Case Study: KYOBO Life KIROS Project

Building Scoring Models to Design an Analytic process to support End-to-End Risk Management

Young-Gon Kim, Kyobo Life Insurance
1. Company Profile
2. Project Overview
3. KIROS Architecture
4. KIROS Details
5. Characteristics of the KIROS System
6. Key Business Benefits: ROI
About Kyobo Life (1/2)

1. Company Profile

Vision

Core Purpose
Our mission is to help people not to despair with hardships in their lives.

Core Value

Customer-Friendly Orientation
Our mission is to help people not to despair with hardships in their lives.

Honesty and Sincerity
Our valued customers' best interests are always our top priority.

Spirit of Challenge
We strive continuously to attain the high performance goals for the company and ourselves.

Vision 2010

The most preferred life insurance company in the domestic market.
(The Customer's Most Preferred Brand)
About Kyobo Life (2/2)

1. Company Profile

- August 7, 1958 : Established
- June 27, 1983 : Founder Yong-Ho Shin receives Founder's Award from the International Insurance Society(IIS)
- July 8, 1996 : Founder become a Laureate of the Insurance Hall of Fame by the IIA
- June 30, 2008 : Rated A2 by Moody’s Investors Service and AAA by NICE Investors Service in Insurer Financial Strength Rating
- November 9, 2009 : Life Insurance Company of the Year at the 2009 Awarded by Asia Insurance Industry Awards(AIIA)
- One of Big 3 players dominating Korean life insurance industry - The Big 3 players Dominating Market share is 55.2% (FY2008, Premium Income)
- Kyobo Life will grow to a 100-year old company beyond the past 50 years that it has been built on love and trust of the customers
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Project Objectives

2. Project Overview

External


• Actively prepare countermeasures against increasing insurance fraud and adverse-selection activities.

• Insurance fraud efforts are becoming more organized and intelligent.

Internal

• Since 2006 profits from new contracts have improved a great deal, but overall profit from contracts declining.

• Importance of measuring insurance risk of current effective contracts has emerged due to increase of claim amount from survival benefits and reduction of the scale of unjust claim prevention amounts.

An advanced structure in insurance risk management

- Sophisticated risk assessment
- Underwriting & claim adjudication differentiation
Project Scope

2. Project Overview

The KIROS system is the first in the insurance market to integrate new contract and claims adjudication processes.

Requirements

- Underwriting
  1. Re-structuring of underwriting risk assessment system
  2. Structuring of early warning system for adverse selection contracts
  3. Improvement of new underwriting support system

- Claims
  5. Structuring of accident review risk assessment system
  6. Structuring of auto detection system for problematic symptoms
  7. Improvement of claims adjudication support system

- Infra
  11. Structuring of insurance risk data mart

KIROS Project Scope

- Insurance Underwriting & Claims Risk Assessment System
- Insurance Underwriting & Claims Adjudication Support System
- Insurance Risk Information Analysis System
- Insurance Risk Data Mart
KIROS Conceptual Image

2. Project Overview

KIROS independent system

- Risk assessment for customers based on the insurance risk data mart
- Performance monitoring and remodeling of risk assessment model
- Definition of unusual and irregular underwriting and claim requests and multi-dimensional analysis

KIROS system utilization

- Decisions to underwrite or pay are supported through the measurement, classification and assessment for new contracts and claims requests

KIROS (Kyobo Insurance Risk Management Operation Supporting systems)
2. Project Overview

Resources

9 months, 258 MM (SAS Korea 148 MM, Risk Scoring using SAS FDS Solution)
KICO (Kyobo Subsidiary) (110 MM, Underwriting/Claim System Renewal)

Project Period

- Kick off (6.15) 2009.7.10
- Requirement & Analysis
- Design 2009.8.28
- Development 2009.12.22
- Test & Maintenance Open (2.8) 2010.3.17

• KIROS S/C approved each phase of the project

Final report of analysis phase
Final report of design phase
Intermediary report for development phase
Report of operation and final completion
Communication Governance

2. Project Overview

Full support of an enterprise wide project for KIROS from the head office to the work site.

- **KIROS Project Organization**
  - CEO
  - Planning
  - B2C
  - B2B
  - Product Marketing
  - Insurance Svc Support
  - Asset Mgmt
  - Work support

- **Enterprise PMO**
  - Competence enforcement
  - Cooperation culture
  - Process Improvement
  - KIROS

- **KIROS Project Organization**
  - Insurance Risk Subcommittee
    - Head: Team Manager
    - 3 relevant teams
  - Sales Subcommittee
    - Head: Team Manager
    - 3 relevant teams
  - Marketing Subcommittee
    - Head: Team Manager
    - 4 relevant teams
  - Service Subcommittee

- **Insurance risk sub-committee council**
  - Role
    - Communication with relevant dept of head office and sales site
    - Formulation of user development requirements and deriving utilization using KIROS
  - Duties
    - Implement FGI 4 times for each class of sales site
    - Collection of user requirements for head office (3 times per week)
    - Review of system design
    - Review and decision-making for matters undertaken in each project phase

- **Project Owner**
- **Project Manager**
- **Development**
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KIROS Configuration

3. KIROS Architecture

Secure flexibility by building a next-generation system by implementing KIROS separately from the current operation system.

- HOST
  - I/F
  - DB2

- Operation EAI
  - Weblogic
  - UNIX

- Development EAI
  - Weblogic
  - UNIX

- Users

- Rule Server (Active)
  - Blaze Advisor (Rule Package)
  - DB2
  - AIX 5.1

- Rule Server (Standby/Dev)
  - Operation UI
  - SAS Mid-tier
  - SAS Enterprise Miner
  - SAS EBI Server
  - SAS DI Studio
  - Blaze Advisor
  - DB2
  - AIX

- FDS Server
  - SAS Mid-tier
  - SAS Enterprise Miner
  - SAS EBI Server
  - SAS DI Studio
  - DB2
  - LSF Scheduler
  - AIX

- WAS
  - Operation UI
  - Metadata Server
  - SAS Mid-tier
  - Web Sphere
  - Windows

- External DISK Usable 8.3 TB

KIROS

315GB

105GB

Oprn.

Dev
## SAS Product Applications

<table>
<thead>
<tr>
<th>Applicable Technology</th>
<th>Manufacturer</th>
<th>Facilitation</th>
</tr>
</thead>
</table>
| SAS Base (9.1)        | SAS          | • Data handling for generating the model rule  
|                       |              | • Generate data for multi-dimensional analysis and defining unusual underwritings and claims request standards |
| SAS Enterprise Miner  | SAS          | • Execute models  
|                       |              | - Underwritings: 18 models, 453 node(rules)  
|                       |              | - Claims: 12 models, 175 node(rules) |
| SAS DI Studio         | SAS          | • Extract data from raw data, host and EDW and load  
|                       |              | • Generate data marts for U/W, claims, SIU, etc.  
|                       |              | • Deliver daily batch results and customer/contract info to rule server |
| SAS Mid-tier          | SAS          | • SAS Portal (KIROS Portal) including multi-dimensional analysis, Early warning system, Performance monitoring, Rule refinement (remodeling), Rule management system (for MR/BR) |
| Metadata Server       |              |              |
| Blaze Advisor         | FICO         | • Load the results of SAS MR  
|                       |              | • Operation of overall rules  
|                       |              | • Interaction with the current operation system (host) |
3. KIROS Architecture

**Application Architecture**

**Legacy System**
- Trns. Data
- Credit
- EDW
- VOC

**External Data**
- KIDI Data
- KLIA Data

**Insurance Risk Data Mart**

**Model Rule (MR)**
- Generating mart (SAS)
- Risk modeling

**Business Rule (BR)**
- U/W & claims adjudication

**Insurance U/W & Claims Risk Assessment System**
- Risk Score

**Insurance U/W & Claims Support System**
- U/W Support System
  - Distribute reviewer grade
  - Classify subscription diagnosis
  - Classify visit confirmation
  - Provide risk info for underwriter
- Claims Support System
  - Re-classify for claims territory
  - Provide risk info for adjudicator

**Unusual U/W and claims Multi-dimensional analysis**

**Performance monitoring for risk assessment model**

**Insurance Risk Information Analysis System**

- KIDI: Korea Insurance Development Institute, KLIA: Korea Life Insurance Association
KIROS implemented to strengthen the support of risk assessment of insured clients.

**As-Is**

- **Standard Risk Assessment Process**
  Based on past experience criteria
  - Occupation group, age, rule of the insurance amount etc.

- **Reflecting limited risk assessment factors**
  Risk assessment for combinations of risk factors (occupation, age, cause of claim, claim amount, etc)

- **Insufficient performance measurement**
  Impossible to determine the appropriateness of risk assessment based on standard application

**To-Be**

- **Risk Assessment method applying risk assessment model**
  Scoring for insured clients' risk size using risk assessment MR
  Link adjudicator’s experience with historical data

**The risk assessment model**

- **Regular performance review for risk assessment**
  Supports the adaptability and consistency of risk assessment model through performance review for the operating rule
The modeling process for using SAS E-Miner

1. Definition of Target
   - Select target for major analysis of activity territory or subjects to improve
   
   Target of the underwriting model:
   - Risk benefit rate

   Target of the claim model:
   - Exemption rate

2. Definition of Modeling Technique
   - Decision of modeling technique
   - Finalize modeling technique on sufficient understanding of underwriter/adjudicator
   - Decision Tree Modeling method

3. Definition of Applicable Variables
   - Definition of all variables following the hypothesis expected to influence the target of the model
   - Primary factor: raw data
   - Derivative variables: summary factor
     - total insurance amount,
Insurance U/W & Claims Risk Assessment System (2/5)

4. KIROS Details

Model that reflects the work regulations
Business Rule (BR)

Model that reflects the experimental statistical value
Model Rule (MR)

Combination of work regulations + experience
Association Rule (AR)

Model that is standardized by reflecting the insurance risk management policy of the company, and other policies

Model that is standardized for similar cases to insurance risk management by utilizing the experimental data of the company

Model that is standardized for high significant score from the Association Rule (AR) is used for company's policy Regulation and processing

(Example)
- People over 50 years of age must receive medical diagnosis
- Occupational drivers are not allowed issuance of accident insurance

(Example)
- Standardization of payment cases with a high exemption rate

※ Reflecting the expertise of the underwriter and claims adjudicator
4. KIROS Details

Example of MR Generation

“장해급부” 청구건중 사고보험금 면책율이 높은 
유형을 모델생성시스템을 이용하여 심사기준화함

Example

Status of MR and BR Development

The risk assessment model is a combination of
“Experience statistics + Underwriter expertise”

Underwriting

MR(453) | BR(120)

Claims

MR(175) | BR(183)

[Table and diagram content]

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Operation process of risk assessment model for insurance review

1. Model Generation
   - Policy/Standard
   - Empirical data
   - Expertise of underwriter/adjudicator
   - BR
   - MR
   - AR
   - Verification of model adaptability by underwriter/adjudicator

2. Model Operation
   - Risk assessment model
   - Performance monitoring
   - w/Performance
   - w/o Performance
   - Continuously applied

Support for decision-making

Performance monitoring for risk assessment model

Low-performance models are reviewed for modification or deletion by the “Council for review of risk assessment model”

Governance of risk assessment model review council

- Owner
  - Officer in charge of insurance risk management
- Manager
  - Team manager of the Insurance risk Management support team
- Review Council Member
  - Manager
  - Manager of claims adjudication
  - Head of the part of each team
As-Is

- Applying the limited risk assessment category

  - 30 risk factors (occupation, age, etc)
  - 10 subject benefits (death, disability, hospitalization, etc)

  - Difficult to reflect new products and new benefits

- Limited utilization of risk assessment results

  - Result of risk assessment (risk score) → Limited to distribution for each grade

To-Be

- Applying the segmentation of the risk assessment category

  - Risk assessment category
    - 600 risk factors (risk information pool)
    - 14 subject benefits (existing + CI, surgery and others)

  - Secure consistency through sophisticated underwriting process
  - Classify Customer segmentation through the risk assessment category

- Applying the risk assessment results to the underwriting process

  - Result of risk assessment (risk score)
    - Insurance limit for benefits
    - Diagnosis/interview confirmation
    - Underwriting differentiation

  - Distribution per Grade
Inquiry regarding contents for risk assessment results.

Providing major categories to support the underwritings process:

1. Payment case for each person
2. Diagnostic score
3. Interview score
4. Applied MR case
The claims support system improves the appropriateness and efficiency of adjudication by utilizing risk assessment results for adjudication relocation and specific information about claims requests.

**As-Is**

- Risk classification method based on simple standards and adjudicators’ expertise

<table>
<thead>
<tr>
<th>Risk classification method</th>
<th>Payment by local branch</th>
<th>Payment by head office</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 risk assessment factors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Difficulty in utilizing various information on the result of the risk assessment for claims

**Utilization of risk assessment result**

- Result information for risk assessment (payment, non-payment, Reduction, etc)
- Classification for head office or local branch

**To-Be**

- Risk classification method by the risk assessment model (score) that reflects various risk factors

<table>
<thead>
<tr>
<th>Risk assessment model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Info (276)</td>
</tr>
<tr>
<td>External data (KIDI, KLIA)</td>
</tr>
<tr>
<td>Claim info for individual (527)</td>
</tr>
</tbody>
</table>

- Improve adaptability of adjudication after reviewing various risk information

- Utilize the risk assessment result for claims adjudication

<table>
<thead>
<tr>
<th>Result of risk assessment (Scored for each person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification for head office/local branch</td>
</tr>
<tr>
<td>Distribution for each grade</td>
</tr>
<tr>
<td>Inquiry standard For investigation</td>
</tr>
<tr>
<td>Adjustment of appropriate adjudication volume</td>
</tr>
<tr>
<td>Provide risk assessment</td>
</tr>
</tbody>
</table>

Insurance U/W & Claims Support System - Claims

4. KIROS Details

Insurance U/W & Claims Support System - Claims

Insurance SAS Global Forum 2010
Inquiry regarding contents of risk assessment results.

- Provide details on risk assessment for each contract
- Claims adjudicator confirms the risk factor for individual reviews in detail
- Determines adjudication decision

1. Client score
2. Insurance policy score
3. Payment case score
4. AR Score
Insurance Risk Information Analysis System

4. KIROS Details

SAS Web Portal

Scope of Work

Unusual and irregular underwriting and claims for Fraud (Early Warning System)

Multi-dimensional Analysis

Performance Monitoring for Rules

Rule Refinement (remodeling) system for operation rules

Rule Management System
Insurance Risk Information Analysis System

4. KIROS Details

- Generate and apply the model rule
- Gather users’ business requirement for rules
- Monitoring
- Rule Refinement (Remodeling)
- Rule Management Process
- Modeling

- Monitor the performance of the model rule
- Execute rule refinement for lower performance
Insurance Risk Information Analysis System

4. KIROS Details

Multi-dimensional Analysis

Unusual underwriting and claims requests Analysis
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Characteristics of KIROS System

5. Characteristics of KIROS System

Key Challenges

- Lack of accuracy regarding risk factor
  - Undertake data cleansing within the project period
    - Segmentation of cases of exemptions granted (09.5.18 ~ present) : 37,000
    - DB for exemption point of right to investigate: 8,000.
    - Hospital/doctor data cleansing : 45,000
- Guarantee of user response time for different models
  - Secure online response of 1 second for accounts
- Performance rate of MR/BR rule test
  - Carry out 55.6% prior to opening

Factors leading to Success

- Full-support of executives, including CEO
- Participation of users consisting of specialists in each field
- Competent Staff
  - Excellent Financial data handling
  - Excellent Insurance Risk Modeler
- Proper Project planning
  - On time delivery (9Months)
  - Resources (257MM)
- Using SAS’ worldwide FDS Framework
- Excellent business domain knowledge gained through continuous insurance project (Korea Big companies)
- Strong Project Management skills
- Effective monitoring and improvement on performance
- Strong support from SASK for completion of the project
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Key Business Benefits: ROI

6. Key Business Benefits: ROI

### Quantitative effect

**Underwritings**
Expect to eliminate a possible future loss of 1.3 billion KRW + α (through preliminary removal of adverse selection contracts)

**Claims**
Expect to save additional claim denial (exemption) amounts by 3.8 billion KRW + α

- **Scheduled to report the KIROS Performance measurement (Sep. 2010)**

### Qualitative effect

- Enhance the accuracy of “risk assessment of insured,” a critical part of insurance risk management
- Enable a prompt response to various insurance fraud patterns through the development of the risk assessment method
- Support for timely insurance risk management policy by improving the management of the insurance risk data
- Enhance external recognition by implementing the first integrated insurance risk management system in the insurance industry (underwriting + claims)

※ Implement post-performance evaluation for Apr. ~ Sep. 2010 (6 months) after the system stabilization phase
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