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ARTIFICIAL INTELLIGENCE TO RETAIN AND TRANSFER KNOWLEDGE IN FOREIGN EXCHANGE TRADING TEAMS AS A FACTOR IN TRANSACTIONAL CONTINUITY IN THE BANKING SECTOR

Ziaulhaq Dhau E. Obeid[1], Dr. Hosain A. A. Aboaisha[2], Abdussalam Alahmer Arhiyem Saleh[3]

[1]College of Technical Science Bani Walid, Libya
[2]University of Gharyan, Libya
[3]College of Technical Science Bani Walid, Libya

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ABSTRACT

This paper addresses the problem of knowledge leakage in corporate banking. In the case of Libya, a high staff turnover of up to 51% and an annual 5% employee retirement rate are estimated for 2023. The problem is exacerbated in specialised operations areas such as foreign exchange since a lack of these can have serious consequences. Given this context, artificial intelligence is proposed; from now on, Artificial Intelligence (AI) is an alternative to preserve and transfer expert knowledge. The research consists of a theoretical review of knowledge transfer and the potential of AI. A methodology is proposed for implementing this tool that begins with a business diagnosis, followed by identifying critical knowledge in foreign exchange operations. A model is then developed for the delivery of knowledge to AI, followed by the definition of a knowledge transfer model that actively involves AI. The methodology includes the simulation of the operation of the tool through desktop tests and concludes with the estimation of the impact of implementing this tool. It is concluded that AI, through supervised learning algorithms and reinforcement learning with the inclusion of learning theories such as sociocultural and constructivism, can learn, transform, restructure, preserve and transfer knowledge to teach new members of an organization, having the impact of accelerating their learning curve.

Keywords: Artificial Intelligence, knowledge transfer, human learning theories, onboarding

Introduction

Artificial Intelligence (AI) is based on the imitation of the functioning of the human brain and the availability of information in a predefined context to solve needs in multiple fields of society and science. Its use in the private sector is becoming increasingly important as a pillar for optimizing processes. In this sense, its contribution to the conservation and transfer of knowledge is inferred to guarantee transactional continuity in the corporate banking sector [1].

AI represents the imitation by computers of the intelligence inherent to humans [2], it

allows machines to imitate human skills since they can analyse their environment and take actions, with a certain degree of autonomy to meet objectives.

In AI, there is "Weak" AI, referring to that focused on solving specific tasks, allowing the generation of applications such as IBM Watson and Amazon Alexa. An important subfield of weak AI is machine learning; from now on, automatic learning, in which there is a database with characteristics or inputs that are processed by a model to obtain a prediction, either numerical or programmed, for a limit of possibilities [3].

In Libya, staff turnover is estimated to be up to 15% by 2023 and 5% of annual retirements within organizations [4]. This staff attrition is expected to result in knowledge leakage, which represents a significant threat to their performance, competitiveness and business continuity, resulting in decreased added value, lack of innovation in the market and economic losses. Furthermore, the lack of an effective system to retain and transfer critical knowledge makes it difficult for new employees to quickly adapt, leading to a long and error-prone learning period.

The corporate banking sector focuses on the production of capital and its use, the deployment and concentration of money is one of the essential functions of banks. Therefore, the efficiency of the banking sector depends on different economic and financial factors for each country in which the bank has a presence, including the level of the economy, national savings, monetary system and policies, quality of the national currency, inflation rates and exchange rates [5].

Given these particularities, banks must strive to ensure that this capital production and circulation is in compliance with the basic principles of banking and with the regulations and policies specific to each country. This is why the areas of operations are so sensitive and key to meeting the banks' objectives.

Failures in the operation of foreign exchange in the corporate banking sector can have impacts such as fines for non-compliance, economic losses, damage to the bank's reputation and regulatory scrutiny.

In the face of these challenges, knowledge transfer in the onboarding process must be fast and efficient. AI's ability to extract key material from large volumes of information and to interact through natural language positions it as a viable and appropriate alternative to preserve and transfer expert knowledge [6].

With a focus on knowledge as a strategic resource and the support of AI, organizations can face the challenges of change and evolution, and strengthen their ability to innovate, grow and remain competitive in the market. In summary, AI is positioned as an innovative solution for corporate banking to transfer critical knowledge to new employees, mitigating knowledge leakage and accelerating the learning curve.

In this work, through a theoretical review, the key concepts in the transfer of knowledge, and human learning techniques are explored and the transformative potential of AI in the field of foreign exchange operations is evaluated. With this analysis, the development of a comprehensive methodology emerges that fuses the concepts studied to boost efficiency in the onboarding process of the foreign exchange operations area of the corporate banking sector.

The methodological process starts with a diagnosis, followed by the identification and selection of critical knowledge associated with foreign exchange operations. The standardization and delivery of this knowledge using S3 warehouses to an OpenAI API 1 enriched with human learning theories, consolidates the basis of the proposed model. The desktop tests carried out allow us to evaluate the potential impact of this methodology in terms of learning simulation

and response quality and then calculate its quantitative benefits in terms of effort release.

The key contribution of this study lies in the formulation of a model for the conservation and transfer of critical knowledge that, through an AI tool, ensures the continuity of transactions in the banking sector. The value generation of the use of this model focused on the optimization of the onboarding process through the release of man hours and the reduction of training costs is highlighted. This approach not only stands as a response to the current challenges of the sector but also positions financial institutions at the technological forefront, promoting innovation and organizational resilience in the face of staff turnover and knowledge leakage.

In this context, the formulation of this model is presented as a promising solution and its adoption is recommended by financial institutions whose economic and cultural context allows a holistic development of this solution. Based on the above discussion this work aimed to formulate a model for preserving and transferring critical knowledge of foreign exchange operations that, through an AI tool, guarantees the continuity of transactions in the corporate banking sector.

Methodological framework

1. Diagnosis

The implementation of AI for knowledge transfer in corporate banking requires a diagnosis of the company's status. To ensure the success of this initiative, it is necessary to evaluate the existence of strategies focused on knowledge management, the level of adoption of other technologies related to AI that indicate a level of maturity in innovation issues, and the financial muscle of the organization to implement and maintain an AI solution.

To collect information, the survey described in Table 1 is used as a qualitative method.

Part 1. Knowledge management strategies or initiatives		
1. Does the company have a formal knowledge management strategy or initiative?	Yes	No
If yes, continue to question 2, otherwise continue to question 5		
2. What are the objectives of this strategy or initiative?	Answer:	
3. What are the main components of this strategy or initiative?	Answer:	
4. What results have been obtained with this strategy or initiative?	Answer:	
Part 2. Adoption of AI-related technologies		
5. Does the company use other AI-related technologies?	Yes	No
If yes, continue to question 2, otherwise continue to question 5		
6. What are these technologies?	Answer:	
7. How are these technologies used?	Answer:	
8. What are the results obtained with these technologies?	Answer:	
Part 3. Financial muscle		

9. Is there a budget for the management of AI-related initiatives?	Yes	No
If yes, continue to question 10, otherwise end the interview form.		
10. How much is the budget available for AI solutions in the company?	Answer:	
11. What human and technical resources are dedicated to AI solutions in the company?	Answer:	

Interview template, this should be directed to executives and managers. The survey includes open and closed questions that allow for obtaining detailed information about the state of the company.

The three closed questions are aimed at defining whether the company has strategies in Knowledge Management, AI and the financial capacity for its implementation. These questions must have a positive result, otherwise the use of this solution is not recommended. As a next step, a robust qualitative analysis of the open questions must be carried out, inferring from the answers the possible viability and probability of success in the implementation of this AI tool.

Success in the three closed questions and the analysis of the open answers by the analyst is what will determine a positive diagnosis for the implementation of this AI tool in the conservation and transfer of knowledge for the company subject to this study.

2. Definition of critical knowledge associated with foreign exchange operations

After validating that the bank under analysis has the resources and specific strategic alignment to develop an AI model that can be implemented for the transfer of knowledge in an operational area, it must be defined what critical knowledge must be delivered to the tool to be trained.

The critical knowledge associated with foreign exchange operations in the corporate banking sector that was identified for this chapter is based on secondary and anonymized primary information; the latter is acquired from the researcher's work experience in the corporate banking sector.

2.1. Identify operations related to your position

The operator must first learn to execute all the operations that comprise his role.

2.2. Identify internal operating systems

These correspond to the applications in which the transactions carried out are recorded, processed and monitored. These seek to carry out automation, reengineering and optimizations to reduce time and control liquidity and risks.

2.3. Identify external platforms

These platforms are part of the daily operation of the banking sector. Their use is essential to carry out interbank transactions, operate local fixed income in pesos and dollars in an optimal manner, speculation, treasury operations and hedging.

2.4. Identify foreign exchange regulations

The regulations that govern the transactions of different countries are a basic pillar for operations. In Latin America, central banks are the entities in charge of formulating and executing monetary policy. The operator requires experience to understand and know when these can interfere with their operations, and failure to comply can result in fines.

2.5. Identify accounting and control needs

Accounting knowledge refers to recording money movements between internal and client accounts in operations within the

bank's internal applications, allowing transactions to be recorded correctly based on reliable financial information, ensuring compliance with tax obligations related to the transactions carried out and generating solid support for audits carried out at the banking institution.

2.6. Identify points of contact (knowledge directories)

Within a banking operations area, it is valuable for new team members to know and be able to easily identify the people with the most knowledge about particular types of financial products or experience in a certain country.

2.7. Identify transformation projects

Visibility on projects that may impact the processing of operations that this new member will execute must be prioritized since a change in an internal system that is not reported can generate errors in the operation.

The identified critical knowledge is adapted to a specific bank. Depending on the needs and context of the organization, the proposed methodology has the flexibility to incorporate or exclude knowledge as necessary.

3. Definition of the Model for delivering critical knowledge to the AI tool

To ensure that the AI receives this knowledge and processes it appropriately, it is necessary to define a conceptual model in which critical knowledge is collected and structured.

3.1. Collect knowledge from selected sources

As a first step, an expert operations agent must collect the main bases of explicit knowledge that he considers, among these are: exchange policies of Latin American countries; manuals of processes carried out in internal and external operations systems; courses on money laundering, fraud, accounting and internal risk management; global directory of the organization; project information and internal news.

3.2. Structuring the collected knowledge

Once the knowledge has been collected, it must be structured around key concepts and relationships between them. To do this, it is proposed to use a taxonomy5 that has up to 3 levels of hierarchy:

Parent concept: is the most general concept in the hierarchy. It represents the main category to which the concepts of the lower levels belong.

- Child concept: is a more specific concept than the parent concept. It represents a subcategory of the parent concept.
    - Subclassification: represents an even more specific category than the child concept.

With the established taxonomy, the applicable structure is defined for the case of foreign exchange operations in the corporate banking sector, taking into account the critical knowledge mentioned above. In this way, when a document is received, the parent concept, child concept and subclassification in which it is found must be classified. This is presented as an example in the following table:

Table 1. Taxonomy Applicable to the Foreign Exchange Operations Area of Corporate Banking.

I Operating Manuals
Process manuals in internal applications
Process manuals in internal applications by country
i. Instructions for internal applications
Process manuals in external applications

Process manuals in external applications by country
ii. Instructions for external applications
II. Exchange rate policy framework
Exchange rate policy by country
Exchange rate policy by financial product
Exchange rate policy by non-financial product
III. Internal courses
In-House Accounting Courses
Internal accounting courses in reconciliations
In-house risk management courses
Internal Money Laundering Courses
Internal Fraud Courses
Internal Hand Controls Courses
IV. Human component
Cultural component
Internal News by Country
Organizational values
Mission of the organization
Vision of the organization
Global Directory of the Organization
V. Project Management
Human talent component of projects by country
Project stakeholders by country
Roles of project stakeholders by country
Project requirements by country
Certificate of incorporation of the project by country
Involved project applications by country
Country project timeline

3.3. Categorize and label knowledge

The next step is to label knowledge appropriately. This means that each record must have a name and the following attributes: the name of the record, the year of application, the country, the name of the standardized process, and the learning priority, equal to the order defined in the taxonomy at the parent concept level.

Table 2. Knowledge labelling for the foreign exchange operations area of corporate banking.

Path: Applicable Taxonomy	Year	Country	Process Name	Priority
Registry Name				

As an example:

Table 3. Example of knowledge labelling for the auction process in Honduras.

I. Operational manuals -> b. Process manuals in external applications -> i. Manuals of Processes in External apps by country	Year	Country	Name of the process	Priority
Honduran Central Auction Bank Process Manual	2021	Honduras	Auctions	1

3.4. Delivering labelled knowledge to AI

Once the knowledge is structured and labelled, the information must be delivered to AI through a vector database so that the model can efficiently perform operations in the search for semantic text or the search for similarities in images, videos, or audio; and then interpret the results so that they are visible to a human.

For the delivery of individual files, it is proposed to upload them to an S3 Warehouse. If there are repositories, there is a flow that divides the loading work into different batches using AWS SQS, grouping several repositories, and each batch is processed to be uploaded to the S3 Warehouse. The comparison made to conclude on the use of this data warehouse is found in Annex.

3.5 Review of the type of AI and data warehouse.[7]

As a result, a process flow is defined as shown in Figure 1 with stages from uncategorized knowledge to knowledge delivery. With this model, each entry that is to be recorded in the knowledge base will follow this flow.

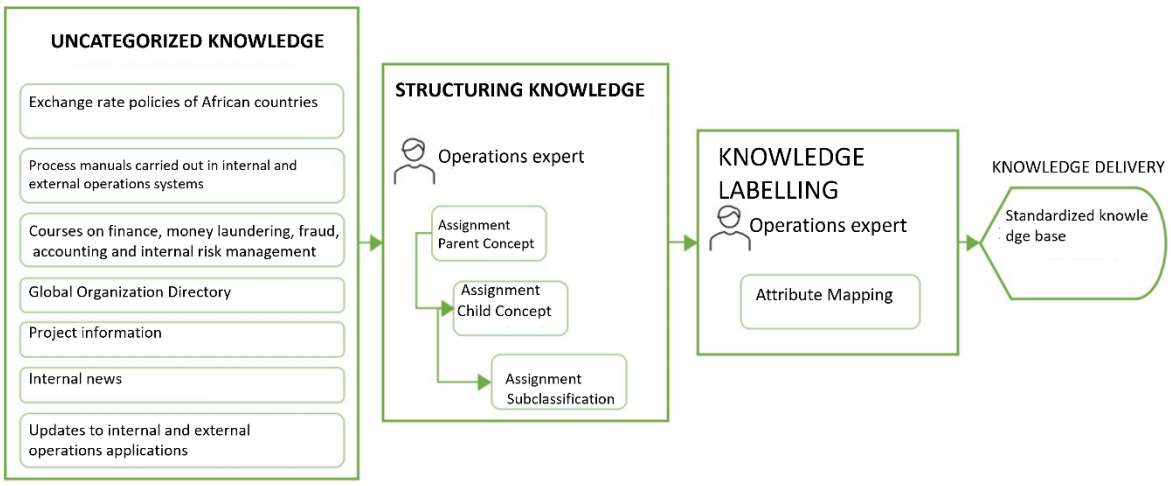

Figure 1: Structuring and delivery process of critical knowledge for foreign exchange operations in corporate banking.

4. Knowledge transfer model for currency operations in the banking sector using AI reinforced with learning theories

When studying GPT models, it is found that a suitable programming interface for the generation of this model is the OpenAI API given its functionalities in natural language processing and its ease of connection with the

S3 Warehouse. The comparison is made to conclude on the use of this API. Review [8] of AI type and data warehouse, the way GPT models learn emphasizes databases as training sources and the responses of the environment for the improvement and reinforcement of their responses and/or predictions, however, understanding data is not enough for the generation and transfer of knowledge, it is necessary to implement learning models that guarantee that the AI tool becomes an effective learning environment.

Table 4: Comparative GPT models

	Amazon Bedrock	OpenAI	Google Cloud Natural Language AI
Language Model	Large, flexible, but limited level of precision language model	GPT-4 follows complex instructions, understands natural language, and can produce coherent and relevant text	Natural language understanding (NLC) to its applications, such as syntactic, sentiment, entity, or entity opinion analysis and Content Rating
Extraction of entities	Customized, data can then be saved in a database	Custom but not explicitly including the feature must be programmed	It is not personalized, it cannot be extracted from one's domain
Data of training	Dataset and General Code	Dataset and General Code	Dataset and General Code
Model size	137B parameters	100B parameters	137B parameters
Cost	Pay-as-you-go	Pay-as-you-go	Pay-as-you-go
Database compatibility	Amazon Aurora Amazon DynamoDB Amazon Redshift Amazon S3	MySQL PostgreSQL MongoDB Cassandra Amazon S3	Cloud SQL Cloud Spanner Cloud Firestore BigQuery
Availability	In the Amazon Web Services (AWS) Cloud	Through OpenAI's API	In the Google Cloud Platform (GCP) cloud

	Amazon S3	Microsoft Azure Blob Storage	Google Cloud Storage
Scalability	Supports objects up to 5TB in size	Supports objects up to 5TB in size.	Supports objects up to 5TB in size.
Types of	· S3 Intelligent- Tiering (Minimum 30-day duration)	· Hot tier	· Standard

storage	S3 Standard -IA	Cool tier (Minimum duration of 30 days)	Nearline (Minimum duration of 30 days)
	S3 Express One Zone (Infrequent Access)	Cold tier (Minimum duration 90 days)	Coldline (Minimum duration 90 days)
	S3 One Zone- Infrequent Access (11 Nines Durability)	Archive tier (Minimum duration 180 days)	Archive (Minimum duration 365 days)
	S3 Glacier Instant Retrieval (Bulk Retrievals)		
	S3 Glacier Flexible Retrieval (archive accessed 1 or 2 times a year)		
	S3 Glacier Deep Archive (Minimum duration 180 days)		
Latency	Milliseconds to Hours for S3 Glacier Deep Archive	Milliseconds to hours for archive tier	Milliseconds
Versioning of objects	Yes	Yes	Yes
Charge by	From S3 Standard – AI in	No Charges by recovery	From Nearline onwards.
recovery	go ahead by GB recovered		
Price	Based on the amount of storage and data transfer	Based on the amount of storage and data transfer	Based on the amount of storage and data transfer
Integrations	AWS Services and OpenAI APIs	Integrations with other Microsoft Azure services	Integrations with other Google Cloud Platform services

The same comparison of technical characteristics is carried out for three existing data warehouses on the market, Amazon S3 (AWS, 2024b), Microsoft Azure Blob Storage (Microsoft, 2024) and Google Cloud Storage (Google, 2024), to evaluate whether there is one with particular integrations that benefit the solution proposed in this document.

It is proposed that AI participate in the training process of new employees and that, in turn, it is reinforced with learning theories such as constructivism and the sociocultural theory of learning so that it has an environment conducive to the transfer of knowledge.

4.1. Incorporating Constructivism Principles in AI

Taking into account the critical knowledge identified previously, there is an opportunity to make use of constructivism. Banking regulations, operating procedures, and the use of internal and external operating systems are concepts that change over time, so in the knowledge formation process, a restructuring of this knowledge occurs iteratively. People with more seniority in the area have a solid knowledge base by having

gone through this restructuring process multiple times. AI can replicate this behaviour by having historical knowledge within its training knowledge base.

In the knowledge formation process in AI, the input is the knowledge bases already standardized in the S3 Warehouse. AI also interacts with changes in processes informed by user interaction or the entry of new knowledge bases into the S3 Store, replicating the restructuring of knowledge proposed in constructivism. As a result, an AI training method is generated that generates new knowledge based on what is defined by constructivism.

4.2. Incorporating aspects of the sociocultural theory of learning in AI

By connecting the AI tool with the global employee directory and information on transformation projects, the new employee can connect with more experienced people. Also, by having contact with the internal news of the organization, mission and values of the organization, the employee can be trained in the cultural factors of the organization.

In this way, AI can provide the new operator with all the data and knowledge necessary for him to integrate into the cultural contexts of the company, in addition to generating a connection with the more experienced other.

AI can provide the new operator with data from the most experienced people and the cultural factors of the bank. This knowledge is input to the GPT model, but they are not exclusive to this medium since the operator can also acquire it naturally in his learning process. The sum of these factors gives rise to an inner psychological development that concludes in the formation of knowledge through cultural development.

As a result, it is expected that the AI tool can support a learning discovery model, but it is not the only way in which the new operator has contact with the factors that influence this social process.

4.3. Integrating learning theories with AI machine learning for knowledge transfer

By connecting the S3 Store to the OpenAI API that integrates human learning theories, it is ensured that the AI training component retrieves files from the S3 Store, uploads vectorized representations according to responses and iterates with users, and as a result, this model represents a suitable tool for knowledge preservation and transfer.

With a positive diagnosis for the use of this tool at the organizational level, a process for knowledge delivery is defined. This process ends with the delivery of a standardized knowledge base to the S3 Store. The OpenAI API integrates reinforcement and supervised learning and is complemented by constructivism and sociocultural learning theory. This results in new knowledge being delivered to the operator, generating the knowledge transfer model.

In the process of learning and preserving critical knowledge using AI, a set of standardized knowledge bases is delivered to the AI, the AI learns and preserves the explicit critical knowledge, after which the AI can teach new members of the organization and gain experience with user interaction.

At all times, an operations expert validates the knowledge held in the S3 Store, the knowledge that the AI has learned, the knowledge that the AI is transferring to new members, and whether they are learning what is necessary to perform their role with this tool. This validation is crucial to ensure that critical knowledge is transmitted accurately and effectively.

5. Emulation

Given the technological limitations of developing an AI model that implements learning theories, desktop tests are carried out to validate the operation of the critical

knowledge delivery model to the AI tool and the knowledge transfer model.

5.1. Emulate change in an operational process

A process manual located in the knowledge base is documented with the following attributes:

Table 5. Delivery of knowledge to the AI tool on the investment process in the central bank for the year 2022

I. Operating manuals -> a. Process manuals in internal applications -> i. Process manuals in internal applications by country	Year	Country	Name of the process	Priority
Manual of the process of movement of funds for investment in the central bank in Honduras	2020	Honduras	Investment	1

In this process, companies decide to make an investment in the Central Bank of Honduras. For this operation to become effective, the company contacts the bank's treasury area and requests that the money be withdrawn from its internal bank account and that it be deposited in its central bank account.

Once the treasury area receives this instruction, it sends an email to the operational area of Honduras requesting the movement of funds between the aforementioned accounts. The operational area proceeds to manually generate this movement through a message called Funds Transfer (FT) and to make the accounting entry in an internal application of the bank.

To reduce liquidity risks, a project was executed to automate this process. Now the treasury sends this instruction through an internal application, which, based on the instruction received, automatically completes the FT and the accounting entry in the respective application. Now the intervention of the operational area is limited to specific maintenance or to verify in case of an unsuccessful operation.

Given this automation, the new process manual is entered into the knowledge base with the following attributes:

Table 6. Delivery of knowledge to the AI tool about the investment process in the central bank for the year 2022.

I. Operating manuals -> a. Process manuals in internal applications -> i. Process manuals in applications Internally by country	Year	Country	Name of the process	Priority
Manual of the process of movement of funds for investment in the central bank in Libya	2022	Libya	Investment	1

After that, a new operator receives a notification reporting an error in a fund movement for this process along with the instruction to do it manually. The new operator decides to use the AI tool and asks how to carry out this fund movement.

The AI is trained with the entire knowledge base including the two versions of the process manual through supervised

learning. In turn, using constructivism, a restructuring of knowledge occurs given the changes in the process.

Figure 2 shows how the AI response evolves. The AI acquires knowledge of the process by having a history of how it has been processed. In addition, through the positive feedback it receives from the environment through reinforcement learning, the AI improves the quality of its response.

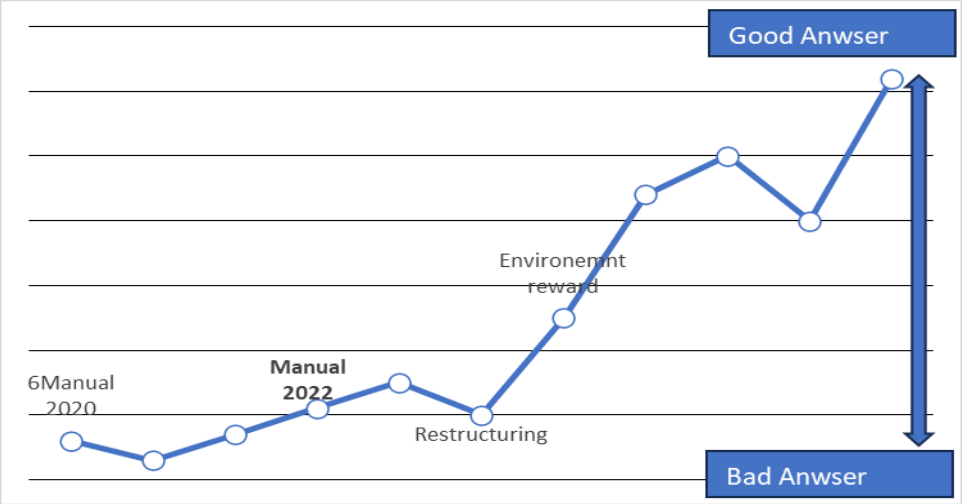

Figure 2: Simulation of AI learning.

5.2. Emulating contact point search in another area

Continuing with the same example, the operator performed the manual process due to the failure in the

application and doubted a fixed field of the FT message that he had to fill out. He asked the AI about someone with knowledge of this application since he wanted to ask questions aimed at the possibility of leaving this field fixed and giving rise to a tactical improvement in the manual process.

In doing so, the AI used the existing knowledge base and made use of what was found in the following documents:

Table 7. Knowledge bases used by the AI in this case.

Taxonomy	Registry Name	Year	Country	Process Name	Priority
IV. Human component -> a. Component cultural -> v. Board of Directors Global of The organization	Global Directory Latest Version	2023	All	N/A	4
V. Project Management -> to. The human component of projects by country -> ii. Roles of the stakeholders of the Country Project	Stakeholder Roles of the Investment Process Automation Project Honduras	2021	Honduras	Investment and divestment	5
V. Project Management -> b. Project requirements by country -> i. Certificate of incorporation of the project by country	Memorandum of incorporation of the project to automate the investment process in Honduras	2021	Honduras	Investment and divestment	5

When the AI carried out its learning process, it gave the operator a series of contacts within the organization who were part of the technology team with the specific application and who in turn worked on the automation of this process. By fostering the connection with another more experienced person, AI supports inter-psychological development and supports the new operator to learn through social factors using the sociocultural theory of learning.

AI learns about each response it generates and is reinforced by the reward of the environment. In these scenarios, AI can respond to the user's query and refer to the more expert if the operator so wishes. If in a particular case, AI does not have the necessary information or experience to make a decision, it can consult with an expert person, learn from their response and use it to improve its knowledge and performance in the future.

As a result of both simulations, it is found that AI acts as a mediator between the operator and critical knowledge within the organization, facilitates inter-psychological learning, simulates the restructuring of knowledge and improves its performance through feedback from the environment. In short, it represents an opportunity for the conservation and transfer of knowledge in the banking sector for foreign exchange operations in the onboarding process.

6. RESULTS

In the present study, after a rigorous analysis of concepts in knowledge transfer, AI and human learning theories applied to the context of corporate banking, a methodological framework is created that illustrates as a first deliverable the definition of critical knowledge in the area of foreign exchange categorized by operations assigned to the position, identification of internal and external application systems, exchange regulations, accounting, knowledge directories and transformation projects.

Continuing with the methodology, as a second deliverable, there is a model for delivering critical knowledge to the AI tool that goes from unstructured knowledge to the delivery of knowledge bases structured using taxonomy and attributes.

After an analysis of the needs of the proposed case, GPT models are defined as the best type of AI to use, along with the choice of the OpenAI API and the Amazon S3 data warehouse as reference tools to define a knowledge transfer model complemented with human learning theories, a model that represents the third deliverable of the document integration of learning theories and learning models of GPT models for knowledge transfer in the corporate banking sector in foreign exchange operations.

The proposed knowledge conservation and transfer model, its use is emulated through a case study associated with the auction process in Honduras, where it is explored how constructivism can contribute in the event of a change in a process and the contribution of the sociocultural theory of learning in the connection with more experienced people referring to the fourth deliverable.

By implementing a tool with the proposed methodology, a saving in man hours is estimated because a more efficient onboarding process is generated. Given the limitation of developing an AI tool for knowledge transfer, the information found in the literature is used to estimate a percentage of savings in the use of this tool and a combination of qualitative and quantitative methods is used to estimate the cost of labor for this on-boarding process. The qualitative information was obtained through an interview with a product manager within the foreign exchange operations area in Colombia of a mature company in the financial sector, where the following indicators were recorded:

- Reprocessing time caused by inexperience in the first 6 months of the apprenticeship.
- Training time with a more experienced analyst: 2 hours a day for 2 months.
- Evaluation time with the supervisor: 1 hour per week for 2 months.
- Time for corporate courses: 2 weeks.
- Time for reading process manuals: 2 days, with 12 manuals.

Quantitative information is estimated with a labour cost equation derived from accepted engineering principles and based on the author's professional experience and informal validation with different actors in the banking sector:

$Labor\ cost\ =\ 1\ hr * s$ (Eq.1)

Equation 1. Generic estimate of labour cost. Where:

- Ihr = Hourly intensity, man-hours
- s = Salary

Taking into account the participation of the operator, analyst and supervisor within this process, these actors are included in the estimation of labour cost.

$Labor\ cost\ =\ Ihr * s_{Operator} + Ihr * s_{Analyst} + Ihr * s_{Supervisor}$ (Eq.2)

Equation 2 Calculation of labour cost in an onboarding process.

The calculation of man-hours for each actor is presented in Table 8. Calculation of hourly intensity, resulting in an equation for calculating labour cost in this process.

Labor cost = 261.3 * $s_{Operator}$ + 119.3 * $s_{Analyst}$ + 45.9 * $s_{Supervisor}$ (Eq.3)

Equation 3 Calculation of the total cost of an onboarding process with hourly intensity.

Table 8. Parameters for Time Calculation

Hours per day	8
Weekdays	5
Days Month	21

Based on these parameters, the hourly intensity of the activities related to onboarding is calculated:

Table 9. Intensity of hours in onboarding.

	Supervisory Time (Hr)	Analyst Time (Hr)	Operating time (Hr)
Training with an analyst		84	84
Evaluation with Supervisor	42		42
Corporate courses			80
Manual reading			16
Total Hours	42	84	222
Total Months	0.25	0.50	1.32

According to the calculation made, the onboarding process for an operator takes 1.32 months and it is estimated that of the remaining time to be fully productive at least 5% will be invested in making consultations, mostly to the analyst and in exceptional cases to the supervisor.

Table 10. Hourly intensity in the learning curve

Learning Curve			
	Supervisory Time (Hr)	Analyst Time (Hr)	Operating time (Hr)
Queries and doubts	3.9312	35.3808	39.312

Table 11. Total hourly intensity.

	Hours	Months
Supervisory Time	45.93	0.27
Analyst Time	119.38	0.71
Operator time	261.31	1.56

A study developed by Deloitte found a saving in the release of effort when using Artificial Intelligence tools of between 25% and 40% on average estimated (Deloitte, 2020), in addition, in a study by McKinsey Global Institute, an increase in the economic impact is estimated between 35% and 70% related to the increase in productivity in workers thanks to AI solutions [9].

The proposed savings for this case is 30% of the hourly intensity of the analyst and supervisor roles by having a tool that gives greater autonomy to the new operator. A saving of 25% of the operator's hourly intensity is also proposed by having faster and more effective learning.

Labor cost AI = 195.9 * $s_{Operator}$ + 83.5 * $s_{Analyst}$ + 32.1 * $s_{Supervisor}$ (Eq.4)

Equation 4. Calculation of the total cost of an onboarding process with hourly intensity using an AI model.

The labour savings when using this tool with the proposed methodology depend on the salary of the different roles and the number of new operators entering the foreign exchange operations area.

It is important to note that actual savings may also vary depending on the specific conditions of each organization, however, the use of the proposed methodology to implement an AI tool in knowledge retention and transfer demonstrates great potential to reduce the costs of the on-boarding process and improve its efficiency.

7. DISCUSSION

The findings of this study demonstrate the potential of AI to mitigate knowledge loss in the corporate banking sector.

Incorporating constructivist and sociocultural learning approaches into the model design facilitates contextualized and meaningful knowledge transfer for the new operator. Likewise, AI's supervised and reinforcement learning ensures the capture of explicit knowledge and the acquisition of experience through feedback.

By implementing an AI model oriented to the conservation and transfer of knowledge in the area of foreign exchange operations, a more effective onboarding process is achieved, reducing training times for the operator, analyst and supervisor. This reduction is specifically because the tool:

1. Provides personalized training to the new operator, reducing the time needed to acquire the critical knowledge associated with his role.
2. Makes the learning of the new operator independent by providing him with points of contact and specific questions for each procedure, freeing up time for the expert analyst.

3. Evaluate the knowledge acquired by the operator, freeing up time for the supervisor.
4. Evaluate and provide progress in the operator and AI learning curve, the growth of AI will initially be proportional to that of the new operators.

The savings of this process are estimated at 114 man-hours per new operator to be trained, this calculation is based on a conservative scenario and based on data found in the literature, the annual economic benefit of this tool depends on the salaries of each role and the number of new operators for the area, with this data the benefit is calculated using equation 3 and Equation 4.

This estimate has limitations given the lack of knowledge bases to train a model and the development of the tool, this study should be considered directional and not precise, given the nature of the technology and the uncertainty involved in the development of an AI tool.

8 CONCLUSION

In this study, concepts in knowledge management and AI were explored, leading to the development of a comprehensive methodology. This methodology began with a diagnosis of the organization, followed by the identification and selection of critical knowledge associated with the area of foreign exchange operations. Subsequently, a process was defined for the standardization and delivery of this knowledge to an AI tool through an S3 Warehouse. The choice of the OpenAI API as an AI engine was based on the complementation of theories of human learning, in this case, constructivism and sociocultural learning theory.

Desktop tests were carried out and the potential impact in terms of effort release was evaluated. Consequently, a solid model is formulated for the conservation and transfer of critical knowledge of foreign exchange operations that, through an AI tool, guarantees the continuity of transactions in the banking sector.

The value generation of this model focuses on the optimization of the onboarding process, freeing up man hours that can be reinvested in value-generating activities. In addition, additional benefits are generated, such as reduced training costs and the availability of an additional support tool for experienced operators.

Developing an AI prototype represents a promising solution for corporate banks to protect their intellectual and human capital, increasing their organizational resilience against staff turnover. Its adoption is recommended for financial institutions that have analytical resources and a managerial commitment to innovation. This approach not only drives operational efficiency but also positions organizations at the forefront of technological innovation in the competitive financial sector.

Suggestions for future research

1. Development of a method to assess the completeness of explicit knowledge about the knowledge to be transmitted.
2. Comparative analysis of different knowledge encoding formats to determine whether the knowledge is truly explicit.
3. Development of a learning model for AI training in complex social factors in organizations.
4. Development of an AI model for the delivery of organizational knowledge.

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