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InsurTech, IoT and Bigdata Analytics Adoption Challenges and Solutions in Morocco

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Abstract

Background: The idea of insurance was discovered several millennia before Christ (BC). In the second and third millennia BC, traders from China and Babylonia practiced shifting or dispersing risks. Today, insurance is the foundation of the economy, but expanding its penetration is difficult in emerging nations. The fourth insurance industry revolution in the developed world was sparked by the recent advent of IoT, Big Data, and InsurTech. Objective: To boost insurance coverage in Morocco, this study examines the problems with and potential solutions to InsurTech, IoT and bigdata analytics. Research Methodology: To identify the themes and factors pertaining to problems and solutions in implementing InsurTech, IoT and bigdata analytics in Morocco's insurance business, this study used a systematic literature review. To find pertinent material from Google Scholar, several keywords were employed. The filtered studies were examined based on inclusion and exclusion standards. Findings: This report outlined many obstacles to InsurTech, IoT and bigdata analytics adoption in the Morocco insurance sector as well as potential remedies. The proposals could help policymakers improve the insurance industry service delivery.

Keywords: InsurTech, Insurance Industry**,** Digital Technologies, Morrocco, IoT and bigdata analytics..

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Introduction

InsurTech adoption leverages the innovative use of technology to transform insurance value chains. Although insurers are aware of the importance of InsurTech in creating a competitive advantage, the actual adoption in the global market seems relatively slow due to various obvious reasons. However, the recent Covid-19 pandemic crisis has expedited technology adoption in the insurance industry. The focus of this study is to build a model for InsurTech adoption using Diffusion of Innovation (DOI) Theory. By using DOI Theory, the main purpose of this study is to investigate the significant factors of InsurTech adoption by value chain activities among insurers.

In Morocco, takaful insurance is controlled by legislation, which amends and replaces law on insurance. Moroccan law defines takaful insurance as "an insurance transaction approved by the Ulema Higher Council with the goal of covering the risks covered by the Takaful insurance contract through a Takaful insurance account managed by a Takaful insurance company licenced to carry out Takaful insurance transactions for a fee. A Takaful insurance operation or an insurance undertaking's activity of administering a Takaful insurance account may not, under any circumstances, result in the collection or payment of interest" (Lamsaddak et al., 2020). Morocco was the first country to get Islamic banking licenses in 2017. Despite rapid growth, Islamic banking accounted for less than 1% of total loans in the banking sector at the end of 2018. (110 percent between June 2018 and April 2019). Most Islamic banks have limited lending prospects for retail consumers by only offering mortgage and auto loans in the form of' Murabaha' contracts. The new sharia-compliant insurance legislation will assist Islamic banks in expanding into the business sector by allowing them to provide Takaful products to protect banks and banking transactions, therefore broadening their product offerings. Morocco's major conventional banks have developed separate Islamic banking divisions in place of Islamic windows. Attijariwafa Bank's Islamic Subsidiary Bank Assafa is the market leader, with a 53 percent market share in financing and a 63 percent market share in deposits. Although the Moroccan government's enhanced attempts to act as a catalyst for Islamic finance growth are positive, the legislative environment still lags that of other African nations (FITCH WIRE, 2019).

This study fill gap by exploring the challenges along with solutions in adoption of InsurTech, IoT and bigdata analytics in Morocco’s insurance sector by using SLR methodology.

Literature Review

Reviewers take out the following data from the involved papers: author name, year of publication, country of publication, publication type and findings. Consequently, a narrative synthesis of the derived information was attained. Table 1, 3,5 denotes to included literature like articles, conference or book along with methodology and year. Table 2,4,6 denotes challenges and solutions derived after reviewing the selected studies.

Table 1: Characteristics of Reviewed InsurTech Adoption Studies in Morocco Insurance Sector

No.	Journal name/Book/ Conference Name	Paper topic/ Conference paper Name	Method	Year	Author
1	IOP Conference Series: Earth and Environmental Science	Insurtech & Blockchain: Implementation of Technology in Insurance Operations and its Environmental Impact.	Quantitative	2020	(Halima, 2022)
2	Moroccoworldnews	Despite Thriving Service Industry, Morocco Lagging Behind in FinTech.	Qualitative	2022	(Elmahdi, 2022)
3	itij.com/	Morocco sets sights on digitization strategy.		2020	(ITIJ, 2020)
4	/www.moroccoworldnews.	Moroccan Business Leaders Reflect on Insurance Technology		2017	(Chaima, 2017)

Table 2 InsurTech Adoption in Morocco Insurance Industry: Issues & Solutions

No. of Studies	Issues	Solutions
Study 1	Morocco's laws are extensive. Fast Parliament is required in digitalization. Due to fraud protection and conservative culture, most people trust conventional insurance. Morocco's insurance business is reluctant to accept InsurTech firms.	Collaboration is the key to moving the Moroccan insurance business forward.

Study 2	FinTech is still a new concept in Morocco.	The government must act and promote the advantages of such programmes.
Study 3	Regulators need to be updated to enable digital signatures for online transactions and allow insurance sales without face-to-face.	Nil
Study 4	A regulatory framework for innovation is required.	Nil

Table 3: Characteristics Of Reviewed Iot Adoption Studies In Morocco Insurance Sector

No.	Journal name/Book/ Conference Name	Paper topic/ Conference paper Name	Methodology	Year	Author
1	IEEE 6th International Conference on Optimization and Applications	Digital agriculture in Morocco, opportunities and challenges	Qualitative	2020	(Jabir & Noureddine, 2020)
2	IEEE International Smart Cities Conference (ISC2)	Internet of Things Connectivity-based Smart Grids in Morocco: Proof of Concept and Guide to Massive Deployments		2019	(Stiri et al., 2019)
3	Procedia Computer Science	IoT security: challenges and countermeasures.		2020	(Mohamed et al.,2020)
4	Third World Conference on Smart T rends in Systems Security and Sustainability	Development perspective of a Moroccan smart city		2019	(BOUDANGA et al., 2019)
5	SCAMS '17: Proceedings of the Mediterranean Symposium on Smart City Application	First Africa and Morocco NB-IoT experimental results and deployment scenario: new approach to improve main 5G KPIs for smart water management		2017	(Ahmed et al., 2017)

Table 4: Iot Adoption In Morocco Insurance Industry: Issues & Solutions

No. of Studies	Issues	Solutions
Study 1	Less-than-optimal sensor material for diverse climates (rain, sun, etc.) Costly sensors Sensor node applications must be power- and energy-efficient. Sensor node lifetime equals battery lifespan	Quality-of-service phrases were required for network routing and radio channel sharing (delay, bandwidth, etc.) Software must be "user-friendly." Advanced Co-design methodologies required for a small, low-cost, autonomous sensor node (low battery consumption). Programming and integration at the sensor node level
Study 2	Literacy rates Technological know-how Cost Regulations Concerns of security and confidentiality	Nil
Study 3	Intrusions may target IoT.	IoT safety, reliability, and secrecy Infrastructure and IoT device security to assure IoT ecosystem service

		availability
Study 4	Financial issues Lack of research and development Lack of manpower for installation Lack of staff training Consumer fears about data complexity and privacy Lack of SG standards and specifications and Internet of Things ignorance Morocco lacks wearable medical understanding.	Renewable energy requires storage, administration, forecasting, and network stability. Government must set clear electrical rules, laws, and strategies.
Study 5	Privacy Infrastructure	Nil

Table 5: Characteristics Of Reviewed Bigdata Analytics Adoption Studies In Morocco Insurance Sector

No.	Journal name/Book/ Conference Name	Paper topic/ Conference paper Name	Methodology	Year	Author
1	Big Data: Challenges and Applications Workshop.	Challenges and Opportunities of Big Data in Moroccan Context: A Research Agenda	Qualitative	2020	(Ayoub et al., 2014)
2	BDCA'17: Proceedings of the 2nd international Conference on Big Data, Cloud and Applications	From Data to Big Data: Moroccan Public Sector.		2017	(Khtira et al., 2017)
3	International Conference on Cloud Computing Technologies and Applications (CloudTech)	Towards adopting Big Data technologies by mobile networks operators: A Moroccan case study.		2016	(Daki et al., 2016)
4	IAOS 2016 CONFERENCE, Abu Dhabi,	Big data and official statistics in Morocco: opportunities and challenges		2016	(Lina, 2016)
5	Proceedings of ACM BDCA conference, Tetouan, Morocco,	From Data to Big Data: Moroccan Public Sector		2017	(Rachida & Bouchra, 2017)

Table 6: Big data Analytics adoption in Morrocco Insurance Industry: Issues & Solutions

No. of Studies	Issues	Solutions
Study 1	Experts in Big Data Needed Moroccan firms unaware or unprepared to leverage Big Data. Big data confidentiality, security risks Usage of Big Data may lead to identity theft, racism, or prejudice. Need to create new algorithms to assess Moroccan online sites. Need for user-friendly programmes to let non-specialists utilize Big Data technologies more easily	IBM agreed to promote cloud computing and Big Data in Morocco.
Study 2	Due to the differences between big data and standard data, additional abilities are required, such as statistics and arithmetic. Changes to current IT storage, computer, and networking	The government should organize big data conferences, seminars, and meetings. We need a government-led forum to examine big data's benefits and drawbacks.

	infrastructures are costly. Big data requires government support for infrastructure, R&D, training, and marketing. Data privacy is a major problem with big data. The firm loses valuable data due to inadequate storage space.	
Study 3	The classical RDBMS and parallel data warehouse handle data with excellent consistency and fault tolerance.	Hadoop
Study 4	Privacy, Financial, Management, Computing infrastructure	Nil
Study 5	Shortage of human resources Data storage, Data Privacy & security	Nil

Research Methodology

Literature review discussing the challenges and solutions in adopting InsurTech in Morocco are analyzed by using SLR methodology wherein keywords mentioned in table 7 are opted to search relevant article meeting including and excluding criteria mentioned in table 8. Systematic literature review identifies, selects, and critically appraises research to answer a clearly formulated question (Dewey & Drahota, 2016).

Table 7 Study Extraction Criteria With Relevant Technologies In Developing Countries

Technology	Inclusion	Exclusion	Keyword search query
InsurTech	Literature and conference proceedings on big data analytics and InsurTech in the Indian financial industry, particularly insurance and health insurance. Past works available since 2017. Primary and secondary research	Studies not in English Magazine, newspaper, thesis, report data Studies in non-financial fields including education, manufacturing Large-scale data analytics and other technologies	papers publishing platforms such as Google scholar and emerald were opted as the exploring means for this review. Following blend of search, terms are applied: Blockchain * AND (insurance sector*) AND (challenge* OR obstacle* OR issue* OR disadvantage* OR threat). The exploration was carried out between 2020 to 2021.
IoT	Literature and conference proceedings on IoT in the Bangladesh financial industry, particularly insurance and health insurance. Past works available since 2017. Primary and secondary research	Studies not in English Magazine, newspaper, thesis, report data Studies in non-financial fields including education, manufacturing Large-scale data analytics and other technologies	papers publishing platforms such as Google scholar and emerald were opted as the exploring means for this review. Following blend of search, terms are applied: IoT* AND (insurance sector*) AND (challenge* OR obstacle* OR issue* OR disadvantage* OR threat). The exploration was carried out between 2017 to 2020.
Big data analytics	Literature and conference proceedings on big data analytics in the Morocco financial industry, particularly insurance and health insurance. Past works available since 2016 Primary and secondary research	Studies not in English Magazine, newspaper, thesis, report data Studies in non-financial fields including education, manufacturing Large-scale data analytics and other technologies	papers publishing platforms such as Google scholar and emerald were opted as the exploring means for this review. Following blend of search, terms are applied: Big data Analytics* AND (insurance sector*) AND (challenge* OR obstacle* OR issue* OR disadvantage* OR threat). The exploration

was carried out between 2016 to 2020.

Table 8 Selected Studies In Relevant Technologies In Developing Countries

Technology	Criteria	InsurTech	IoT	Bigdata Analytics
InsurTech	Identification	10	10	10
	Screening	7 after removing 3 duplicates	9 after removing 1 duplicate	8 after 2 duplicates
	Eligibility	6 after removing 1 archive	8 after removing 1 archive	6 after removing 2 archives
	Included	4 after removing 2 full articles	5 after removing 3 full articles	5 after removing 1 full article

Findings

As per table 9 and table 10, the first issue is law and legislation, which slows innovation adoption owing to concerns about data privacy. The second difficulty is a quick Parliament, notably in digitalization. Parliament is vital in limiting the pandemic's damage and guaranteeing public safety. Until COVID-19 pushed many parliaments to modify and meet, these clauses went unnoticed. Digital technology puts pressure on both insurers and regulators. The digital technology presents unique challenges in the legal handling of cross-border and automated operations, as well as in the protection of insured individuals and management of competition with conventional actors (Chaima, 2017). Digital technology has potential to offer improved service quality for clients and more flexibility for insurance firms, intermediaries, and brokers (ITIJ, 2020). The third issue is that most people trust conventional insurance owing to fraud protection and conservative culture. To allow new entrants such as InsurTech firms, Morocco's insurance business is quite conservative (Halima, 2022). Fourth, pandemic has changed people's minds in utilizing and integrating digital services. Due to extra Shariah regulatory constraints and a risk cautious mentality, Islamic financial institutions are deemed reluctant to adapt. To adapt and stay competitive, Islamic financial system must overcome obsolete business practices that cannot be changed. Traditional financial institutions should collaborate with younger, more innovative start-ups and FinTech developers who can help revolutionize banking and financial services (Hassnian et al., 2019).

Fifth challenge is FinTech startup is new to Morocco's financial business. The sixth task is to change rules to enable digital signatures for online transactions and allow insurance sales without a face-to-face meeting (Elmahdi, 2022). Finally, a regulatory framework is required to support innovation (ITIJ, 2020). The Moroccan insurance industry's growth depends on cooperation. It will also help develop new products based on distinction, personalization, and diversification to meet the client's wants and expectations (Halima, 2022). The government must act and promote the advantages of such programmes (Chaima, 2017). To create and utilize InsurTech, insurance firms must invest in technology and data science, as well as innovation to reach new customers and meet their needs. Aside from expensive customer acquisition and administration expenses, inadequate automation of insurance operations and low underwriting profitability are factors that limit long-term sector growth. InsurTech integrates technology, supplements conventional media, and automates important activities to innovate broker channels. Global economics has altered due to new prospects and business models created by new applications of science and technology according to Sudtasan and Mitomo. The new technological revolution will enhance the insurance industry's value chain (product creation, cost control, customer service, and risk management). InsurTech uses all technical breakthroughs to position itself in the insurance industry. A new insurance system will need active collaboration between the insurance business, technological firms, and regulators.

Table 9 InsurTech Adoption Challenges in Morocco Insurance Industry

Morocco's laws is extensive.
Most people trust traditional insurance due of fraud protection and conservatism.
The moroccan insurance business, especially islamic insurance, is highly cautious about allowing newcomers.
Fintech is still a new concept in morocco.
Regulators need to be updated to enable digital signatures for online transactions and allow insurance sales without a face-to-face.
A regulatory framework for innovation is required.

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Table 10 InsurTech Adoption Solutions in Morocco Insurance Industry

Cooperation drives the moroccan insurance industry.
The government must act and promote the advantages of such programmes.

There are many issues and solutions derived from literature reviewed by using systematic literature technique. Issues and solutions are further categorized under sub-heading by using content analysis. Here table 11 provides the common challenges faced by the insurance industry, while some prominent solutions are pointed in table 12 which are derived after reviewing the repeating nature of challenges and solutions.

First, less quality sensor material is mounted in various conditions (rain, sun, etc.). This poor quality leaves sensors susceptible to hackers. IoT security protects client privacy, data integrity, and confidentiality. The security of IoT devices and infrastructures ensures the availability of IoT services (Mohamed et al., 2020). The second issue is the high cost of sensors required to build a smart system, making it difficult to implement. The third problem is that applications at sensor nodes must not be greedy with processing resources and energy. The fourth difficulty is lifespan sensor node equals battery life (Jabir & Noureddine, 2020). The fifth issue is literacy particularly digital literacy, needed to adopt technology. To cope with smart systems in an environment, the sixth obstacle is technical knowledge which lacks in Morocco needed to operate data in this novel technology. The seventh difficulty relates to legislation that needs to be created to protect customers' sensitive data or privacy. The eighth challenge is about security and privacy of data collected by IoT devices which compromised due to poor quality or other reasons.

The ninth difficulty is financial constraints as a lot of investment required to implement technology in an organization. The tenth difficulty is a lack of research and development owing to funding restrictions. The eleventh issue is a shortage of people for IoT installation and maintenance. The twelfth issue is a lack of employee training (Stiri et al., 2019). Fears of customers owing to difficulty of usage and data confidentiality (Mohamed et al., 2020). Fourteen issues are absence of SG standards. The fifteenth problem is lack of skills and information regarding IoT. Lastly, lack of knowledge about smart healthcare advantages (BOUDANGA et al., 2019). Advanced Co-design should be utilized to create a low-cost, autonomous sensor node (Mohamed et al., 2020). Programming sensor nodes is another task. These algorithms coordinate (periodic, on-demand, event-driven) data gathering, route data to the base station, and execute commands (Jabir & Noureddine, 2020). Renewable energy requires storage, administration, forecasting, and network stability (Ahmed et al., 2017). No SG specifications or norms. The government needs clear authority norms, regulations, and strategies (Boudanga et al., 2019).

Table 11 IoT Adoption Challenges in Morroco Insurance Industry

Sensor material quality necessary to work in various climates (rain, sun, etc.)
Sensors are costly.
Applications in sensor nodes must not be greedy with processing power or energy.
Sensor node life span equivalent to battery life
Literacies
Technical expertise
Regulations
Concerns of safety and security
Money problems
Lack of R&D
Manpower shortages
Training deficiency
Consumers' concerns about data privacy and difficulty of usage
Absence of SG standards
Lack of iot skills and expertise
Unawareness of smart healthcare's advantages

Table 12: IoT Adoption Solutions in Morrocco Insurance Industry

Network routing and radio channel sharing qos (delay, bandwidth, etc.)
User-friendly software, interfaces, and apps.
Advanced co-design methods required for a smaller, cheaper, and more autonomous sensor node (low battery consumption).
Creating the programmes required for sensor node installation and integration
Iot security for consumer privacy, data integrity, and confidentiality
Securing iot devices and infrastructures to guarantee iot ecosystem services are available
Renewable energy requires storage, administration, forecasting, and network stability.
The government must set clear policies, rules, and strategies for power networks.

There are many issues and solutions derived from literature reviewed by using systematic literature technique. Issues and solutions are further categorized under sub-heading by using content analysis. Here table 13 provides the common challenges faced by the insurance industry, while some prominent solutions are pointed out in table 14 which are derived after reviewing the repeating nature of challenges and solutions.

First, Big Data professionals must be trained. Big Data education and research are needed (Ayoub et al., 2014). The second problem is preparing to use Big Data effectively. Moroccan firms aren't equipped to use Big Data effectively (Ayoub et al., 2014). Third, big data security and privacy challenges. Big data raises security and privacy risks since information may be processed, sold, and utilized without the person's permission. Unethical Big Data usage may lead to identity theft, racism, or prejudice (Ayoub et al., 2014). Fourth challenge relates with identity theft, racism, or prejudice from unethical Big Data usage (Ayoub et al., 2014). Fifth, non-specialists require user-friendly apps to employ Big Data technologies. Big Data and conventional data are distinct, therefore new skills like statistics, arithmetic, and sophisticated analytics are required (Khtira et al., 2017). Sixth, changing IT storage, computing, and networking infrastructure needs result in pricey infrastructure. Insufficient storage space causes the firm to lose valuable data. Traditional databases can't handle big data's volume, diversity, and velocity. RDBMS and parallel data warehouse data processing is consistent and fault tolerant. Continuous data analysis must be used to transform information into practical strategies. Big Data is the answer (Daki et al., 2016). The last difficulty is government financing for big data infrastructure, R&D, training, and promotion (Daki et al., 2016). Morocco and IBM partnered to promote cloud computing and Big Data. Government should host conferences, seminars, and meetings for companies and agencies to explore big data innovations (Ayoub et al., 2014). Data experts, technology developers, entrepreneurs, and policymakers should discuss big data's promises and challenges (Khtira et al., 2017). Hadoop handles big data.

Table 13: Bigdata Analytics Adoption Challenges in Morocco Insurance I

Experts in big data needed
Not ready to effectively use big data.
Big data confidentiality, security issues
Usage of big data may lead to identity theft, racism, or prejudice.
Need for user-friendly programmes to let non-specialists utilise big data technologies
Because big data is distinct from regular data, additional skills like statistics and mathematics are required.
Changes to current IT storage, computer, and networking infrastructures are costly.
Government financing is required for big data infrastructure, R&D, training, and promotion.

Table 14: Bigdata Analytics Adoption Solutions in Morocco Insurance Industry

Morocco and IBM announced a deal to promote new technologies including cloud computing and big data.
Government should organise big data conferences, seminars, and meetings.
The government should convene data specialists, technologists, entrepreneurs, and policymakers to examine big data's benefits and drawbacks.
Hadoop for large data handling

Conclusion

This research examined how InsurTech, IoT, and big data are being used in Morocco's insurance industry. It showed both the difficulties and the chances for growth. A review of existing studies made it clear that Morocco's insurance sector faces big hurdles like weak tech tools, strict rules, and little digital know-how. Despite these problems, there are many opportunities to improve. Using new tech can modernize how services are offered and help reach more people, especially in areas with little insurance coverage. The study offers useful ideas for government leaders, insurance companies, and tech companies that want to promote new ideas and better access for everyone. By adopting these new tools, Morocco can keep up with global trends and make its insurance services more efficient, easier to access, and stronger.

The main limitation of this study is that it only reviews existing literature using a systematic review method. It focuses on identifying challenges and solutions relevant to Morocco. The study can include a quantitative aspect by examining how current technologies impact insurance coverage in Morocco. Policyholders can then choose solutions to help increase the use of these technologies and expand insurance coverage.

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