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INSURANCE INNOVATION ASSESSMENT MODEL. REFERENCE OBJECT. APPLICATION TECHNIQUES (PART III)

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Abstract:
This presentation is aimed to stimulate discussion among professionals about the continuation of the author's own designed concept of the *InZu Model*, which supports the assessment of corporate innovativeness in the insurance sector. The following proposal comes as the next step in the work on the development of the *InZu Model* and refers to the necessity for the creation of a model concept of an innovative insurance company as well as the methodology and application in comparisons and assessments to be conducted in this corporate sector in the future.

Being aware of the necessity for assessment of innovativeness in the insurance sector, the authors began their conceptual work on the *InZu Model* in search of those aspects and areas of operation of an insurance company which, if managed innovatively, may finally give rise to the customer oriented reductions in prices of the offered insurance products. Thus, to a large extent, the holistic context of the *InZu Model* construction results from an aspiration to diagnose and promote the socially advantageous function of innovations pursued in the sector of insurance.

Keywords: innovations, insurance, insurance processes, mapping, benchmark objects

1. FURTHER DEVELOPMENT OF THE INZU MODEL

The earlier conceptual work connected with the *InZu Model* was presented in the forum of the subsequent TIIM conferences. In *2013* in the text *Innovations in the Context of the Risk Management* the authors emphasized the method of management of innovation activity costs in the sector of insurance and presented the EVA (Economic Value Added) dynamics based on the original method of monitoring of the investment cost effectiveness in the course of the whole life span of the "innovation effect." And in *2014* in the text *Insurance Products Innovations Based on Management Accounting*, they tackled the topic of the use of the learning curve concept – a managerial accounting tool – in support of product innovativeness of insurance companies that did not have any empirical observations (which may occur, for example, in the case of insurance offered with regard to the production based on nanotechnologies). Then, in *2015* they presented the first part of the study devoted to the *Insurance Innovation Assessment Model – process based approach (part I)*, where the process-activity based approach was proposed as a starting point in the construction of the *InZU Model*. 10 model processes and 20 activities were distinguished then. In **2016** the authors set the hierarchy of activities and proposed the parameters which they perceived significant in the further procedure of the *InZu Model* construction. They also outlined the creation of a model innovation company. This took effect in the text entitled *An Insurer's Innovation Appraisal Model – Process Based Approach (part II).*

2. NECESSITY FOR THE SPECIFICATION OF THE TYPE OF INNOVATION IMPORTANT IN RESEARCH

It is crucial – in the context of the imperative of socially beneficial effect of innovation in the sector of insurance – to well understand innovation, which generally speaking may mean any change improving something, creating a new value or allowing for the creation of something new. The analysis of "innovativeness" and "innovation" in the course of deliberations and discussions about the *InZU Model* gave rise to subsequent closer approaches (Karmańska, Michalski, Śliwiński, 2013, 2014, 2015, and 2016) to the kind of innovation which this research should be about. Today the authors may say that the closest meaning of "innovation" is that put forward by Peter F. Drucker, but only when he says that *"innovation does not have to be technical, it does not even have to be material"* (Drucker, 1992, p. 29). However, this research is not about the innovation described by Drucker in this way: "*innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service"* (Drucker, 1992, p. 29). In order to explicitly explain the problem the authors decided to follow the classifications adopted by the Central Statistical Office (GUS) with regard to innovation activity, which is cyclically examined by GUS in the corporate sector (for example: *Działalność innowacyjna przedsiębiorstw w Polsce w latach 2013-2015 (Corporate innovation activity in Poland in 2013-2015) ,* GUS, First printing, 25.10.2015 [www1]). It is important because GUS does it on the basis of a standard international methodology worked out under the auspices of the OECD and EUROSTAT, and presented in *"Proposed Guidelines for Collecting and Interpreting Technological Innovation Data – Oslo Manual"* (the third edition of 2005 [www.2]; the first edition was published in 1992, the second edition in 1997). Such a decision was made primarily due to the willingness to create a tool (*Model InZU*), which could be used in the same semantic framework as the tools used by GUS to examine innovation in non-insurance sectors.

The statistical research done on a macroeconomic scale, and – for comparison – on a global scale, distinguishes four types of innovation. *Technological/technical innovations* contribute to the development of goods and services and are based on the results of scientific work and research activity. This type of innovation is often a source of other types: organisational and process innovations. *Organisational innovations* consist in a change in corporate operation, a change in the organisation of work or management organisation and are often cost free in character. They are related to the rationalisation of organisation and its adjustment to the changing determinants of the corporate activity environment. On the other hand*, process innovations* concern the implementation of changes in the process of rendering services, and *marketing innovations* refer to the area of sales and distribution of goods and services. All types of innovations often occur jointly, especially in manufacturing companies (launching new products). Service companies primarily make use of organisational and marketing innovations.

The concept presented here (another step towards the creation of a model approach to the innovation assessment in the insurance sector (*InZU Model*)) focuses on organisational innovations. This determines the process based approach, whose application was chosen in the former steps of the construction of the *InZU Model* concept.

3. FURTHER IDEAS AND INTENTIONS

At the stage presented in 2016 it was stated that processes isolated in further modelling will constitute **topical groups**, and sub-processes will become *diagnostic features* (used in taxonomic research). They are measurable features. The diagnostic feature measure setting is based on the reduction in the outlay of working hours designed for the implementation of every sub-process. The measure (value) of a diagnostic feature may be interpreted as a synergic effect of the applied knowledge, skills and attitudes of the people having impact on the implementation of the sub-process. It is assumed that: (1) innovation solutions are introduced at the level of sub-processes and activities primarily due to the need for cost management, (2) in different insurance companies the values of diagnostic features may be different. The innovativeness of an insurance company may be assessed through the similarity measure of the objects in relation to the level of features. It is crucial in this reasoning to determine a reference object. What is meant here by a reference object is a hypothetical insurance company *InZu*, having the highest possible level of innovativeness, in the geographical data and economic determinants of operation.

At the stage of discussion, i.e. the stage of creation of the concept of future empirical study, which the authors are going to undertake, the following steps of creation of the *InZu Model* are assumed:

- the determination of the total employment figure in the insurance industry at two separate points in time, for example 2005 and 2015 (in Poland on the basis of data obtained from the Financial Supervision Authority); the creation of a reference object within the analysed insurance sector for each of these two years;
- the determination of benchmark gauge *InZu-M1* of the long-term impact of innovation in insurance on the structure of a potential process involvement (expressed in working hours).

In the proposed approach an assessment of insurance innovation becomes possible when the reference object has been defined. The assessment may be made through a comparison of the level of similarity measure. The results will be presented on a radar graph. The reference object surface area is equal to 100%. The insurance company surface area varies from 0% to 100%. Thus, also by comparison of the surface area of the analysed object (an insurance company) with the surface are of the reference object it is possible to establish the position of the insurance company with regard to its innovation level. It should be pointed out that the reference object may be changing over time. The ways insurance companies operate may change. Actually, they may be affected by a number of technical and social factors, but also by the fact that innovative solutions at a point in time will become standard solutions in the future. This ability is an important factor and modeling of the proceedings, which will be, in a sense, timeless (or at least long term) should be adequately treated.

The proposed approaches may provide researchers with answers to the following questions:

Stage 1:

1. What is the allocation of available resources (in year 1 and year 2) in the analysed insurance company in comparison with the reference object (InZu Model)?
2. How did the commitment of resources change in the analysed periods of time?
3. What did the real allocation of resources look like in the analysed insurance company?
4. In what process did the differences occur?

The findings should allow for the assessment of the organisational areas in which the analysed insurance company identifies solutions to achieve the parameters of the reference object. At this point some risk of a wrong assessment is posed. It may result from the fact that the employment level in the analysed insurance company may be extraordinarily large in relation to the scale or quality of operation, expressed for example by the gross written premium or the achieved financial result. The examination of this issue and the elimination of entities where such an employment hypertrophy is easy to identify is a prerequisite for a good selection of the population of insurers, whose innovation is to be assessed.

Stage 2:

5. In which part does the change in the process commitment of resources in the analysed X insurance company observed in the course of the analysed period (for example 10 years) correspond to the benchmark change, in which part does it /exceed/not reach this change?

The analysis requires an appropriate assessment of diagnostic features (expressed in working hours). For example, if over a period of 10 years in a certain process the use of resources declined from 8% to 7%, it could be attributed to a more effective application of the innovative solutions than assumed in the reference object. In order to avoid making a mistake in the assessment of such a situation, it would be useful to see whether the change in the pattern of allocation of resources actually was financially advantageous. It could happen that at a lower percentage of the allocation of resources to the process actually more people would be employed in the process. It is good if over the analysed period the growth results from an increased scale of operation. The employment trend within 10 years should be evaluated with regard to it.

6. What are the financial implications of changes in the allocation of the resources of the insurance company? Do they correspond to the allocation in the reference object?

Such an analysis requires the creation of a reference for the research of the insurance sector cost of working hours. It could be calculated using the aggregated data concerning the whole sector in relation to the cost and total number of employment.

In the case of great difficulties and work intensity in the pursuit of analyses aimed at answering the aforementioned questions, it seems possible to simplify the analysis and confine the search for answers to questions 1 and 2. Simplified as it may seem, the identification of changes occurring in the analysed insurance company pursued in order to adequately answer the posed questions may also be regarded reliable. The benchmark structure is made in such a way as to reflect the features which are averaged to a certain extent, characteristic of the environment of insurance companies at the background of which the X insurance company is to be assessed. Thus, if you apply the percentage structure of resource allocation to processes with regard to every analysed company, you will obtain characteristics to be related to, for example, changes in the scale of activity, which should – in such a case – be accounted for in the analysis as another parameter.

The discussion above and the proposed approach may arouse grave concern. The authors try to work out a good concept to assess the innovation in insurance in time and space (a set of insurers to be assessed).

It seems that thanks to the development of such a modelling, on the basis of this simple reasoning, it may be possible to establish interesting and useful characteristics, even though limited in scope, of the insurance sector in the future empirical studies.

It is impossible to present examples to illustrate the detailed reasoning at this point. The following illustration of the conceptual framework with regard to how to determine the standard measurement of the selected diagnostic features does not reflect all the issues. However, it is the best and the shortest way to present our concept. For example, there is no criterion of the standard size of an insurance company, though this criterion seems to be appropriate here. The presented example should be seen as an elementary illustration of the methodology which, referred to a selected sub-process sample, may eventually result in finding (see column G) the characteristics representing a reference point in the assessment of other insurance companies.

Table 1: Sample of diagnostic features.

		A	B	C	D	E	F	G
2.3.	S3 –underwriting process	O1	8	1 331 200	9	1 302 912	1	-28 288

Legend:

A – Process level: O1 – operation level of the first degree, O2 – operation level of the second degree, O3 – operation level of the third degree, W – supporting processes (sample process above);
B, D – Benchmark, expert standardized measures, separately for two years: year 1 – column B, for example 2005, year 2 – column D, for example 2015,
C, E – Allocation of annual resources to processes, working hours, according to TD-Activity Based Costing,: 80% x column C x 8 working hours x 5 days x 52 weeks) (in the above sample: 8% of resources is 1,331,200 working hours in a year; 1.9% of resource is to 1,302,912 working hours in year 2);
F – Change (in %) in the structure of annual allocation of resources between year 1 and year 2
G – Synergy (caused by many factors, such as detailed knowledge, attitudes and behaviours, relationships with the environment, technical methods and other solutions) measures of the effect of innovation in processes over 10 years.

Source: A. Śliwiński, A. Karmańska, T. Michalski, *Insurance Innovation Assessment Model – Process Based Approach (Part I),* TIIM 2015, Barii 2015

The determination of the reference object is crucial here. It may be followed by an expert method using the methodology of the case analysis and the familiarity with the organization of the insurance business and in-depth interviews, conducted in the leading insurance companies in the country, a region of the world or the insurance sector (depending on the analytical context). An expert approach is certainly challenging, and therefore requires a prior methodological preparation. It is also necessary due to the fact that the so-called reference object may change over time. The reference object could

be represented by the diagnostic features based on: (a) real data describing a set of insurers which are to be subject to further assessment with regard to innovativeness; (b) benchmark insurers (foreign) to be treated as a market model.

As remarked before, it is crucial to determine the so-called reference object in the process of model application. From the perspective of the research subject, a reference object is an insurance company which may be considered the most innovative. This object is virtual. The assessed companies should aspire to obtain assessment (acc. to similarity measures applied) on the level of the reference object. Two taxonomic measures, as already stated, may be used in the assessment of innovativeness.

The model applies two groups of measures: the distance measure and similarity measure. Measure μ describing the degree of similarity between the dimension structures of two objects is defined by the following equation:

$$\mu_{i,p} = \frac{z_i \circ z_p}{|z_i||z_p|}$$

Where: $z_i \circ z_p$ denotes the scalar multiple of vectors z_i and z_p containing all dimensions of the particular objects and $|z|$ the length of the vectors. This means that the value of μ is between -1 and 1 as the scalar multiple is the cosine of the angle between the vectors.
The measure of similarity of objects dimensions d*(i,p) is defined by the following equation:

$$d^*(i,p) = 1 - \frac{1}{2\sqrt{kn}} * d(i,p)$$
$$0 \le d^*(i,p) \le 1 ,$$

where: k denotes the number of objects and n denotes the number of dimensions, it is a normalized version of the differentiation of objects dimensions d(i,p).

$$d(i,p) = \sqrt{(\sum_{i=1}(z_{i,i} - z_{i,p})^2}$$

where: d_{ip} denotes the distance between objects i and p and $z_{ij}z_{pj}$ the values of dimension j of object i and p respectively.

The literature suggests that the reference object should be determined according to the criterion of similarity of structures of diagnostic features (Michalski, 2000, p. 93). The reference object is a sort of universal object. It means that it is a reference for all the examined objects; in this case insurance companies. The object may be described with vector $\mathbf{Z_o}$, whose components $\mathbf{z_{o,j}}$, are described as follows (Michalski, 1995, p.410)**:**

$$z_{o,j} = \begin{cases} \max\limits_t z_{t,j} & \text{for stimulant features} \\ \min\limits_t z_{t,j} & \text{for destimulant features} \end{cases}$$

The method of reference object determination will allow for the assessment of the level of innovativeness of the analysed insurance companies in two aspects. The determination of a reference object based on the market data of the examined diagnostic features of processes and sub-processes will allow for the assessment of the company in relation to the reference level of market innovativeness (market reference). In the case of determination of a reference object for an insurance company based on the data concerning one specific point in time, then calculating similarity measures concerning a different point in time, it will be possible to assess a change in the level of innovativeness at a selected point in time. The reference determined in such a way will be called an internal reference.

The comparison of the analysed insurance companies with the market reference will allow for the creation of insurance companies rating according to their level of competitiveness. And the comparison of similarity measure values with the internal reference will allow for the assessment of the

innovativeness level over time. It should be borne in mind that all insurance companies must not be compared at a time. Large companies with a long operation history may indicate a higher level of innovativeness than those with a relatively short period of operation. Therefore, a few market reference objects should be determined depending on the size of the company. The estimation of the company size may come as a problem. The market share of the company, the volume of own equity or corporate economic life span may be taken into account.

4. CONCLUSIONS

The proposed InZu model may be used in empirical research to assess the level of product and organisational innovativeness of insurance companies operating on the selected markets. In the process of model creation it is crucial to determine the so-called reference object. It is advisable to determine two of them: a market reference object and an internal reference object. Furthermore, the market reference model should be diversified depending on the kind of insurance company. The criterion to diversify may be based for example on the market operation time. This problem requires further discussion or even preliminary research in order to identify the determinants of innovativeness in life insurance companies. These determinants may be used later in the process of diversification of the market reference object.
The results of research on the innovativeness of insurance companies may have a comprehensive practical application. The ratings based on the market reference may be used by supervision authorities or institutions deciding about financing innovative projects. Internal models may provide basis for the assessment of development of an insurance company over time as well as the assessment of innovativeness related expenditure incurred by the company boards.

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