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THE IMPACT OF INFORMATION TECHNOLOGY ON THE DESIGN OF ARCHITECTURAL SPACES OF BANKS

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Abstract:

The study aims to investigate the impact of technological development on designing the architectural spaces of banks and its effectiveness specifically in bank's architecture, as one of the latest technological updates in Egypt is the digital banks (unmanned branches) which consist of an integrated system of services connects all the data with a network which provides all the banking services without human intervention and this network is named by cyberspace. The study also asks whether the Design of digital banks has a positive impact on the human movement inside the bank or not. It also includes studying the technological development of architectural spaces for banks which had a great impact on the space areas, interior new material used in the design of the spaces and a great impact on the user's movement inside the bank and the time consumed for every client. The study formulates the distribution of areas of each type of bank and states the effect of the distribution of architectural spaces on the speed of completing a bank transaction, technology greatly affects the architectural spaces within the bank, which greatly affects the performance of banking institutions by reducing the period that each customer needs to perform any banking transaction and reducing errors resulting from human interaction, as the bank has become fully automated, which is led to saving labor and time. And reduce the error coefficient.

Keywords: Architectural Spaces, Technological Development, Cyberspace, Digital Bank, New Materials.

تأثير تكنولوجيا المعلومات على تصميم الفراغات المعمارية للبنوك

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ملخص البحث:

تهدف الدراسة إلى معرفة تأثير التطور التكنولوجي على تصميم الفراغات المعمارية ، حيث أن من أحدث وسائل التكنولوجيا في مصر هي البنوك الرقمية (الفروع الالكترونيه) والتي تتكون من نظام متكامل من الخدمات حيث انه يتم الربط بين جميع البيانات بشبكة واحده تقدم لنا جميع الخدمات المصرفية دون تدخل بشري وتسمى هذه الشبكة بالفراغ الالكتروني. كما يدرس البحث تأثير تصميم البنوك الالكترونيه و مدي إيجابيته على حركه المستخدم داخل البنك. و تتضمن الدراسة دراسة التطور التكنولوجي للبنوك من تطور الفراغات المعماريه التي ادت الي التغيير في مسطحات الفراغات المعماريه و تطور التصميم الداخلي للبنك نتيجه تطور الخامات المستخدمه في التصميم الداخلي

الذي ادي الي تغيير كبير في حركه العميل داخل البنك و اثرت بالايجاب علي الوقت الذي يحتاجه العميل لاداء المعاملات البنكيه.... فنتجت عن هذه الدراسه توثيق توزيع مساحات البنوك التكنولوجيه وبيان تأثير التكنولوجيا علي توزيع المساحات المعمارية على سرعة إنجاز المعاملات المصرفية. و تم استنتاج أن التكنولوجيا اثرت بشكل كبير على الفراغات المعمارية داخل البنك مما اثر بشكل كبير علي اداء المؤسسات البنكيه من تقليل الفتره الزمنيه الذي يحتاجها كل عميل لاداء اي معامله بنكيه و تقليل الاخطاء الناتجه عن التعامل البشري حيث ان البنك اصبح مميكن بالكامل مما ادي الي توفير العماله والوقت و تقليل معامل الخطأ.

الكلمات المفتاحية: الفراغات المعمارية، التطور التكنولوجي، الفراغ الالكتروني، البنك الديجيتال، المواد الجديدة.

1. Introduction

Technology has a positive impact on all facets of life as the banking institutions were influenced by the new technological developments. as Banks are considered one of the richest types of buildings, both in their vocabulary and in Their furnishing or finishing materials[1], the new technological advancements in banks have led to the need for the development of finishing materials , furnishing and introducing new machines helps in all the banks' process, which leads to the reduction in the labor force and the increase of the working hours to improve banks services efficiency and satisfy the customer needs, as one of the regular bank problems that the customers were left waiting and wasting a lot of time in queues [2],and that indicates that banking institutions' performance needs to be upgraded and developed, to keep all other banking services like withdrawal and deposit services working for longer hours cause most of the banking services rely on human interaction, which is only available during certain working hours. According to that, the banking industry developed mobile bank apps (internet banking), auto banks and digital bank branches which is one of the most recent developments in Egypt's banking industry to keep up with technological advancements is the emergence of digital banks, also referred to as "unmanned branches" or "digital banks," as the first opened digital bank branch in Egypt is from nearly five years ago, at the start of 2018 [3]. The goal of the unmanned branches is to build an integrated system of services via a data network, or "Cyberspace," that can handle all banking needs without the need for human intervention. [4] Within a limited time, this system takes place in Egypt with a few workers, as the customer completes all of the bank transactions with the help of the branch's staff. This system has been implemented in a few bank branches, including the Suez Canal Bank and Cairo Bank of the National Bank of Egypt. In total, there are now close to 35 branches using this system in Egypt. And also some of the traditional bank branches have been developed by adding to a digital corner to develop the old branches according to technological developments [3], It is important to note that the existence of these branches during the coronavirus pandemic effectively limited the spread of diseases and epidemics, in addition to the widespread use of Automated Transition Machines (ATMs), which helped to maintain normalcy in daily operations during the crisis [5].

Research problem:

Raising awareness on the importance of developing bank architecture by using new technological methods like cyberspace (electronic space) to keep up with worldwide large developments.

Research Methodology:

The descriptive and analytical approach (a descriptive and analytical study of the tradational banks and the impact of cyberspace technology on the tradational banks to be developed to the digital banks and its impact on its interior spaces ,areas and circulation.

1-The Traditional bank:

The traditional bank functions are mainly divided into two sections the first section is related to customer service and their facilities, and the second is related to employees and their facilities. Each has its stages **Fig .1.** [2]

1.1 As for the customers section:

It contains places for waiting and queuing and services for customers like WCs and cafeteria

Fig .2.

1.2 The workers section:

Includes employee and administration offices and their services.

The two sections shape the bank's design and paths

Fig .2.

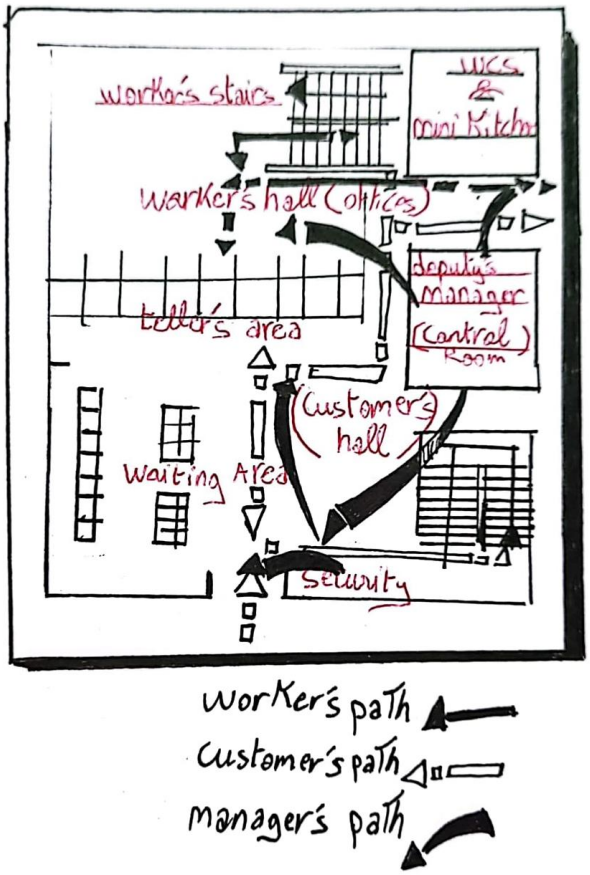

Figure (1): the movement paths and exchange relationship inside the bank. [2]

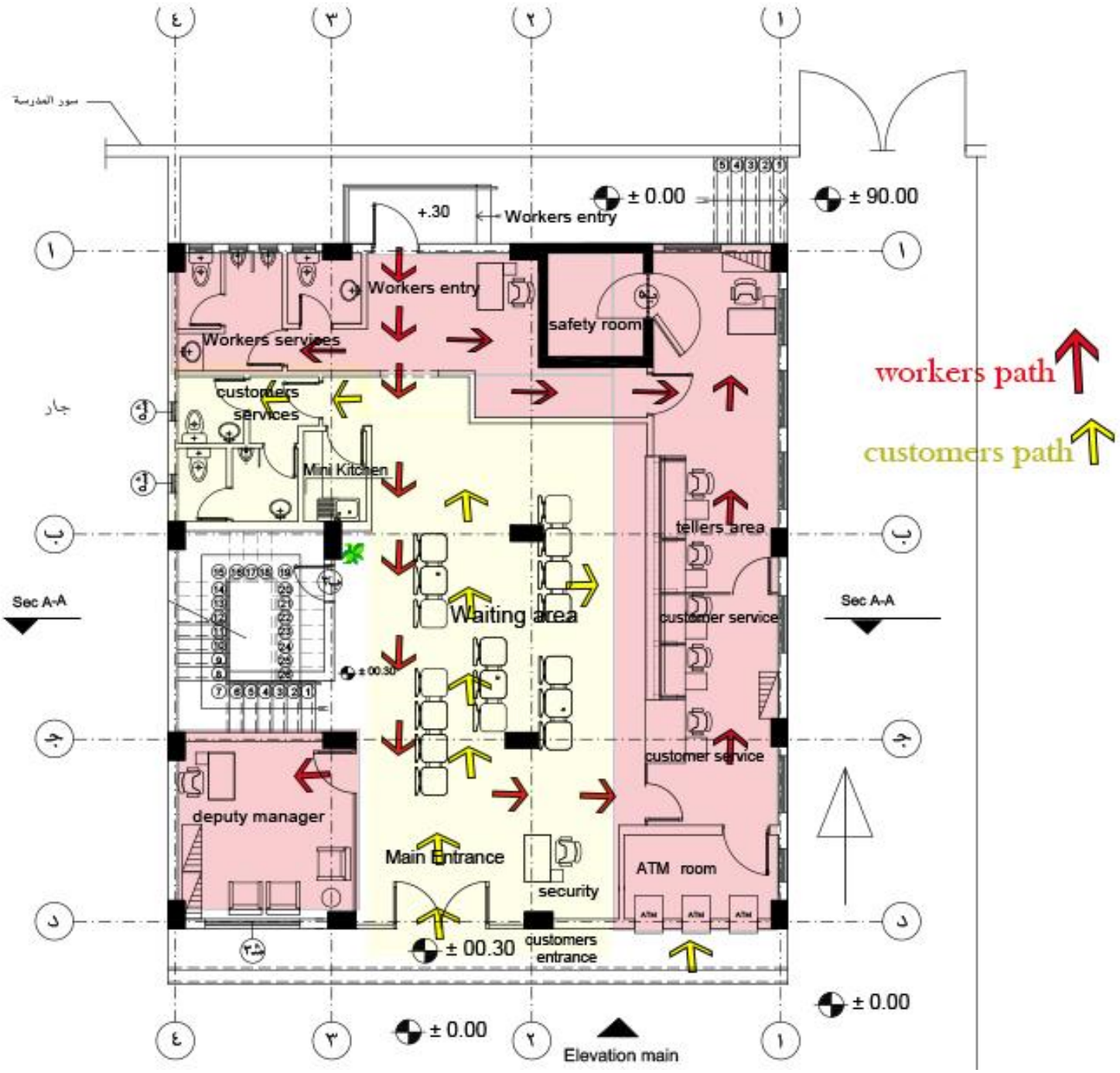

Figure (2): The following plan illustrates the workers and customers circulation in the bank.

1.3 Regular bank spaces:

• The waiting area.
• Customer service area
• The teller area, besides the safety room.
• The manager's room.
• Deputy's manager room.
• IT and Control room and meeting room.
• Archives and publications room.
• Mini kitchen and private bathrooms for employees and clients.
• The branch may contain an office area for employees, a waiting area for businessmen, and customer service offices for businessmen, depending on the size of the branch [2].

1.4 The working steps in regular banks are summarized as follows:

(1) The customer picks a number from the queuing system machine with the help of the security employee, and then the customer determines the required transaction whether it is Teller (cash area) Fig (3) or Customer Service (non-cash area) **Fig.4.**

Figure (3): Teller's area in the traditional banks [3]

Figure (4): customer service zone in the traditional bank [3]

(2) After withdrawing the number, the customer goes to the waiting area to wait for their turn.
(3) When it is the customer's turn, his number will appear on the screen and a number will be announced, whether customer service or comprehensive exchange, so the customer will go to the type of service he requires.
(4) If the customer wants the teller's area, the customer goes to the exchange counter and deals there with a money exchange employee, and if the customer wants customer service, he goes to the customer service area to have his problem dealt with.
(5) The regular bank contains a safety room, which is not visible to the public and is behind the tellers where the bank's money is reserved. It also contains rooms for archives and publications to store the branch's data in these rooms.
(6) There is also a manager's room in the bank to supervise the branch and the employees, an office to serve the employees and customers, and bathrooms designated for customers and employees. There is also an area for (IT and Control room). This area contains the systems that control the branch and its data. There is also a place for... (ATM) may have a room inside the branch to feed the cash machine, or it may not have a room and the machine is fed from the top, and this is due to the type of machine used in the branch.

(7) Other spaces may exist relative to the size of the branch, such as the deputy director's room, administrative staff rooms, waiting rooms for VIP visitors, and customer service offices for VIP visitors.
(8) There are advertising banners hanging inside the bank to display the latest developments in the bank and its latest services.

(2)Cyberspace (digital space) meaning:

Cyberspace or (digital space) meaning has been developed by many specialists
William Gibson (sci-fi author) is considered the first to coin the term "Cyberspace." This was in the early 1980s, and after that, this term became used in a wide range of professional and academic circles [6].

Michael Benedict has developed a new definition for cyberspace expression he expressed it as a global network in which the users communicate, educate entertain, or work through a computer or any means of communication and in a way that uses physical representation systems or virtual reality for representation and virtual simulation. It's an imaginary space that doesn't contain a defined border [6].
From Marvin & Graham's point of view on cyberspace (digital space), they are spatially imaginary, invisible spaces. Intangible and abstract, they arose within the basic network of information, to overcome the confusion of space and time, and these Spaces can emerge and develop as systems at all spatial levels, starting from small systems inside smart buildings. Intelligent Buildings and Smart Homes pass through cables to make the whole world a global village [7] .

2.1 Cyberspace in architecture

Architects began to design virtual buildings on the information network that represent the personality of the institution that controls the site. For example, the New York Stock Exchange was designed by an architect (Hani Rashid) who constructed a virtual building on the Internet. In 2001, he finalized the design of the virtual building to aid investors.in directing bond and financial share buying and selling activities from their site without the need to visit the stock exchange building, and in a replicated way [7] **.**

2.2 Cyberspace in banks

The cyberspace (digital space) started to be applied in banks through the digital bank which is completely unmanned without any human intervention in all the bank transactions it works through an integrated system of services via a data network [8]**.**

3 Digital Bank (Unmanned branch):

3.1 The Digital bank:

It's the new development of the traditional bank buildings as it works for more working hours than the traditional bank with higher efficiency as the customers deal with machines without any human interventions, meaning the COVID-19 pandemic has also increased the usage of digital banks and internet banking. Because during a pandemic activities or mobility were restricted, people finally adapted and made transactions using digital banks [9].

The digital bank mainly has one path for the bank customers as it has no paths for workers cause it is completely machined with no human intervention.

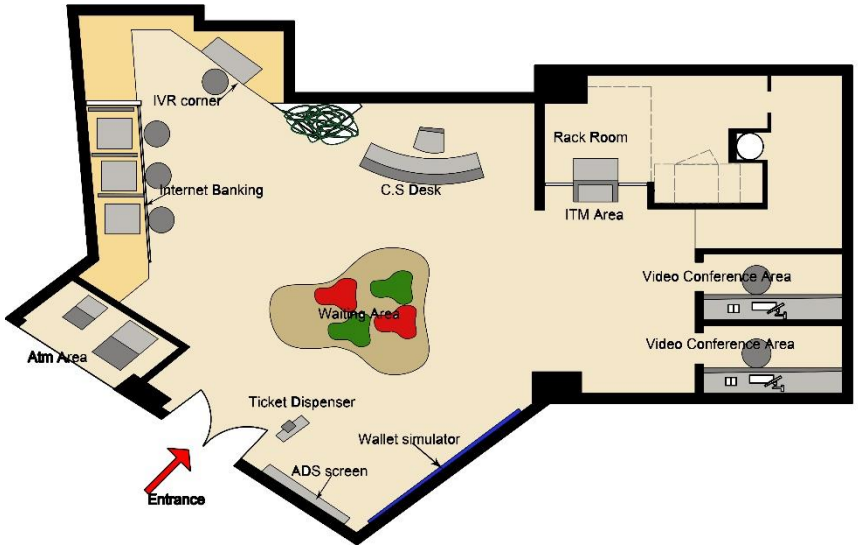

Figure (5): digital bank plan .

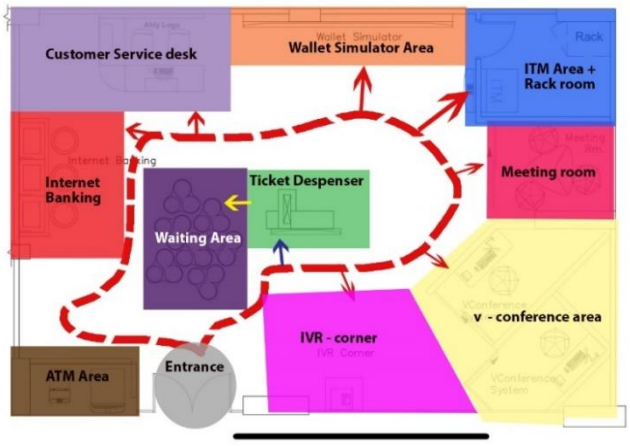

Figure (6): A diagram shows the digital bank zones.

3.2 The contents of the digital bank and the approximate distribution of its areas:According to the analysis of digital bank plans

- ATM space with an average area of 6 square meters.
- Ticket dispenser machine with an average area surrounding it of 5 square meters.
- An empty waiting area with an average area of 15 square meters.
- An alternative vacuum for the comprehensive exchange area (ITM) and the (rack room) with an average area of 13 square meters.
- An alternative space for the customer service area, which is the video communications room. (Video conference area) with an average area of 15 square meters.
- An empty meeting room with an average area of 8 square meters.
- Internet banking space with an average area of 10 square meters.
- The coffee corner has an average area of 6 square meters.
- The IVR Corner space has an average area of 7 square meters.
- Vacuum the Wallet Simulator and the ADS screen with an average area of 6 square meters.

3.3 The working steps in the digital bank

(1) Our journey in technology banks begins when entering the branch **Fig .7**. There is no longer a machine from which a security employee can withdraw a number for customer service or a number for teller staff, but there is now a machine called (Ticket Dispenser) **Fig .8**. The customer enters his phone number and then the bank sends a message to the customer on his mobile phone via the Ticket Dispenser, and the bank informs him via message of his number and the time to wait for the service [3]

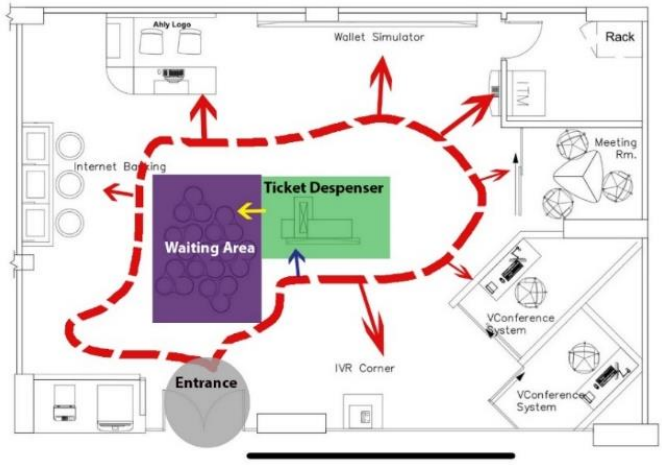

Figure (7): Customer movement passage in the Digital bank [3]

Figure (8): The Ticket dispenser machine [11]

(2) After taking a number from (Ticket Dispenser), the customer has the opportunity to enter and wait for his turn in the customer waiting area or go to perform any task until the bank sends another message to the customer informing him that it is his turn to return to the branch again.
(3) After it is the customer's turn he begins to move into the branch to perform the operation he needs from the bank, and the bank guides him inside if he needs guidance, the customer service desk (c.s.), which is a customer service desk **Fig .9**. consisting of two employees, one of whom guides the customer inside the branch. The other employee supervises the first employee and supervises the operations that take place within the branch.[10]

Figure (9): customer service desk [10]

(4) If the customer needs customer service at the bank, he should go to an alternative area called the Video Conference Area **Fig .10**, abbreviated as the VDA area, and also called the Digital Room. It consists of Two or three rooms, depending on the size of the branch, and contains a screen that when the customer clicks on it, a customer service employee appears to assist and guide the customer. [11]
If the customer wants to go to the comprehensive teller's area, it is divided into two parts. The first part is the ITM machine, which is the Integration teller machine. This machine has much greater withdrawal and deposit limits than the ATM (Automatic transition Machine). [11]

Figure (10): VDA area (digital room) [11]

Figure (10): VDA area [3]

Figure (11): ITM and meeting room [10]

(5) The second section in the digital bank, which performs the rest of the tellers functions in the regular bank, is the (SDD) and is called the (Self-service desk), through which the customer transfers and updates data or transfers from one account to another via screens [10].
(6) The digital bank also contains a rack room, and this room represents the It and Control room in the regular bank, and the mission of this room is to collect branch data and keep the branch's systems safe [11].
(7) There is also an empty meeting room **Fig .11**. This room is rented to major businessmen dealing with the bank so that they can hold their emergency meetings inside the bank's meeting room. One of the development plans is Converting this room into a waiting room for businessmen (VIP Waiting Area) to be separated from regular customers inside the branch to provide more private waiting places. Inside the meeting room, there is a secret safe for businessmen to keep their money in while holding meetings inside it [3].

(8) The mini kitchen space in the bank was replaced with a Coffee Corner **Fig .12**, to reduce the office space and allow each customer to serve himself, reduce labor, reduce human interaction, and save the customer's time.
(9) The publications (Advertisements) have been replaced with the Wallet Simulator **Fig .13**, which is a screen on which the bank's advertisements and offers are displayed. It differs from the interactive screen **Fig .14**, which is a longitudinal interactive screen through which the customer learns the latest information and news about the bank [11].

Figure (12): coffee corner [11]

Figure (13): wallet simulator [3]

Figure (14): Interactive screen [10]

Figure (15): waiting area [11]

(10) The digital bank also contains:

(Automatic Transition machine) It is at the door of the branch and is the same as the regular ATM in non-automated branches.

(11) If the customer faces any problem while withdrawing via the ATM, he can go inside the branch to a space called the Ivr Corner without the need to take a number from the ticket dispenser, and the Ivr Corner represents the bank's complaints department (Call Center).

In the digital bank, it is represented by a screen that when the customer clicks on it, an employee will appear to assist the customer in solving his problem [3].

We can illustrate the difference between the traditional bank and the digital bank through the following table 1

Table(1)The following table is a comparison between Traditional and Digital banks.

	Traditional bank	Digital bank
Time consumption	The time needed for customers to wait for their transactions is way more than the digital bank as there is a percentage of error due to human intervention.	Less than the time needed for customers to wait in traditional banks because the bank depends on machines so the transactions are faster than normal.
Working hours	The traditional bank works for 5 days per week.	The digital bank works all the weekdays (7 days) which is more than the traditional bank by 2 working days (14 hours).
Efficiency	There may be a percentage of error through the transactions due to the human interventions in all the bank transactions.	More efficient due to the usage of machines there are no human interventions in the transactions.
Archiving system	It requires large spaces(areas) for the data storage.	The archiving system is digitalized depends on the computers system.
Data security	The data is less secured as its documented on papers and filling system.	The data is highly secured as its saved on network system linked to the central branch.
Finishing materials	Luxury finishing and furnishing materials.	Very simple finishing materials and depend on signs.

3.4 What is the technology for linking the bank's technological branch and the administrative building through which employees appear on the bank's screens

The bank's automated system and the administrative branch are linked using cyberspace technology, and this technology takes more than a year in time for the branch to be prepared for the operating stage.

The employees who appear to customers via screens, whether serving customers, managing complaints, or any of the digital bank's screens, carry out their tasks from another administrative building affiliated with the digital bank.

This technology saves labor, as a single administrative building with its employees may be connected to more than one mechanized branch. Through this process, labor and time are saved, so the number of working hours in automated banks increases by 5 working hours compared to regular banks. [12]

3.5 Among the plans to develop the technology bank in the future

The c.s desk outside Egypt is a robot that guides the customer inside the branch, and among the plans to develop the digital banks on which the banking system is based, the banking system in Egypt now is introducing the robot **Fig .16**, as abroad, to perform the function of the c.s desk, and this is to raise the efficiency of the banks and increase them. Its working hours will be fully automated, meaning completely automated. [12]

Figure (16): Banking robots outside egypt[12]

(4) What is the automated banking room (Digital Corner) inside a regular bank and what is its content:

It is the creation of a technological bank in a miniature form inside the branches of regular banks in the form of a space inside the bank called the digital corner **Fig .17**. It contains all the spaces of an automated bank, but in a smaller area and performs the same tasks as a regular bank. This is because technological banks have proven their importance, so customers began to prefer them over regular banks and it has become theirs. A strong role in saving time and effort for customers and employees.[3]

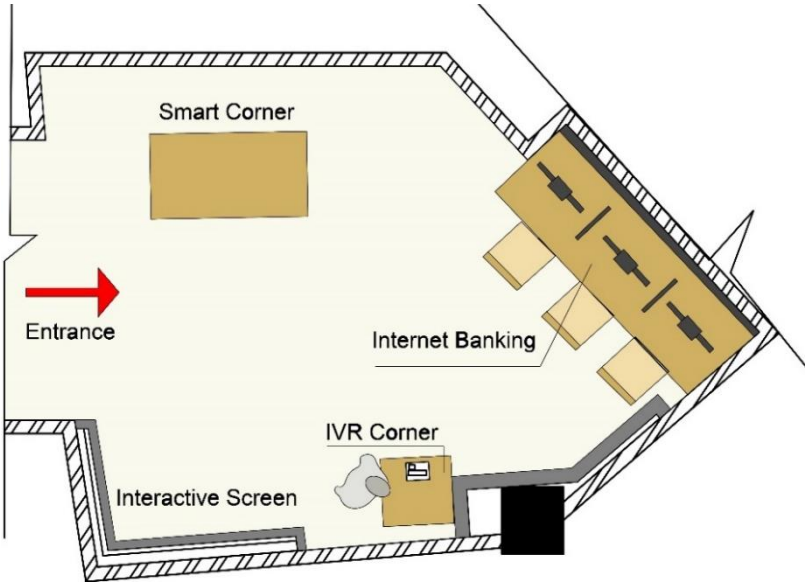

Figure (17): digital corner plan .

(5) Among the recent developments of banks in Egypt:

5.1 Auto Bank bus

Figure (18): Auto bus [3]

It is a mobile bank in the form of a bus that contains the same spaces as the technological bank
Fig. 18, but with smaller areas it does not have the comprehensive teller space. It contains a ticket dispenser machine **Fig. 19**. The V Conference, which is the place for customer service, and the Interactive screen, which is for the customer to inquire about the latest developments in the bank and the Internet. Banking and this space for a query
The customer can access his bank balance and everything that belongs to him, and it also contains waiting chairs for the customers' **Fig. 20**. and also contains Atm **Fig. 21.** like any normal digital bank branch. The Auto Bank is distinguished by its ease of access by any customer because it provides fast service.
There is currently only one Auto Bank in Egypt within the banking service, and it is affiliated with the National Bank of Egypt [3, 10].

Figure (19): Ticket dispenser

Figure (20): image illustrates the customer service area and waiting area in the bank [3]

Figure (21): Atm

5.2 Mobile bank

With this service, the user can perform some of the bank transactions via a mobile phone from home [13].

5.3 Digital mobile bank:

It's a near future plan in Egypt to develop digital banks and convert the banks spaces and areas into a digital mobile bank app in which the customers can do all the banking transactions virtually As if they are in the bank and that will decrease the cost of building areas of banks and the finishing and furnishing materials. The first digital mobile bank is expected to start working in the year 2024, banque misr is considered to be the first digital mobile bank to start working in Egypt. The digital mobile bank has been worked on it since 2020 and its license have been issued by the central bank of Egypt in August 2023 [14].

Results

1- The digital bank has fewer workers than the traditional bank. It is digitalized, so it saves extra labor and time and minimizes the error percentage as there are no human interventions through bank transactions.
2- The digital bank (unmanned branch) is smaller in area than the traditional bank branches. Its area ranges between 120 to 200 meters square. It constitutes approximately half the area of the traditional bank, with the same spaces and the same operations performed in the traditional bank.
3- The digital bank is less complicated in architectural design and less expensive in interior finishes. This is because the customer spends fewer hours waiting in the digital branches due to the fast speed of banking transactions inside it. The branch relies directly on lighting, colors, and guiding signs to direct the customer so the interior design of the digital bank needs to be very simple to make the customer easily guided through the paths and signs.
4- the traditional bank works 5 days per week while the digital bank works the whole week so it gives the customer extra working hours for their transactions.
5-The possibility of using electronic space as an alternative to some physical architectural spaces, and the possibility of reducing areas of some buildings after replacing some of their voids with electronic vacuum.

Conclusion

The importance of developing bank architecture by cyberspace technology (electronic space) to design new banks digitalized without any human interventions in the transaction process had a positive effect on the bank users and for that reason, the digital banks spread widely all over Egypt as they proved their effectiveness, and the banks organizations started to develop the traditional banks by adding the digital corners area to satisfy the customers' needs.

According to the above study and results, the study recommends the following

1- Consumeing the bank labors by developing the technology of linkage between the digital bank branches with the central building to be also automated by robots or machines .

2-developeing the digital bank mobile app to make the bank service 24 hours instead of 7 hours per day .
3-It is recommended to study the change in land use as a result of relying on cyberspace to perform the tasks of the bank activities.
4-The usage of new interactive materials in the digtal banks to facilatate the customers movement in the bank branch and their transactions.

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