



# AN OVERVIEW OF DIGITALIZATION AND PERSONALIZATION IN INSURANCE WITH A FOCUS ON LIFE INSURANCE

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**Abstract:** *In light of the digitization of distribution channels, products and services, the financial sector has shown that it can easily respond to the challenges of the 21st century and move its operations completely to the Internet. Banks have done well in this process, but insurance companies lag significantly behind. The insurance industry, which is characterized by a high degree of personalization of its products, faces great challenges in this field. The aim of this paper is to show the level of digitalization of insurance market in the Republic of Serbia, as an emerging market and to show the possibilities of insurance personalization in the light of new digital sales channels.*

**Key Words:** *Personalization, customization, digitalization, insurance, life insurance*

## 1. INTRODUCTION

Insurance is a key mechanism by which humans prepare for risk and has played a central role in the development of the global economy [1]. The risks in insurance are numerous. In the world there are over 450 different risks. By combining different risks and coverage levels of selected risks, insurers create products that they commercially offer to their clients. However, those products are the result of the policyholder's needs that the insurer has been able to recognize. On the other hand, the needs of customers of insurance services are numerous and cannot often fit into the commercial products offered by the insurer. If the risk is possible, measurable, uncertain and unexpected, and at the same time it causes economic damage by realization, then it is certainly insurable. In other words, insurers provide service of risks insurance that are chosen by the policyholder and thus enable a highly personalized service by creating an insurance package that is tailored to the insured.

The insurance packages that insurers offer commercially can also be tailored so that the end product, the insurance coverage, better suits the needs of the insured. By contracting different insurance value options, additional risks, extensions of coverage, policy period, prevention measures, the amount of deductible or excess, etc., the insured gets the opportunity to create a

personalized package, but it also directly affects the price of the insurance policy.

The digitalization of sales and the recent accelerated transition to online shop in many industries created a global impression that despite all the benefits that online shopping bring in terms of reducing business costs, visible consequences still remain in the field of personalization. Industries like insurance sector, which are characterized by a high degree of personalization of their services, remain deprived in the field of online sales because they have not developed the capacity to transfer the personalization of their products to online platforms or to transfer them to a sufficient extent.

In the following, this paper will present the offer of insurance companies that currently offer their services via the Internet on the Serbian market, with a special focus on life insurance. The method of calculating the life insurance premium will be analyzed in detail and possibilities of online personalization of the insurance policy.

## 2. DIGITAL TRANSFORMATION OF THE INSURANCE INDUSTRY

Insurance, like all other industries, is under the pressure of digital transformation by the entry of younger generations ("millennials") who use digital technologies on a daily basis in all spheres of their life.

Today, insurance customers expect a fully digital experience while purchasing products that are personalized to their needs, and at the same time personalized in terms of price, according to risk awareness. The entry of Insurtech companies into the insurance market has further accelerated the process of digitalization of insurance companies. The convenience of purchasing insurance policies through Insurtech platforms has taken the user experience to a new level and insurance companies that want to be competitive must be visible on them.

According to PWC survey, 41% consumers who faced challenges with their insurer say that they are likely or more likely to switch providers due to a lack of digital capabilities [2]. The user experience must be exceptional.

Customer support is expected 24/7 via favorite communication channels. Traditional communication channels such as email or call centers are used less, while social networks, customer self-service portals and intelligent chatbots take over the primacy.

As trust in insurance companies depends mostly on the fast and efficient claims process, digitization in the insurance sphere is expected there first. For 94% of clients, the efficiency of resolving claims and the transparency of the claims process contribute loyalty to the insurer at greatest extent [3]. Clients want efficient system to file a claim that can be accessed on their mobile devices anywhere, anytime (online file claims, online claim track and online appoint of loss assessor). User experience built on a digital claim can:

- Increase customer satisfaction score by 20% points;
- Improve claim handling accuracy;
- Reduce claims expenses by 30% [4].

Progressive insurers who are willing to implement end-to-end digital claims processes (Fig.1.) have to go through a challenging path that includes the implementation of new business models focusing on customer experience, process optimization and damage prevention.

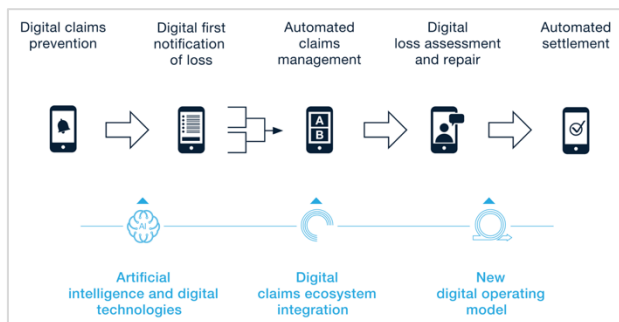


Fig. 1. End-to-end digitalization of insurance claim process [4]

The personalization of insurance products implies development of insurance solutions personalized to needs of each individual customer. Through better risk segmentation, personalization enables a better possibility of personalizing the price of insurance coverage.

Among the many InsurTech innovations stands out Internet of Things (IoT). IoT enables insurers new ways of collecting information which improves the process of underwriting, in terms of more accurate risk assessment. In this sense personalization of underwriting process has already started in some insurance companies globally. For example, Usage-based insurance (“Pay As You Drive”) uses IoT data to create a personalized insurance premium rate according to the behavior and driving style of the policyholder, while smart devices that monitor the health status of the insured can also affect the cost of health insurance.

Analytics that are based on real data and devices that generate large amounts of data have significant capabilities. It can prevent an unwanted event from happening by alerting the user to the danger. This reduces the number of insurance claims [5].

### 3. DIGITALIZATION OF INSURANCE – SERBIA CASE

#### 3.1. Insurance industry outlook

In conditions of increased and restructuring risks caused by the pandemic, climate changes, digitalization, etc., insurance markets showed a certain degree of resilience, despite drop in world GDP of 3.1% in 2020 [6]. This was contributed by change in risk awareness and additional financial security in light of the newly created situation. The estimated real growth of the global non-life insurance premium in 2021 is 3.3%, whereby in developed countries growth in is estimated at 2.8%, and in emerging countries growth at 5.8% [7].

According to the level of development, measured by the ratio of total premium to GDP and total premium per capita, the Serbian insurance sector is below the average for EU member states [8]. However, when compared with emerging economies, Serbia with 2% average holds a satisfactory position (Fig.2.), with the potential to improve it further [9].

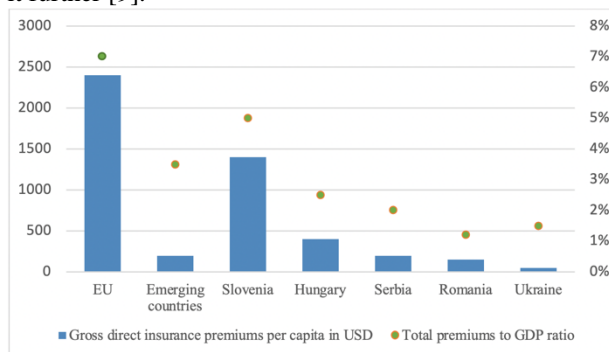


Fig. 2. Insurance sector development indicators in 2020. [9]

The premium composition shows that the share of non-life insurance accounted for 77.3%, while the share of life insurance was 22.7% in 2021 [8].

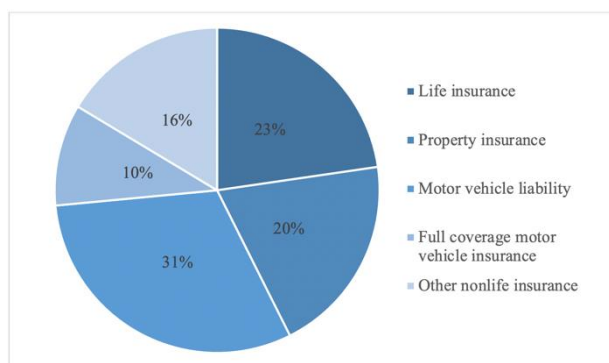


Fig. 3. Total premium according to the types of insurance in 2021 (%) [8]

#### 3.2. Life insurance and digital sales in Serbia

Modern information and communication technology have found its application in the distribution of insurance products in Serbia, but not to the extent that was predicted. In an effort to respond to the challenges of technological development, insurance companies have shown a willingness to start with changes that affect the very

essence of the insurance companies' technology and operations. The relatively slow implementation of electronic business in the insurance industry is caused by several specifics - the complexity of the insurance product itself, consumer attitudes and high initial investments.

Today, there is no insurance company in Serbia that does not have its own website. On the web page insurers provide basic information about the company, insurance products that they offer and details on how to contact and communicate with insurance agents. Some insurance companies give possibility to calculate prices of several simpler insurance products. Only few companies enable contracting the insurance coverage online.

For electronic business, simpler products are more suitable. They are more understandable to the potential customer and therefore do not require additional information and advice. In other words, "simple" insurance products like: motor vehicle insurance, property insurance, personal liability insurance coverage and some

simpler types of life insurance are most suitable for online sales. It can be said that these insurances are "simpler" because it can be standardized more easily. The result of standardization is better comparability of products, which is financially important for the future clients of the insurance services [10].

There are fully automated products in the offer of insurance companies' web stores (insurance that can be purchased online) and semi-automated products (without purchase, but information about the insurance offer and price of coverage is available). If the product is not available on the web store, potential clients can send a request related to a specific request.

There are currently several hybrid platforms on the Serbian market that provide a comparative overview of insurance products and the possibility of online purchase for some of them. These platforms come with 24/7 support, which creates the impression of a personal approach that clients traditionally expect.

Table1. An overview of insurance sales through the web store on the Serbian market

Insurance company		Life insurance			Nonlife insurance	
		Web shop	Online quote sent by email - input data -	Online calculator - input data -	Web shop	Types of insurance
1	DDOR	no	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ date of birth</li> <li>▪ gender</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ health</li> <li>▪ car assistance</li> </ul>
2	Generali	no	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ date of birth</li> <li>▪ gender</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ car assistance</li> <li>▪ homeowners</li> </ul>
3	Grawe	no	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ date of birth</li> <li>▪ gender</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> </ul>
4	Triglav	no	<ul style="list-style-type: none"> <li>▪ date of birth</li> <li>▪ marital status</li> <li>▪ family status</li> <li>▪ indebtedness status</li> <li>▪ savings status</li> <li>▪ property status</li> <li>▪ monthly income</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ homeowners</li> </ul>
5	Uniqua	no	<ul style="list-style-type: none"> <li>▪ a written request for a quote sent by email</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ car assistance</li> <li>▪ homeowners</li> </ul>
6	Merkur	no	<ul style="list-style-type: none"> <li>▪ a written request for a quote sent by email</li> </ul>	no	no	-
7	Dunav	no	<ul style="list-style-type: none"> <li>▪ a written request for a quote sent by email</li> </ul>		yes	<ul style="list-style-type: none"> <li>▪ travel</li> </ul>
8	OTP	no	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ date of birth</li> <li>▪ gender</li> <li>▪ profession</li> <li>▪ marital status</li> <li>▪ family status</li> <li>▪ monthly income</li> </ul>	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ the amount of the monthly premium or the amount of the insured sum</li> <li>▪ policy duration</li> </ul>	no	-
9	Sava	no	<ul style="list-style-type: none"> <li>▪ date of birth</li> <li>▪ gender</li> <li>▪ profession</li> </ul>	no	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ homeowners</li> </ul>
10	Wiener	no	<ul style="list-style-type: none"> <li>▪ a written request for a quote sent by email</li> </ul>	<ul style="list-style-type: none"> <li>▪ type of insurance policies</li> <li>▪ date of birth</li> <li>▪ gender</li> <li>▪ the amount of the premium</li> <li>▪ payment dynamics</li> <li>▪ policy duration</li> <li>▪ period of deferral</li> </ul>	yes	<ul style="list-style-type: none"> <li>▪ travel</li> <li>▪ homeowners</li> </ul>

Although, as previously stated, there are several types of insurance products that are most suitable for online sales, only few of them are fully automated on the Serbian market. The complete purchase of insurance product, from personalized offer to the contracting and payment of the insurance premium is currently enabled for the following products:

- travel insurance,
- car assistance,
- homeowners insurance and
- health insurance.

Travel insurance through online shopping is offered by most insurance companies and it is the first product that was offered by insurers on webshop. Health insurance is currently offered online only by one company on the Serbian market. Life insurance products and B2B insurance options are currently unavailable.

From the technical point of view, in contrast to non-life insurance, life insurances are technically simple products and suitable for online sales. With a significant degree of personalization, using the online configurators, they can fully satisfy the needs of the future clients in just a few "clicks".

In the digital market of Serbia, it is currently only possible to send inquiries regarding specific product offered by insurers. Configuration of life insurance product comes down to selection of life insurance package created by insurer and entering the age of the insured and contact information in the online form. This kind of process is substantially neither automated nor personalized. The completed form then is digitally (by email) directed to the insurance agent, who underwrite risk in the traditional way and sends insurance offer via e-mail to the potential client. In this way, the distribution path of the offer was shortened, but the client did not participate in its creation.

#### **4. THE USE OF ONLINE CONFIGURATORS FOR LIFE INSURANCE PERSONALIZATION**

As previously stated, due to their simplicity in terms of calculating the insurance premium, life insurance for case of death and/or survival are very suitable for full automation and online configuration.

In order to understand the possibilities of personalization of life insurance and its convenience for transferring it to the web, it is necessary to understand the characteristics of life insurance and the method of premium calculation.

##### **4.1. Technical basics of life insurance**

There are numerous types (models) of life insurance and they are similar according to the subject of insurance, but they differ according to the method of payments and payments and according to the insurance tariff. Each type of insurance has its own insurance rates, which primarily depend on the mortality tables and the quality of the data contained in them. Interest rates are contained in the tariff, and they do not change over a long period of time.

A mortality table, also known as a life table or actuarial table, shows the rate of deaths occurring in a defined population during a selected time interval, or

survival rates from birth to death. Mortality tables contain a number of indicators such as: number of living ( $l_x$ ), number of dead ( $d_x$ ), probability of survival, average life expectancy, commutative numbers, etc.

Mortality tables constructed from observations that include the entire population of a nation (usually divided into female and male populations) are commonly called population mortality tables. Insurance mortality tables are constructed based on mortality data originating from a collection of insurance portfolios and/or pension funds. The justification for the existence of special insurance mortality tables lies in the fact that the level of mortality can differ significantly depending on the type of the insurance. Population tables usually reveal a higher level of mortality than insurance tables, which is why they represent a conservative estimate of mortality in insurance contract portfolios. Therefore, the population tables are used to determine the margin or reserve that will be calculated in the insurance premium.

In addition to the mortality tables, the interest rate is another element required to calculate the technical premium. The range of interest rates is 3 to 5%. When choosing an interest rate, it should be borne in mind that the interest rate chosen as the calculation basis for the tariff should be lower than the rate of return that the insurance company can obtain through the investment of reserves. The interest rate should not change frequently because life insurance contracts are long-term and insurance premium is fixed. According to the recommendation of the International Actuarial Association, the interest rate is based on the expected rate of return on assets whose cash flows should ensure the indemnity of policyholders [11].

The third element for calculating the technical premium is insurance operating costs. These costs are common to all business. Operating costs depend on the change in the amount of the insured sum and when calculating the tariffs, they are determined in parts of the insured sum [12].

Using mortality tables and fixed annual interest rates, commutative numbers are calculated. They serve as basis for creating life insurance tariffs. Tables of commutative numbers simplify the numerical calculation of many actuarial functions. Expected values are more easily obtained by the deterministic method, which is tightly coupled with commutative numbers. The deterministic model implies that we observe a closed set of same aged individuals and observe them over time [13]. Considering that the insurance industry is older than the use of computers, in order to facilitate the actuary's work, various written marks called commutative numbers were contrived and they are entered into the table along with other data. Commutative numbers contain a reference interest rate.

##### **4.2. Configuration of life insurance**

Factors which are important when calculating an insurance tariff and contracting life insurance are:

- insurance policy period,
- policyholders age,
- gender,
- profession, as well as the life style and medical health condition of the insured.

According to the insured risk, life insurance is divided into:

- Term life insurance (insurance for case of death)
- Money back life insurance (insurance for case of survivor)
- Endowment life insurance (insurance for case of death and survivor)

According to the premium payment option, there are:

- Single premium life insurance (lump-sum premium payment)
- Regular premium life insurance:
  - According to the beginning of the payment, premium can be immediate or delayed for a period of time.
  - According to the completion of the payment, premium can be lifelong or temporary.

According to the payout options, life insurance is divided into:

- Insurance with lump-sum payout
- Insurance with installment-payout option (annuity option):
  - According to the beginning of receiving the annuity, it can be immediate, which means that the annuity is received immediately after the payment of the premium, or delayed for some period of time.
  - Depending on the end of receiving the annuity, it can be lifelong or temporary.

To explain how the algorithm that calculates the insurance premium works, we will present an example of the calculation of a one-time premium money back life insurance with delayed and lifelong annuity.

Let's assume that the annuity is 1 money unit, which the insured starts receiving at the beginning of each year,  $k$  years after the payment of a one-time premium of  ${}_k a_x$  money units until the end of his life. The timeline for this calculation is as follows:

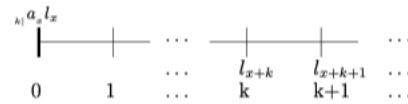


Fig. 4. Timeline of payments and payouts

By discounting all values at the moment of payment of the single premium by the insured (wide bar on timeline), adding and by substitution of commutative numbers follows:

$$a_x * l_x = \frac{l_{x+k}}{r^k} + \frac{l_{x+k+1}}{r^{k+1}} + \frac{l_{x+k+2}}{r^{k+2}} + \dots \quad / * \frac{1}{r^x} \quad (1)$$

$$a_x * D_x = D_{x+k} + D_{x+k+1} + D_{x+k+2} + \dots \quad (2)$$

$$a_x * D_x = N_{x+k} \quad (3)$$

It follows that the single premium (P) for the delayed and lifelong annuity (R) is:

$$a_x = \frac{N_{x+k}}{D_x} \quad / * R \quad (4)$$

$$P = R * \frac{N_{x+k}}{D_x} \quad (5)$$

For example: If a 35-year-old person wants to receive a lifetime annual annuity of 5,000 money units, from the age of 60 (25 years after the date of insurance), the net lump sum insurance premium is calculated as follows:

$$P = 5000 * \frac{N_{60}}{D_{35}} \quad (6)$$

By substituting the numerical values of the commutative numbers ( $N_{60}$  i  $D_{35}$ ) from the insurance mortality tables the premium amount is calculated. All other life insurance tariffs are calculated respectively, combining different ways of premium payment and payout options.

Based on all the above, the configuration of life insurance products could be presented as follows:

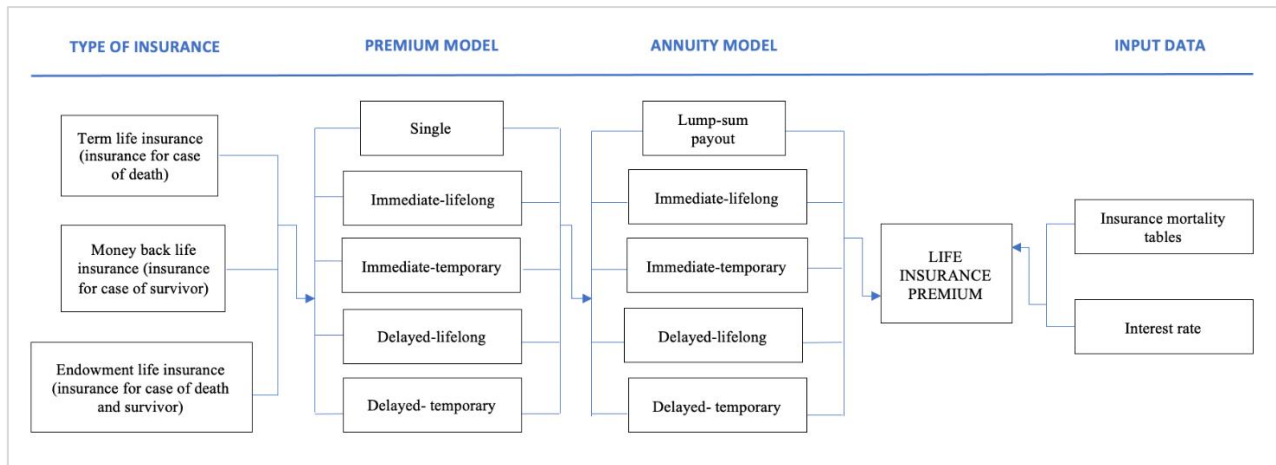


Fig. 5. The configuration of life insurances

## 5. CONCLUSION

One of the key factors in the success of the business of life insurance companies are insurance tariffs, while at

the same time the success of a life insurance products lies in the fact that they are based on theory of probability, statistics and long-term product development. Advanced

technologies have enabled insurance companies to try out new possibilities of monitoring, measuring and analyzing risk.

The enormous growth of new data sources combined with the predictive capabilities of advanced technologies and their algorithms, leads to smaller segments of consumers. Digitalization is no longer a novelty but a strategy of insurance companies. Some of the advanced technologies that insurers are starting to use are: Internet of Things, Artificial Intelligence, Blockchain, Machine Learning, Big Data Analytics. The application of these technologies leads to risk segmentation, better price and personalized offers, as well as more efficient sales.

Identifying and targeting the future needs of policyholders according to the upcoming life stage will be next step in personalization. Insurance companies stream to be lifelong partners and allies of their clients. The increased use of the Internet and social networks generates a huge amount of unstructured data. By analyzing such data, insurance companies can create targeted marketing campaigns that will gain new users. Monitoring the online behavior of the insured can provide much more accurate information about user needs than surveys.

In the future, life insurance will be much more personalized, in terms of the insured's needs and price. The client's medical history combined with the life habits observed using health apps and mobile devices can significantly influence the correction of tariffs in terms of more precise risk segmentation. The digital transformation and personalization of insurance encourage policyholders to positive behavior. It does not only refer to whether we will pay less for the insurance. It also refers to whether we will take care more about our health.

In the future, digital transformation will enable, both insurers and clients, to collaborate on loss prevention and thereby create benefits for both parties. Insurers can gain a huge competitive advantage on the market and reduce their costs by investing in the prevention of harmful event, instead of focusing on managing claims when the damage occurs. Analytics based on real data and devices that generate large amounts of data such as mobile phones, wearables and telemetric, have significant opportunities to prevent an unwanted event from occurring by warning the insured in case of danger or pointing out the benefits that they can have by changing their behavior and lifestyle.

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