The researcher would love to hear your insights on how automation technologies are being used in the banking field. This will help us measure the impact of these technologies on employee productivity. The interview is expected to take about 20 minutes and your responses are completely anonymous. For academic research purposes, the interview process will be recorded.

If you have any questions about the research, please email researcher:

y.gao-2@student.utwente.nl

Really appreciate your input!

Focus Topic	Interview Questions
Working environment (To understand the background and application situation of the automation technologies)	<p>Q1, To what extent does your organization use automation systems (for example Excel, ATM, Mobile, Internet banking system) in offering services to clients?</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person? (For example, what percentage of time it takes compared to ATM)</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p>
Extensions (To extend the perceived importance of respondents and the disadvantages of automated technology)	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Q2, Could you extend some issues of these technologies?</p>

9.2 Interview transcript

Employee	Ranks of the four main impacts
A	Work output > Perceived feelings > Accuracy > Work input
B	Perceived feelings > Accuracy > Work output > Work input
C	Work output > Perceived feelings > Accuracy > Work input
D	Work output > Perceived feelings > Accuracy > Work input
E	Perceived feelings > Work output > Work input > Accuracy
F	Work output > Perceived feelings > Work input > Accuracy

Table 1. Ranks of the four main impacts for Q1 (Extensions)

Respondent A	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>I hold the position as a wealth management manager. My daily service is deposits and withdrawals, helping customers purchase wealth management, fund trusts and other products, and introducing product investment returns and marketing to customers.</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>These technologies are frequently used daily. At present, customers use mobile banking more often because mobile banking is easy to operate and online banking is relatively rare. Basically, online banking is used by corporate users. Customers are less familiar with online banking and require employee support services.</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>I think the above-mentioned automation technologies are very helpful to my daily work. This is because from the most basic purchase of financial products for customers, if they do not need to purchase a particularly high risk, like our own online banking system and mobile banking payment system can basically be used. Our website banking system is designed for corporate clients, and our customers are very satisfied with the fact that it provides a professional and secure channel for transferring funds for corporate investments or business activities. And some individual customer groups can also use our mobile banking system to compare the available financial products, and they can compare the features of different products and the return of their investment portfolios at a glance. This also reduces the workload of our financial product sales.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>Without ATM, the workload will increase, and employees must guide customers to deposit and withdraw money, resulting in increased workload. Because there are fewer customers using cash now, in the absence of mobile banking, every bank has its own POS machine for financial transfer. For example, if a customer wants to buy wealth management or other products at this bank, , The bank can transfer money directly through this financial POS machine. If you have mobile banking, you can do it directly on the mobile banking. Because the transfer limit of this mobile banking is relatively large now, for example, our bank does not need any mobile USB shield or cipher for a single transfer. The single ratio is up to 500,000, and the maximum limit for the day is 1 million, which is basically 1.5 million.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>The most commonly used function of ATM is depositing and withdrawing money and transferring money. And like what we mentioned earlier, if there is no ATM, as far as my current position is concerned, it will not have a big impact on my work, and it will increase the workload by 30%. In other respects, with these technologies, I feel that my work is easier and I can provide better services to customers.</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>Now every company is reducing costs and increasing efficiency to implement paperless office. For example, customers previously needed to open a deposit receipt, or some paper vouchers were needed at the counter. We can use mobile banking to meet this demand.</p>

	<p>Because you can see from the mobile banking how much the product's total funds, annualized income and daily capital income are, about 80% of the customers who have such needs.</p> <p>However, there are several restrictions. The first is the age limit. For customers under the age of 18, it is more difficult to open a bank card. First, he must be accompanied by the guardian before he can open the card. The second is that for the elderly over 60 years old, paper deposit receipts are required for business, and they do not have smart phones or cannot use mobile banking. Except for these two types of customers, 80% of the paperless office can basically be achieved.</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>In terms of time, it will have a slight impact on the number of transactions. Compared with mobile banking, online banking operations are more cumbersome. For example, at the same time, you can do ten transactions on mobile banking, but you can only do about 6-8 in this online bank. The time and speed are different. Generally speaking, online banking is slow. Because online banking provides enterprise-level business, the steps required are cumbersome and time-consuming.</p> <p>For example, for one general account, a company can open many general accounts, and the processing time is about 1 to 2 hours, which is relatively cumbersome.</p> <p>In the enterprise-level account, a lot of information review still needs to be processed manually. Because it is more important, or involves more aspects, and it is not all automated.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>Basically more efficient. Increased work output reduces time input. It has a greater impact on reducing time investment.</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>If the customer has a better understanding of the business, it's not difficult. If the customer doesn't know much about the business, it's more difficult, but basically there is no problem with the transfer and daily operations. If the customer has not been exposed to this technology, use mobile banking. It is a bit difficult to buy this financial product or regular product. For example, a newly recruited intern can familiarize himself with the operating system of the bank, purchase products, or help customers on a daily basis, basically without spending too much time. But for customers, it is still a bit difficult.</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>If it is for customers, it is better, because customers are more convenient. But for the wealth management manager, the wealth management manager needs to meet the customer and then market the product to him. However, because of the popularity of mobile banking, the account manager cannot see the customer and cannot conduct better marketing.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>It is a bit negative for the financial product sales manager. Because some products must communicate face-to-face with customers, for example, you want customers to handle regular transactions. Because the communication is not smooth, customers may purchase wealth management through mobile banking, which resulted in my personal sales mission not being fulfilled. Virtually increased workload and reduced efficiency.</p>

Respondent B	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>Daily services are for customers to deposit and withdraw money, help customers open accounts, operate mobile banking, online banking, and handle other special services such as loss reporting. The business on the counter can be handled, including transfers, customer consultation and daily operations.</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>We now use excel less on the counter. We use the core system business to unify the process. Some customers come over to open mobile banking and provide customers with operating systems such as how to use mobile banking.</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>With the continuous update of the system, the popularization of mobile banking, online banking and ATM has greatly reduced the pressure on counter services. Many customers will handle the transaction on their mobile phones, and deposits and withdrawals can be processed at ATMs, so now they are doing business at the counter. Basically all of them are elderly customers, and some special services, the staff pressure is reduced, the customers are also very convenient, and it also helps customers save time.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>If there is no ATM, the number of customers for counter services will increase. For example, deposits and withdrawals can only go to the counter, so the workload and business volume of employees will increase, and the increase in the number of people will also make employees feel particularly busy and tired, so ATM reduces the number of employees pressure.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>If there is no ATM, it will definitely take longer for the customer to come to our counter to withdraw money than if there is an ATM. The reason is that the customer needs to fill out and sign the form at the counter, and our staff needs to do some manual review of the information. For example, it takes about two minutes to process a withdrawal at an ATM, but it takes about three or four minutes for us to do it manually at the counter.</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>The simple daily deposits and withdrawals of these customers can be handled by themselves at the ATM, so employees have more time to serve some such as VIP customers or special services, and they can have more energy and more time to do for these customers. better service.</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>Nowadays, most companies use online banking more for corporate customers, or customers with large capital flows will also use online banking, because each transaction limit will be large, unlike mobile banking, which has a limit, such as how many transfers can only be made a day , So online banking is more enterprise-level processing, as well as large customers.</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>If you want to go to the counter for online bank transfer, the processing time will definitely be longer, because the customer needs to post a check, and the basic information such as the transfer bank's bank number or transfer bank address needs to be very clear, and employees need to spend more time inquiring about the transfer bank's Information, but after opening online banking, companies can directly operate these in their own units. Customers also reduce time and reduce counter pressure and workload. It is also two-way, which is convenient for customers to reduce the workload of employees. For example, it takes at least 15 minutes for a company to transfer money to the counter, and it only takes a few minutes to complete it if it is operated on the Internet by itself, because online banking does not require a lot of operating procedures like the counter, and it can</p>

	<p>especially reduce the waiting time at the counter. Because there are too many people doing business in the branch, customers also need to wait.</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p> <p>Indeed, the amount of funds transferred with online banking is relatively large. If the employee is negligent or careless, it may make a mistake or the transfer bank information is inaccurate, and the transfer will not be successful. In this case, you need to further contact the company's account bank to process the refund over the counter. Re-transferring funds increases the workload of employees and brings a lot of inconvenience to customers.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>Mobile banking is faster and more convenient than online banking. Many customers come over and ask to open mobile banking. It is also very convenient for them to do business. As long as mobile banking is activated, employees are more willing to use mobile banking to do business on their own after understanding the operating system for ordinary customers. , It can be handled at home, which can save customers' time and reduce the work burden of tellers.</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>For different age groups, young people can quickly become familiar with the processes and applications, and they can master them very quickly. However, for middle-aged and elderly people, they are not familiar with electronic products. , Unwilling to learn mobile banking or feel that it is safer to transact over the counter. Therefore, young people are more willing to use mobile banking. Nowadays, there are very few young people doing business over the counter, and most of them are middle-aged and elderly people.</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>A positive impression is generated and a sense of accomplishment is created for the employees themselves. The employees themselves often use mobile banking and feel that they can handle these services and feel that it will be more convenient and satisfactory. Make employees more energy and time to serve special customers. It shows that the advancement of science and technology has made people more aware of the convenience and convenience of information.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>Basically, it is safe. As long as you don't let others touch your phone or reveal your password, it's still safe.</p>

Respondent C	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>I'm a teller, I help customers with personal business or unit business, and answer customers' personal needs</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>The system in the general operating unit, log in to the bank's internal operating system, not much use of Excel, and not much use of reports.</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>Our bank has recently applied the tablet computer intelligent customer service machine, but due to the technology and the device itself is not perfect. There are often customers experiencing problems such as system lag or program flashback. We have received many negative comments about these machines in the last month.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>The difference will be very big, because ATM can divert many customers. Before there was no ATM, many people would go to the counter to do business and wait in a long queue to do business. Now there are not many people on the counter after the ATM. Basically, ATM mobile banking Wait instead.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>The most frequently used function of ATM is to deposit and withdraw money. Our bank transfers require 24 hours to arrive in the account, so the most used function is to deposit and withdraw money. For young people, ATM will be faster, faster than counter processing, and can increase the time by 50%</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>Yes, because simple businesses can be realized on ATMs and complex businesses can be handled at the counter, so that employees can have more energy and time to complete counter services.</p>
Internet Banking	<p>Q1, Which customers will use online banking and what are the functions of online banking?</p> <p>The general customer groups of online banking are young people. People in the 70s, 80s, and 90s, as well as corporate customers, are generally cashier accounting operations. Older people can't do it, and the overall trend is younger.</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>Helped 80% of their work, and also saved time for customers, and for employees, reduced pressure on the counter</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p> <p>It can reduce business. For example, after companies use online banking, simple services such as transfers can be operated on their own. Unless cash is frozen or changes in unit information need to be processed at the counter, Internet banking is basically used for transfers. Corporate online banking is quite convenient. For example, when our bank comes to the counter, we need to fill in the form, and it will take time to fill in the wrong way, so this can reduce the time spent by customers on the road.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>Mobile banking can check balances, pull flow, transfer money to buy wealth management, and process credit card installments. Basic mobile banking can be done, and you can withdraw money by scanning the QR code, reducing the workload of employees</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p>

	<p>While older people may not be familiar with these digital operating systems, beginners can generally spend about 10 minutes getting familiar with how to do some basic operations.</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>Mobile banking has brought a sense of crisis that will reduce the number of operational staff at the counter. We used to have 6 front desk positions, now we are down to 4. I even feel like I'm going to be laid off, now that people at the counter are going out to do marketing, there is pressure on us as employees. But older people love to do business at the counter because they have plenty of time and are willing to wait in line at the counter, and younger people use mobile banking more.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>Customers worry that mobile banking and other technologies are not safe, so they are unwilling to use mobile banking, and the user experience of our bank's iPad is too small for business. And the new technology gives customers a bad experience, the system cannot be accessed, the web page cannot be opened, there will be freezes and bugs, in this case, the staff will still be asked for help, and the technology needs to be improved.</p>

Respondent D	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>I usually work on credit and credit management in my service work. Customers are approved by me when they make loans. They have a certain credit line, such as a loan of 100,000. My review materials will pass if they meet the conditions. And for the People's Bank of China and China Banking Regulatory Bureau to submit relevant reports every day, helping them to collect statistics on bank credit.</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>Generally log in the bank's internal operating system, Excel and operating system, similar to big data, support background investigation and credit investigation</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>It can be used for general inquiries, but there is no help at ordinary times, and the system is relatively backward.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>The impact is great. Without ATM, for example, some customers just want to take one or two hundred, and now they need to wait in line at the counter. What could have been done in three minutes may now take half an hour or more, which also increases the repetitiveness of employees. And trivial work reduces customer satisfaction.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>The most frequently used function of ATM is that customers deposit and withdraw money, check the balance and change the password. For example, when a customer withdraws money from an ATM, it takes about three minutes to enter the password, and it takes about 5-6 minutes to withdraw money from the customer.</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>The main counter business faces more elderly people, because they don't know how to operate ATM, young people basically go to ATM to solve the problem, a few minutes is very quick.</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>For corporate users of the investment business, companies will open their own corporate online account when the background information needed to enter all into the system, and then the company legal person in their own computer operation can be completed quickly, about ten minutes. Then he came to the counter for the words, he needs to bring all the original paper documents, and then the counter needs to review and upload. This first requires authorization from our side, and then we have to check the authenticity of the documents. If there are not many customers, it will take at least half an hour, generally speaking, it takes about 45 minutes.</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>Obviously, because after entering the account number, the customer knows their account better, and the staff may make mistakes in helping to deal with it. Customers are also more satisfied with the bank.</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p> <p>Internet banking is more convenient for corporate payments. For people, you basically open an APP on your mobile phone from the Internet. Internet banking is mainly for businesses. All the information needed to open an account in online banking is entered into the system, and customers can handle the business they want in the future.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>There is no obvious impact. Mobile banking is very common now. Basically everyone has mobile banking.</p>

	<p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>In this age group, it is more difficult for older people to operate and find it difficult to use. There are also elderly customers who come to the bank to ask employees for help in using mobile banking. Generally, they can use it after church. However, it is easy for the elderly to forget their password and find the transfer page, and it is not convenient to fill in the transfer information.</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>Work pressure is reduced, because the bank's most common service is transfer and access. Mobile banking can replace 50% of the business, and customers can do it by themselves, unless large transfers need to be processed at the bank. The loan review mobile banking cannot be operated, and our bank needs to come and handle it in person, which has little effect on my work.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>There is no security issue. The main reason is that the interface planning partition after the customer enters may not be easy for the customer to use, and some large transfers will be more cumbersome, mainly due to security issues.</p>

Respondent E	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>I usually work in a village branch bank. Now I am a credit account manager. I am responsible for the placement of bank credit funds and lending to customers. I mainly deal with small businesses and individual industrial and commercial households, most of which are individuals. Large corporate customers are few. The daily work is the preliminary investigation of the client's qualification background.</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>Using a credit management system, it is more convenient to collect customer information in the early stage. For example, if a customer has previously opened a bank card, we can synchronize the information by uploading the ID number in the system.</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>It reduces a part of the work, which may not be too perfect compared to the four major systems, but without this system, a lot of work will be inconvenient.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>It also has a big impact on credit, because if deposits and withdrawals are handled at the counter, I have to queue up at the counter for related credit business and account transfer, which took extra time.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>The most frequently used functions of ATM are customers depositing and withdrawing money, transferring money, etc. If it is a skilled and old employee, it will take 3-5 minutes at the earliest, and it may take 10 minutes or more if authorization is required. If the ATM is used, it can be taken out in one or two minutes, saving at least half of the time.</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>Some simple businesses can be diverted, and complex businesses can be handled at the counter. Increased my motivation to do complex business for clients.</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>Online banking is convenient for customers to deposit and withdraw funds, and allows customers to transfer funds in different places. Our village branch bank has a great demand for this aspect.</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>Yes, especially online banking can divert part of the business. Our online banking business does not involve loans. If you want to handle it, you need to go to the bank to find a customer manager to handle it.</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p> <p>Online banking can divert part of the business, which also reduces our work pressure.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>There is not much impact but there is a sense of crisis. The four major banks are now able to apply for loans in online banking, can automatically analyze the amount of loans to customers, and automatically call credit in the background. It is a good thing that our system is relatively blocked. Our bank relies on credit unions. The system is still a bit worse, but it will be upgraded sooner or later, and there is still a sense of crisis.</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>For new employees, we have systematic learning courseware, but it takes at least half a year to be very proficient.</p>

	<p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>There is a sense of crisis, young customers use online banking and mobile banking, etc. The customers are basically elderly customers, and it is easy to segment customer groups for marketing. Do online banking marketing to young people.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>As far as our system is concerned, we still need to continue to improve. The technological power is not too strong. To be able to better interact with customers, lack of communication will lack progress. In terms of credit, the credit system has not been connected. If it is connected, we can directly apply for customers from the Internet, which can save a part of the workload and is not easy to make mistakes.</p>

Respondent F	
Focus Topic	Interview Questions
Working environment	<p>Q1, To what extent does your organization use automation systems in offering services to clients?</p> <p>A teller in a position usually provides customers with deposit and withdrawal services, mobile banking, online banking, etc., as well as marketing deposits, these most basic services.</p> <p>Q2, How do you implement those technologies in your daily work?</p> <p>ATM is most commonly used, which reduces the workload of tellers. Now the number of tellers has begun to decrease, and they have transformed themselves into services such as lobby managers. Because ATM can replace a lot of manual operations, there are also smart teller machines, which are different from ATMs in that they can do card inquiries and other tasks. It also reduces the work of tellers.</p> <p>Q3, How do you feel about those technologies? To what extent do you think automation reduces the workload and increases productivity as compared to manual working?</p> <p>ATM is easier to operate, and it is easier for young people to operate. Because we are in a pastoral area, there are more elderly customers, and they don't know much about ATM. Usually tellers guide customers to operate, and they are bilingual in Mongolian and Khan, which is very user-friendly.</p> <p>My day-to-day job is to provide consulting services and card opening services to customers, especially older users over 50 years old. So the most common application is actually ATMs replacing the services we used to provide to individual customers for accessing their money. Our bank has recently developed smart teller machines, which are different from ATMs in that customers can use them to open their own cards, which reduces some of our workload.</p>
ATM	<p>Q1, How do you think your work will be if your organization does not implement ATM technology?</p> <p>The workload will become much larger. We have 4 ATM machines that can operate. The teller handles about 20% of the business per day. Without ATM, the business volume can be 100 transactions. Customers are relatively idle from the end of October to the end of each year, and the business volume is dramatic. With an increase of 200%, ATM can reduce the business volume by half.</p> <p>Q2, What do you think is the most frequently used function of ATMs? Imagine how long it would take if you were to provide this service to your clients in person?</p> <p>The most commonly used function of ATM is to deposit and withdraw money from customers. Generally, it takes about three minutes for customers to process deposits and withdrawals, but it takes only one or two minutes to wait at the ATM.</p> <p>Q3, ATM reduces redundant and repeated work, are you motivated to serve customers better in other field?</p> <p>We now have relatively few teller deposits and withdrawals, and all we provide are inter-bank transfers, because there is no handling fee at the counter but there is a handling fee at the ATM, and it takes one or two days to return the wrong transfer. If you manually check it, you can find it out on the spot. This is the advantage of labor over ATM. Moreover, the current tellers are basically mobile banking and Internet banking services are relatively large, mobile banking and online banking are not used too much by the elderly, and there are more elderly customers in the counter business.</p>
Internet Banking	<p>Q1, How do you perceive the Internet banking impact your work output and hour?</p> <p>Internet banking is for corporate customers and can provide inquiry transfer and reconciliation services. For example, if a company comes to the counter to transfer money to employees, if he uses a personal account and there are 20 employees under his name, he may have to stay at the bank for one morning, but if using mobile banking, it can be done in an hour at most, saving work. Time has reduced the workload of the teller, because it is necessary to fill in a bill when transferring money at the counter. For online banking, you only need to check the name and the bank that opened the account.</p> <p>Q2, In your opinion, does internet banking technology increase accuracy besides reducing errors for your organization?</p> <p>Online banking has increased the accuracy of work, because when corporate customers come to open, they need to fill in basic information to verify that they are accurate.</p>

	<p>Manual errors may occur. For example, when customers come to make business transfers, employees may not be so careful and make mistakes close to the end of get off work. However, online banking does not have to worry about off-duty hours, it is available 24 hours a day. It can give customers more convenience and reduce the time cost of customers on the road.</p> <p>Q3, From which side does Internet Banking reduce your daily workload and increase your work achievement.</p> <p>For me, the workload and work pressure have been reduced, and I can have more energy to serve special customers.</p>
Mobile Banking	<p>Q1, Nowadays most of the mobile banking services can replace the functions of offline banking. How does this change the way you work?</p> <p>In the case of our bank, the amount of work handled by our tellers is about 100 cases a day. Without mobile banking and other intelligent systems to take up those repetitive tasks, that would leave us with a minimum of 300 customers to serve each day. This would pose a great challenge to our work productivity.</p> <p>Q2, Do you think it's difficult for beginner to manage the mobile banking system?</p> <p>Elderly people in their 60s and 70s don't need to learn this. Even if they are taught, they will worry about the safety of mobile banking. They are more resistant. They will basically choose to go to the bank to do it. used.</p> <p>Q3, Mobile Banking is becoming more popular, it reduced the customer numbers who go to traditional bank, will you feel less self-achievement because of this?</p> <p>It's even more stressful because I can't see customers, can't communicate with them, and don't know what services they need. Now telephone communication is not intuitive and can't communicate with customers better, which has a negative impact on work. People will be more intimate when they have more contact with each other. Now mobile banking restricts face-to-face communication.</p>
Extensions	<p>Q1, What is the ranking of the significance of these four impacts from your opinion? (work output, work input, perceived feelings, accuracy)</p> <p>Table 1</p> <p>Q2, Could you extend some issues of these technologies?</p> <p>Some customers do not know much about the new technology because they are in farming areas. For example, we had a customer who used an ATM for the first time and was not familiar with the operation process, resulting in entering the wrong password too many times. Eventually his bank card was locked by the machine. He was particularly anxious at that time, but it happened to be a Saturday, and there were only three of us on duty on Saturday, so we couldn't get the card. At that time, we could not directly access the backend of the ATM to operate, because the bank security regulations have provisions. I had to keep reassuring the customer to come back next Monday or other weekdays. It took me four hours to calm the elderly customer down</p>