Empower the Operation of Agricultural Insurance Companies with Big Data Technology

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ABSTRACT

Innovative startups that combine big data technology with existing businesses turned many industries upside down in recent years. The traditional enterprise that follows a human-centric decision-making strategy faces unprecedented pressure from data-driven algorithm-empowered new competitors who provide highly customized products that deeply connect with customers. The rapid growth of those startups brought big data technology into the spotlight, setting up the stage for a new round of business evolution, the intelligent evolution. Insurance, an industry built upon data analysis, innately possesses even more potentials and advantages than other businesses. To optimize their operations, many insurance companies have used big data technology in product design, pricing, and marketing. In comparison, agricultural insurance companies lag in this competition, struggling with inefficient and ineffective systems. This article explores ways of agricultural insurance companies can incorporate big data technology into their operations to create business values by examining the working, intelligent business model of Ping An Group, a world-leading technology-driven financial services provider.

Keywords: *Big Data, Intelligent Business, Insurance, Risk Control, Operation Management*

1. INTRODUCTION

The advancement of technology has enabled computers to process a massive amount of unstructured data in real-time, and therefore makes data a strategic asset because "it opens the door to new efficiencies, insights, and capabilities" [1] for businesses and governments. The rise of autonomous cars and smart devices is only the iceberg of big data applications.

While the change is subtle in the insurance industry from an external look, the internal transformation is significant, and its impact is remarkable. Some large insurance companies have applied big data technology in every corner of their operation and seen a tremendous boost in operational efficiency [2]. Nevertheless, agricultural insurance companies have not bothered to catch up with this intelligent business trend. Though a few unique characteristics of agricultural insurance may justify this indifference, agricultural insurance companies should realize the importance of this intelligent evolution. They must jump on board with the trend as soon as possible to maintain their competitive advantage in this rapidly changing business environment.

This article provides strategies for agricultural insurance companies to implement intelligent business transformation in the following three steps: first, it investigates the operational pain points found common among the agricultural insurance companies; second, it looks into the intelligent business transformation of Ping An Group and discusses how they have used big data technology to alleviate or eliminate their operational pain points; last, using Ping An's intelligent business strategy, this article proposes a list of actions agricultural insurance companies can take to counter previously identified operational pain points.

2. OPERATIONAL PAIN POINTS OF AGRICULTURAL INSURANCE COMPANIES

Agricultural insurance is a broad category of insurance products related to commercial planting, foresting, and animal husbandry. While agricultural insurance is a subordinate category of property insurances, its risk properties differ fundamentally from other types of property insurances, such as auto insurance. The difference comes from the unique characteristics of

agriculture, which result in four operational pain points specific to agricultural insurance:

2.1. Operational Pain Points Specific to Agricultural Insurance

First, the payout ratio of agricultural insurance is high. Unlike other property insurances, where losses are often of a partial value of the insured objects, an agricultural insurance claim is most likely a total loss claim. If a cow is infected, the farmer must dispose of it entirely instead of keeping some parts. As such, the farmer will incur a complete loss. Another factor contributing to the high payout ratio is that agricultural accidents are often interrelated and caused by regional climate disasters, pest disasters, or diseases. When a fish gets sick from parasites, the entire population around it may have the same issue. It is impossible to have each fish examined and count how many are still clean. Rather, the farmer will file a claim for the entire population.

Second, determining the value of insured objects is hard. Unlike cars with a ready market for any conditions, agricultural products do not have a clear value until they mature. Their ability to self-recover after damage contributes another layer of difficulty determining their present value.

Third, the management cost of agricultural insurance is high. While small animals and crops are hard to count and their insured values are estimates, large animals or plants are easy to identify. When a farmer buys insurance for large animals, insurance companies have to go through a tedious process of documenting each individual animal. The spread of insurees across the country and the terrible road conditions make it necessary for agricultural insurance companies to hire a large number of workforces to keep the operation flow.

Last, agricultural insurance companies have a low level of risk-resistance. Because each region presents unique attributes, agricultural insurance companies are often small to medium-sized local companies. Although they have a deep understanding of the local environment and market, they are not equipped with the same knowledge for neighboring provinces. Therefore, when a regional disaster happens, the local company cannot spread the risk and often face bankruptcy.

2.2. General Operational Pain Points to Insurance

In addition, another two universal operational pain points that all insurance companies face plague the operation of agricultural insurance companies: adverse selection and moral hazard. Although local agricultural insurance companies know the local market well, an insuree is the most critical factor affecting the condition of insured products. While most insurees have a high willingness to keep the insured objects healthily growing and use insurance as a contingency plan, some insurees purchase insurances to earn an illicit profit.
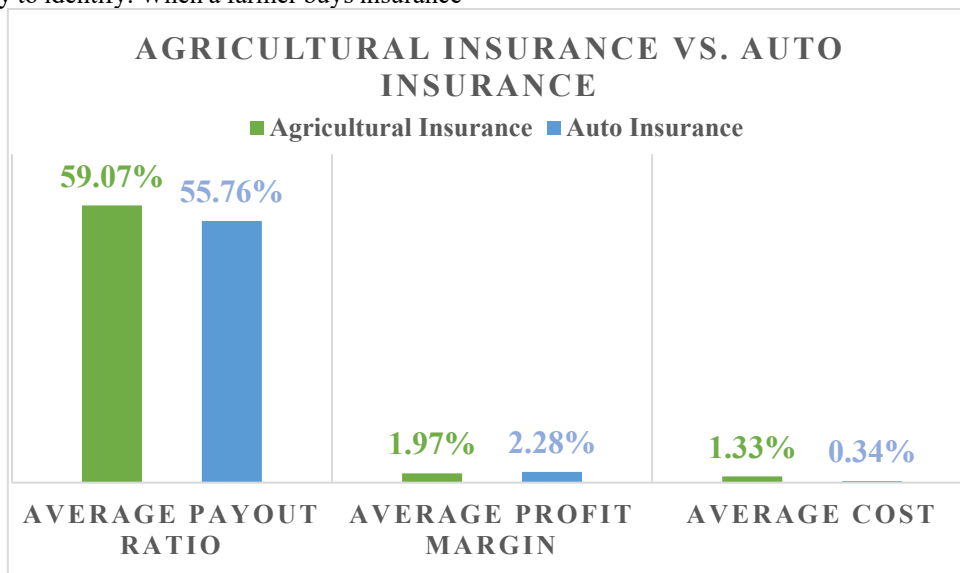

Figure 1: A comparison of some key ratios between agricultural insurance and auto insurance. Data are collected from the annual financial report of People's Insurance Company of China between 2018 and 2020. PICC is the largest insurance company in China with over 50% of market share in agricultural insurance and 32% of market share in auto insurance

Together, these six operational pain points lead to a high-cost, low-return dilemma. Despite a margin of difference among areas, agricultural insurance costs range from 3% to 20% of the value of insured objects [3], while other types of property insurance only cost less than 1%. The average homeowner insurance in the U.S. is merely 0.6% [4]. The high cost discourages many farmers from buying agricultural insurance. Although the

Chinese government pays 74% of the insurance cost [5], only 23.21% of agricultural products were in 2020 [6]. In the meantime, the profit margin for agricultural insurance is slim. PICC, the largest agricultural insurance company worldwide and captures over half of the Chinese agricultural insurance market, merely broke even in 2020.

The instability of revenue and its high management cost make agricultural insurance an unappealing business. The market value and the number of competitors of agricultural insurance are far below other commercial insurance. In 2020, the total market value of agricultural insurance was only 1.8% of the entire insurance market, and only 9 out of 239 insurance companies provided agricultural insurance [7]. Therefore, although agriculture is the economy's lifeblood with the government's full support, the development of agricultural insurance is relatively stagnant.

3. PING AN'S INTELLIGENT BUSINESS MODEL

Ping An Group is a Chinese holding conglomerate with subsidiaries providing a full spectrum of financial services. It has over 225 million customers and earns over $100 billion in insurance premiums annually. While there are many reasons behind the group's success, a key factor is its early adoption of big data technology in its operation. With big data technology, the group solves the pain points in its five primary operations: product design, product marketing, sale, claim settlement, and customer service.

Insurance companies conventionally hire actuaries to design insurance products. By using historical and statistical data to identify risk factors that contribute to

the loss of insured objects, actuaries attempt to devise insurance products that balance the company's risk exposure and return. Though the central limit theorem establishes that a large sample of data can correct outliers, thus making insurance products profitable most of the time, a statistical error cannot be eliminated when using sample data. This imperfection, though rarely, has cost insurance companies a fortune. While it is excruciating, if at all possible, for humans to process tens of millions of records and to design an insurance product involving hundreds of factors, big data technology has made it a reality. By analyzing population data, computers can calculate the correlation among all risk factors and determine how they collectively affect the risk exposure and the potential return the insurance company faces. With this capability, insurance companies can design profitable insurance products more easily and more confidently.

Insurance companies rely heavily on internal and external salespersons or organizations to find clients during product marketing. Not only it produces a tremendous amount of commission cost, but it also leads to incidents of commission fraud. In the meantime, because agents connect the insurance companies and clients, customer retention rate fluctuates with salespersons turnover rate. Big data technology provides solutions to both issues. By integrating various data sources, a unified information system can identify customers who demand insurance services and directly bridge customers with the company. This innovation saves labor costs and improves the customer retention rate. Between 2018 and 2020, the number of agents in Ping An Group decreased from 1.4 million to 1 million, but its revenue increased 25% [9].
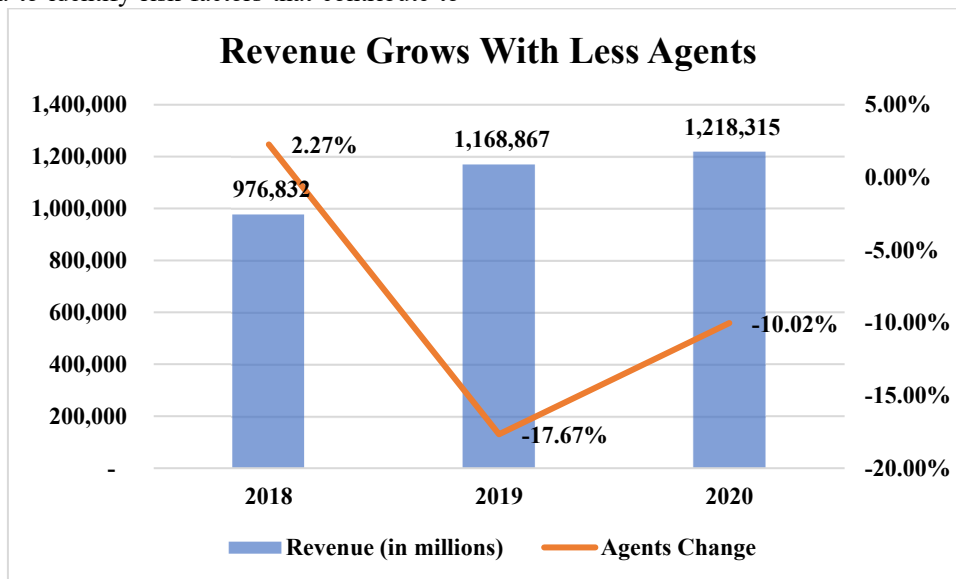

Figure 2: Ping An's revenue continues to grow despite the number of agents decreasing. Data are collected from the annual financial report of Ping An Group between 2018 and 2020.

When insurance companies underwrite for customers, they ask insurees to submit dozens of documents for

qualification assessment and quoting purposes. The process can take 1 to 3 days. Furthermore, because the

pricing is based on the profile of a group of customers who share similar characteristics, the final quote may not reflect the proper condition of an individual customer. Both issues can drive clients away. Big data makes instant qualification assessment and personalized pricing possible. Ping An has shortened the average underwriting time from 15 hours to 30 minutes by using facial and voice recognition to establish a bio record for each client, lowering the cancellation rate from 4% to 1% [10].

During the claim settlement, insurance companies dispatch agents to where the accident happens and appraise the liabilities. The labor cost, the duration of appraisal, and the delay in paying for the loss have made insurance companies notorious. In addition, agents sometimes collude with customers to engage in insurance fraud, causing companies tens of millions of dollars. By using image recognition to review the damage and evaluate its authenticity, Ping An has reached 90% of the correct rate for auto claim settlement [10].

Insurance companies hire customer representatives to respond to customer inquiries. Despite the fact that companies design training programs to provide customer service representatives with sufficient product knowledge and teach them how to act professionally, their performance varies, introducing uncertainty into customer relationship management. Big data technology has led to the creation of chatbots that can understand customers' implicit concerns and handle their requests. According to Ping An, customer service chatbots serve over 90% of customer calls and have a 95% success rate in solving customer needs [10].

With the empowerment of big data technology, Ping An Group has made itself a global brand. Its market capitalization of $140.79 billions makes it the second largest insurance company worldwide [11]. It is ranked as the most valuable insurance brand by Brand Finance [12], and the 16th in the Fortune Global 500 list in 2021 [13].

4. AGRICULTURAL INSURANCE COMPANIES' PATH TO INTELLIGENT BUSINESS

While unique characteristics have resulted in a different set of operational pain points for agricultural insurance companies from their peers of property insurances, Ping An's success in using big data technology to improve its operational efficiency and create business values points a clear direction for agricultural insurance companies' path to intelligent business.

4.1. Intelligent Business in Product Design

Agricultural insurance companies should first examine if the actuaries have designed the insurance

product correctly to reduce high payout ratios. If a high payout ratio occurred in a year when there was no major disaster, it is evident that the design of insurance products fails to balance the risk exposure and the return that insurance companies face. By adopting a similar strategy of using big data technology to analyze the effect of each risk factor on an insurance product, insurance companies should be able to bring back the balance between its risk exposure and potential rewards, increase the profit margin, and make the operation sustainable.

4.2. Intelligent Business in Cost Control

Agricultural insurance companies can use image recognition to improve the efficiency of identifying and documenting insured objects to reduce the high management cost. A 2020 seminar hosted by Making Finance Work for Africa described the application of using high-resolution satellite images and algorithms to count the number of trees planted in an area to automate the process of underwriting [14]. Insurance companies can use drones or radar to make counting more efficient for less noticeable objects.

4.3. Intelligent Business in Risk Control

While big data technology cannot create a ready market for agricultural products that are yet to mature, it can use historical data to evaluate the degree of damage to estimate the recovery rate. In addition, insurance companies can use sensors and satellites to continue tracking and predicting the weather conditions, soil conditions, and health conditions of insured objects to assist farmers in improving yields and preventing loss. A 2017 study examines the effectiveness of using different data mining techniques to maximize crop production and proves that a few techniques can produce meaningful impact [15].

Insurance companies can use big data technology such as deep learning to improve the risk-resistance level to make product design more scalable. Because deep learning allows computers to find implicit patterns in unstructured, seemingly unrelated datasets, insurance companies can save time and resources on learning a new market. With a broader spread of businesses, insurance companies can expand its market variety and become more risk resistant.

Last but not least, insurance companies can use big data technology to identify fraudulent clients from real clients and reduce the number of incidents of insurance frauds by adopting facial recognition, voice recognition, and background information assessment systems.

5. CONCLUSION

This article identifies operational pain points among the agricultural insurance companies, evaluates the

intelligent business model of Ping An Group, and delivers actionable strategies to agricultural insurance companies to improve operational efficiency by integrating big data technology.

This article acknowledges a few limitations in its proposed strategies. First, the proposal is based entirely on the successful example of a single commercial insurance business. This success may be an isolated incident. Second, there is a measurable difference between agricultural insurance and other commercial insurances, ranging from their insured objects to their risk system. The combination of those nuances might have an impact, whether positive or negative, on the effect of applying big data technology in different insurance products.

A future improvement for this article can focus on either of the limitations identified above. For example, a future paper can include multiple insurance companies to compare their intelligent business strategies. Alternatively, a forthcoming paper can study the intelligent business transformation of an agricultural insurance company and evaluate its effectiveness.

In the future, with the advancement of technology, humans' capability to forecast climate change, prevent and intervene in natural disasters will improve the stability of agriculture. The emergence of new types of planting and animal husbandry, such as vertical farming, desert crops, will also make the entire agricultural market more prosperous and diversified. While these developments can bring convenience, opportunities, and hopes to humankind, more data types will also be available. To make use of this strategic asset and create business values, such as improving the quality of marketing and pricing, enriching the variety of products, and keeping the risk exposure under control, agricultural insurance companies must figure out what data matters the most. The earlier the process starts, the better the algorithm they can devise.

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