

1) Given that insurance penetration in emerging markets in Africa is approximately 3%, they lag behind the global average of 7.2%, causing vulnerability in high-risk, low-infrastructure environments. Analyzing the insurance industry in emerging markets reveals four inefficiencies that reduce penetration. These are inaccurate pricing, slow claims processing, fraud exposure, and fragmented workflows.

Inaccurate Pricing: Insurers in emerging markets use demographic data (such as age, vehicle type, etc.) for calculating premiums. This is due to limited access to real-time behavioral data, which would be more accurate in premium pricing (Kene-Okafor, 2023). Due to a lack of telematics and data integration within Saudi Arabia, auto insurers base premiums on driver age or car model, ignoring reputable driving metrics. This causes inaccurate premiums, which are unaffordable for low-income drivers and underpriced for high-risk ones, reducing penetration and profitability.

Slow Claims Processing: Analysis of Egypt’s healthcare insurance sector revealed month-long delays in claim reimbursements because of poor authentication. Industry surveys revealed that insurers depend on physical inspections due to limited automation and poor stakeholder coordination. This inefficiency is derived from underinvestment in technology and dependence on outdated workflows, eroding policyholder trust and delaying aid which reduces insurance uptake.

Fraud Exposure: Fraud prevention studies express that manual claims processing increases exposure to risks such as fake medical bills in Saudi Arabia that inevitably cost up to 20% in premiums (Kene-Okafor, 2023; McKinsey & Company, 2022). Due to inefficient technology systems in these markets, public trust is undermined, and therefore, penetration is low.

Fragmented Workflows: Nearly 64% of property and casualty insurers have issues in African and Middle Eastern markets due to legacy systems, worsened by siloed data management. Deloitte’s analysis proves that low funding for efforts to bring siloed data together causes data access delays (Deloitte, 2022). Stakeholder interviews reveal that fragmented systems come from gradual, uncoordinated technology adoption, reducing scalability in emerging markets.

Summary Table:

Issue	Description	Impact
Inaccurate Pricing	Using demographic data instead of behavioral data.	Inaccurate premiums make plans worse for the insurer and the insured.
Slow Claims Processing	Manual workflows and poor automation in claims handling.	Delayed reimbursements reduces trust and insurance penetration
Fraud Exposure	Weak detection of fraud because of manual oversight.	More losses, expensive premiums, and bad confidence.
Fragmented Workflows	Legacy systems and siloed data harm efficiency.	Less scalability and further slowed claims processing.

Conclusion: Shown in the table, these inefficiencies are serious in emerging markets, so they are important to address. They infer that tech solutions, which are explored more in question 2, are needed for the success of insurance.

2) Large Language Models (LLMs) can be implemented into Curacel’s product suite to address

the shortcomings previously described. We used a SWOT analysis that presented the LLMs Mistral 7B and BlockGPT as optimal for increasing insurance penetration (Gao et al., 2024). **SWOT Analysis Insights:** Mistral 7B’s strengths are its local deployment and customizable Supervised Fine-Tuning (SFT) to process unstructured data. A weakness is its complicated setup, however, that can be combatted by Machine Learning Operations (MLOps) expertise (HuggingFace, 2024). Its opportunity is telematics integration, and the threat is potential regulatory shifts that might reduce scalability. BlockGPT’s strengths are blockchain-based fraud detection and Application Programming Interface (API) orchestration. Its complicated setup is ignored because of system compatibility (Gao et al., 2024; IBM, 2024). Its biggest opportunity is Internet of Things (IoT) integration, and the threat of complex integration is handled by its compatible design.

Model	Strengths	Weaknesses	Opportunities	Threats
Mistral 7B	Local setup; SFT for raw data	Complex setup; needs MLOps	Telematics integration	Regulatory shifts
BlockGPT	Blockchain fraud checks; API orchestration	Integration complexity	IoT-based automation	Legacy system incompatibility

Integration Process and Solutions:

1. **Inaccurate Pricing:** Deploy Mistral 7B on Curacel’s infrastructure, fine-tuning it to process telematics data from OBD-II sensors. This will impact Curacel’s car insurance products specifically, assessing driving patterns to do risk assessments for calculating premiums.
2. **Slow Claims Processing:** In medical insurance, Mistral 7B can process unstructured medical reports. This can automate verification (using BlockGPT) to reduce delays.
3. **Fraud Exposure:** BlockGPT’s blockchain, using smart contracts and multi-oracle consensus systems, can compare claims with trusted data sources to prevent fraud (Gao et al., 2024).
4. **Fragmented Workflows:** BlockGPT’s API orchestration can combine IoT feeds and legacy systems on a unified platform. This centralizes data access, making scalability possible (Deloitte, 2022).

Conclusion: Using Mistral 7B and BlockGPT, paired with telematics and IoT streams, builds a backend and products that can adapt with scale and address the inefficiencies (IBM, 2024).

3)

AI Governance Frameworks

Saudi Arabia

The Saudi Data and Artificial Intelligence Authority (SDAIA) set AI Ethics Principles. They did this because of Saudi’s Vision 2030, a program that focuses on diversifying the economy using artificial intelligence, which in turn, requires proper restrictions. The draft Global AI Hub Law has stricter enforcement (CMS LawNow, 2025). To deploy an AI-powered fraud detection model, Curacel needs to register with SDAIA, have algorithm audits, provide technical documentation, explain outputs, and initiate risk controls. This slows processes and initial setup which will delay Curacel’s establishment in Saudi Arabian markets.

Egypt

Egypt encourages responsibility through its National AI Strategy (2019) and the Egyptian Charter for Responsible AI (2023) (Digital Nemko, 2025). These aren't laws, but Egypt does have a draft AI law, signaling a stricter future for AI use (Masaar, 2025). Curacel must design their AI systems to be explainable and fair in anticipation of future classification requirements.

Data Protection Laws

Saudi Arabia

The Personal Data Protection Law (PDPL) (Royal Decree M/19 of 2021) has extraterritorial reach and requires data localization (DLA Piper, 2025). All insurance-related personal data must be stored inside Saudi Arabia unless anonymized beyond recovery. To comply, Curacel can either store data locally using infrastructure such as Amazon Web Services (AWS) Middle East or anonymize data using techniques like k-anonymity or differential privacy. Non-compliance to these regulations could result in fines up to \$1.3 million, increasing legal and operational risk for remote data processing (ICLG, 2024).

Egypt

Egypt's PDPL (Law No. 151 of 2020) makes Curacel get user consent before using data, have Data Protection Officer (DPO) approval, and limit data transfers to countries with bad data protection (PwC Middle East, 2025). Therefore, Curacel must integrate complex consent management systems and maintain detailed user permission records. Data exports require Standard Contractual Clauses (SCCs) or approval from Egypt's Data Protection Center (Library of Congress, 2025).

Digital Infrastructure Regulations

Saudi Arabia

The National Cybersecurity Authority (NCA) will monitor cloud providers, making sure that they follow the Telecommunications Act of 2022 and Essential Cybersecurity Controls. Both require proper security measures in data handling (CST, 2022). Bodies such as the Egyptian Ministry of Communications and Information Technology (MCIT), will keep infrastructure integrity in check (ICLG, 2025). Any cloud infrastructure must pass cybersecurity audits and meet technical requirements. This affects platform design, especially if the company uses third-party LLMs or microservices across regions.

Egypt

The Digital Egypt initiative enforces security standards under Law No. 10 of 2003 (MCIT, 2025). Egypt invests in infrastructure modernization but expects local operators to secure user-facing platforms. Curacel must strengthen its backend systems for regulatory alignment on data encryption and network transparency.

Conclusion: Curacel faces challenges aligning AI with non-binding ethics principles, adhering to cloud/cybersecurity standards and meeting PDPL's data localization and extraterritorial requirements in Saudi Arabia. Additionally, in Egypt, managing PDPL's transfer/consent protocols, complying with digital transformation regulations and navigating AI law uncertainty, present various challenges.

4) We believe that Curacel should not proceed with expansion into any markets, and instead focus on LLM integration and development in current markets (Question 6). However, if Curacel were to expand, then Saudi Arabia and Egypt are the best options because of their growth

potential in the insurtech sector as outlined by the Vision 2030 in Saudi Arabia and Egypt’s Digital Egypt initiative. Using the following plan, Curacel will be able to expand into these markets as efficiently and safely as possible.

Step-by-Step Plan

1. Work With Local Legal Experts For Compliance

- **Action:** Contract legal and compliance professionals specializing in Saudi Arabian and Egyptian regulations for ongoing support throughout the expansion (see Question 5 for partners and methods to establish partnerships).
- **Details:** In Saudi Arabia, find experts that are familiar with their PDPL, AI Ethics Principles, and the draft Global AI Hub Law (Lexology, 2024; CMS LawNow, 2025). In Egypt, they should know their PDPL, the Egyptian Charter for Responsible AI, and the draft AI law (TSIP Compass, 2025; Masaar, 2025). These connections can help Curacel navigate new laws (OECD, 2025). Experts can also validate anonymization strategies to ensure compliance with PDPL exemptions.

2. Conduct a Regulatory Gap Analysis

- **Action:** Use the ISO 27001 framework (internationally recognized standard for information security management systems) to determine the “gaps” that Curacel needs to address for complete compliance with data protection, AI governance, and digital infrastructure laws in both countries.
- **Details:** In Saudi Arabia, Curacel should focus on data localization, AI ethics alignment, and NCA standards. For Egypt, focus on consent management, draft AI law implications, digital infrastructure regulations (PwC Middle East, 2025; MCIT, 2025) and use compliance software (e.g., OneTrust) to rank gaps by risk and complexity.

3. Develop an Integrated Compliance Framework

- **Action:** Create a flexible compliance framework integrating data protection, AI ethics, digital infrastructure requirements, and regulatory monitoring.
- **Details:** For Saudi Arabia, include plans for anonymization and localization, AI alignment with SDAIA principles, and NCA cybersecurity controls (CST, 2022). For Egypt, address consent protocols and preparation for AI legislation (STIP Compass, 2025). Incorporate regulatory monitoring via subscriptions to SDAIA and Egypt’s National Council for AI updates, eliminating redundant monitoring steps (Masaar, 2025). Quarterly audits can ensure ongoing compliance.

4. Implement a Sequential Fallback Data Protection Strategy

- **Action:** Assess data anonymization feasibility first, using irreversible techniques; if insufficient, establish local data centers for legal compliance.
- **Details:**
 - **Priority: Anonymization Analysis**—Use k-anonymity, l-diversity, or differential privacy to anonymize insurance data (e.g., claim amounts, policy types), not allowing for re-identification. Implement using tools that are validated by third-party audits to confirm compliance with PDPL exemptions. If anonymization meets regulatory standards, process data externally to reduce localization needs.
 - **Fallback: Local Data Centers**—If anonymization fails legally or feasibly, use cloud providers like AWS Middle East in Saudi Arabia or establish owned data centers. Develop a consent management system for

Egypt, ensuring explicit consent, with encryption and access controls for both countries to avoid fines. (ICLG, 2024; Library of Congress, 2025).

5. **Establish Cross-Border Data Transfer Mechanisms (If Local Data Centers Are Used)**

- **Action:** Develop SCCs or Binding Corporate Rules (BCRs) for legally compliant data transfers when anonymization is not feasible (local data centers would be used for storage, but third party processors would be used for advanced processes, requiring proper cross-border transfer mechanisms).
- **Details:** Ensure compliance with Saudi Arabia and Egypt's PDPL requirements for cross-border transfers. Legal experts can validate clauses in SCCs to protect the data. They should be updated regularly to align with regulatory changes, such as with the entry of Egypt's draft AI law (Masaar, 2025; CMS LawNow, 2025). This addresses the gap in transfer mechanisms when anonymization is not possible, lowering risks during data transfers.

6. **Align AI Systems with Ethical Guidelines (The Split Converges at This Step)**

- **Action:** Ensure that all AI systems are transparent, fair, and secure while adhering to the SDAIA's AI Ethics Principles and Egypt's Charter.
- **Details:** Use bias detection tools to maintain ethics and prepare for future regulations. Having AI audits will maintain compliance and build trust.

7. **Ensure Digital Infrastructure Compliance with Cost Analysis**

- **Action:** Comply with NCA regulations, supported by a cost-benefit analysis of cybersecurity implementation.
- **Details:** In Saudi Arabia, follow NCA's Essential Cybersecurity Controls using cost-effective tools like AWS Shield (CST, 2022; CyberArrow, 2024). In Egypt, align with the Digital Egypt initiative.

8. **Create Contingency Plans for Regulatory Delays**

- **Action:** Create contingency plans for delays in regulatory clarity in case approval processes take longer than expected.
- **Details:** Build flexible systems that can be updated when regulatory rules change, and set a budget for making those updates. This allows Curacel to plan ahead for regulatory shifts (Masaar, 2025).

9. **Train Staff and Engage Stakeholders**

- **Action:** Educate employees on regulations and keep contacts with partners like local insurance companies and consumers.
- **Details:** Train them on PDPL, AI ethics, and digital infrastructure compliance, hiring local talent to enhance capabilities (ICLG, 2024). Engage stakeholders through partnerships with insurers and industry forums, helping Curacel during expansion (Question 5).

10. **Initiate Phased Market Entry**

- **Action:** Launch pilot projects to test compliance and operational feasibility.
- **Details:** Start with a small range of Curacel's product suite, using observations to improve anonymization and compliance before fully entering the markets.

Conclusion: Using this plan allows Curacel to be completely compliant with AI governance, data protection, and digital infrastructure regulations in Egypt and Saudi Arabia. This will allow them to make the most of market opportunities while being operationally efficient.

5) If Curacel were to expand into Saudi Arabia and Egypt, they would need local partnerships to help them abide by the regulatory frameworks and to scale effectively. We have identified five potential partners in each region, each of which enhance Curacel's go-to-market execution and compliance readiness by using local expertise and making sure that Curacel aligns with Saudi Arabia and Egypt's PDPL, while supporting the integration of our LLMs (Question 2).

Saudi Arabia

1. Tawuniya

- **Description + Feasibility:** As one of Saudi Arabia's leading insurers, Tawuniya's extensive customer base in health and auto insurance allows Curacel's products to have enhanced market penetration. Tawuniya's compliance expertise with PDPL reduces regulatory risks, and its digital infrastructure supports BlockGPT's fraud detection. High integration and partnership costs are a challenge, but they can be addressed with a revenue-sharing model.
- **How to Establish:** Contact them through industry forums like InsureTech Connect Middle East, pitching Curacel's capabilities to their innovation team. Do a pilot project using Mistral 7B, which should be adjusted to operate with Tawuniya's standards, for claims automation with Tawuniya's customer data. The partnership can be validated with a joint venture agreement, ensuring mutual benefits and compliance (The Arabian Mirror, 2025).

2. Bupa Arabia

- **Description + Feasibility:** Serving over 4 million health insurance customers, Bupa Arabia has a lot of regulatory expertise. A partnership can increase compliance with health insurance requirements (Atlas Magazine, 2023). Scalability depends on the compatibility of IT systems, and delays will be reduced because of Bupa's digital focus.
- **How to Establish:** Engage through Saudi Vision 2030 events, presenting Curacel's AI solutions for claims efficiency. Negotiate a co-development agreement to integrate Mistral 7B and BlockGPT, starting with a test phase for health claims. The partnership can be sealed with a Memorandum of Understanding (MoU) that is clear about protocols for sharing data (Atlas Magazine, 2023).

3. Saudi Company for Artificial Intelligence (SCAI)

- **Description + Feasibility:** SCAI comes up with AI solutions for financial services. Their AI models are able to process telematics data. Their AI models can be integrated in Curacel's claims processing, supporting Mistral 7B in providing processed data for analysis (SCAI, 2025). Sensors, for the data itself, could be purchased or gotten through a partnership between a provider and SCAI (because of SCAI's local presence). The complexity of AI integration does require MLOps expertise which can be handled by the next partnership (King Abdulaziz University).
- **How to Establish:** Approach SCAI through SDAIA's AI summits, proposing a partnership to enhance Curacel's AI stack. Co-develop a module integrating SCAI's analytics with Mistral 7B, piloting with auto insurance data. Formalize with a technology transfer agreement (SCAI, 2025).

4. King Abdulaziz University (KAU)

- **Description + Feasibility:** KAU, a top AI research institution, supplies graduates skilled in MLOps, ideal for fine-tuning Mistral 7B and BlockGPT to address fragmented workflows in Saudi Arabian markets (EduRank, 2025). Talent from KAU can also assist integration between Curacel and SCAI, as mentioned before. Its Vision 2030 alignment ensures market-relevant expertise, but there is competition requiring fair, but competitive salaries.
 - **How to Establish:** Partner with KAU’s career services through job fairs, offering internships for AI students to work on Curacel’s projects. Create a research program to develop and work with Curacel’s AI models. This creates a way to get long-term hiring in the future.
5. **Saudi Data and Artificial Intelligence Authority (SDAIA)**
- **Feasibility:** SDAIA has a lot of regulatory power in Saudi Arabia. So having a partnership with them will help Curacel adjust their AI solutions to meet PDPL standards (Lexology, 2024). The SDAIA’s National Data Bank facilitates secure data sharing. It should be noted, however, that bureaucratic delays require proactive engagement.
 - **How to Establish:** Engage SDAIA through its regulatory workshops, submitting Curacel’s AI framework for review. Join SDAIA’s AI adoption program, securing compliance certification through ongoing consultations.

Egypt

1. Misr Insurance Company

- **Feasibility:** Misr Insurance is Egypt’s leading general insurer. They can offer market insights and customer access, accelerating Curacel’s market penetration. Its FRA compliance expertise can help avoid any potential fines, though legacy system integration requires phased implementation.
- **How to Establish:** Contact Misr via Egypt’s Insurance Federation events, proposing a pilot for AI-driven claims processing. Negotiate a strategic alliance agreement, leveraging Misr’s distribution channels for market entry.

2. AXA Egypt Insurance

- **Feasibility:** AXA Egypt is an insurance provider with global expertise and local presence (GlobalData, 2022). Its digital infrastructure aids fraud detection which can be paired with BlockGPT’s workflow unification. Although system alignment may cause delays, it's lessened by their tech capabilities.
- **How to Establish:** Approach AXA Egypt through Cairo-based fintech summits, pitching Curacel’s AI solutions. Curacel’s partnership with AXA Mansard can also make establishing this partnership easier (Curacel, 2025). Co-develop a claims automation module, formalizing with an MoU specifying integration timelines (GlobalData, 2022).

3. Crowd Analyzer

- **Feasibility:** Specializing in Arabic-language analytics, Crowd Analyzer enhances pricing accuracy with a sentiment analysis of Curacel’s product suite. Limited insurance experience requires Curacel’s domain input, but it can provide public opinions for optimal changes.
- **How to Establish:** Connect via StartupList Africa events, proposing a data analytics partnership. Develop a joint AI module, securing a licensing agreement for seamless integration.

4. Cairo University

- **Feasibility:** Cairo University’s AI graduates support BlockGPT’s API orchestration, addressing fragmented workflows (EduRank, 2025). Competition from startups requires robust recruitment strategies.
- **How to Establish:** Engage Cairo University’s AI department through academic conferences, offering scholarships for students to work on Curacel’s AI projects. Similar to KAU, this creates a talent pipeline to get long-term employees (EduRank, 2025).

5. Financial Regulatory Authority (FRA)

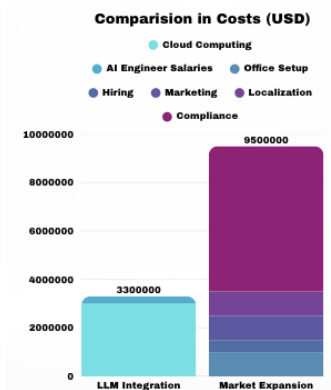
- **Feasibility:** Using the FRA’s guidance, Curacel can maintain compliance with Egypt’s PDPL while allowing Mistral 7B to be deployed (PwC Middle East, 2025). Slow regulatory processes are mitigated by proactive engagement.
- **How to Establish:** Attend FRA’s compliance workshops, submitting Curacel’s AI plans for review. Join FRA’s regulatory sandbox, securing compliance via ongoing consultations (PwC Middle East, 2025).

6) Curacel must choose between integrating LLMs like Mistral 7B and BlockGPT into existing markets (Saudi Arabia or Egypt) or expanding into new ones with higher regulatory costs. To determine the strategy that is in the best interests of Curacel, we used industry reports and financial modeling that evaluated implementation costs, efficiency gains, revenue potential, risk, and return on investment (ROI). Thus, our decision to invest in LLM integration in existing markets, rather than expanding, fulfills Curacel’s goals while building on AI-driven solutions (Question 2) to address inefficiencies (Question 1).

Implementation Costs

Existing Markets: Integrating LLMs into existing markets uses existing infrastructure, costing \$3 million for cloud computing (e.g., \$2.67 for 15M tokens on an A100 GPU for Mistral 7B), fine-tuning, and training AI engineers (\$200,000–\$300,000 annually).

New Markets: Expanding into Saudi Arabia and Egypt requires \$5–10 million per market: \$500,000–\$1 million for offices, \$500,000 annually for hiring, \$1 million for marketing, \$1 million for localization (Arabic UI, certified websites), and \$3–7 million for PDPL-compliant infrastructure. Partnerships with Tawuniya and AXA Egypt offset some costs but add negotiation expenses (Question 5).



Expected Efficiency Gains

Existing Markets: Integrating LLMs into existing markets uses Mistral 7B for claims

processing up to 4 times the speed and BlockGPT for fraud detection, reducing operational costs by 10% (\$15 million on \$150 million annual costs) and boosting revenue by 5% (\$25 million on \$500 million premiums), yielding \$40 million annually from year one.

New Markets: Expanding into new markets could achieve similar gains (e.g., 80% faster claims; Curacel, 2025), but regulatory approvals and SCAI integration delay benefits (KPMG, 2023; Masaar, 2025).

New Revenue Potential

Existing Markets: Integrating LLMs into existing markets increases revenue by \$50 million annually through enhanced retention and AI-driven products like Curacel Grow, limited by market size (businessday.ng, 2025; globaldata.com, 2025).

New Markets: Expanding into Saudi Arabia (\$18.4 billion gross written premium [GWP] in 2024, 8.9% compound annual growth rate [CAGR] to 2029) could add \$184 million at 1% share in the overall national insurance market and Egypt (\$1.8 billion GWP in 2024, 26% year-over-year [YOY] growth) could add \$18 million per market at 1% share, but first-year revenue would be around \$5 million per market due to localization and regulatory costs. (insurancebusinessmag.com, 2025; meinsurancereview.com, 2025).

Long-term Strategic Value

Existing Markets: Integrating LLMs strengthens Curacel's African leadership, accumulating proprietary data (claims, fraud patterns) for a competitive edge, unlocking \$2.1 to 3.2 billion in value.

New Markets: Expanding into new markets diversifies into high-growth regions (Saudi Arabia: 5.2% CAGR to 2028; Egypt: North African hub), but PDPL restrictions limit data leverage across regions (S&P Global, 2025; dlapiper.com, 2025).

Risk Levels

Existing Markets: Integrating LLMs into existing markets has low risk, as Curacel's familiarity minimizes regulatory and operational uncertainties.

New Markets: Expanding into new markets carries high risk due to stringent regulations (e.g., Saudi Arabia's PDPL fines up to \$1.3 million), cultural barriers, and delays in establishing operations (Question 5).

ROI Analysis

Existing Markets: To assess ROI, a net present value (NPV) calculation (using a constant cash flow model because of pre-existing market presence) uses a 10% discount rate over five years. Integrating LLMs in existing markets requires a \$3 million initial investment, generating \$40 million in annual benefits (cost savings and revenue growth) starting in year one, resulting in an NPV of \$148.63 million.

New Markets: Expanding into new markets requires a \$10 million investment per market, with benefits growing from \$5 million in year one to \$25 million by year five, yielding an NPV of \$66.59 million per market (using a step function model because of regulatory challenges which can delay revenue generation). The higher NPV for LLM integration reflects faster returns and lower risk due to immediate efficiency gains and minimal regulatory hurdles.

Conclusion: Integrating LLMs into existing markets has the highest ROI due to lower costs,

immediate efficiency gains, and little to no compliance requirements. Expanding into Saudi Arabia and Egypt provides long-term revenue potential but faces high costs and delays. After completely integrating the LLMs in current markets, Curacel can expand to the new markets. This expansion can be implemented using the plan that was previously outlined (Question 4).

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