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ISSUES OF BRAND CAPITAL LOSS RISK ANALYSIS

The article describes issues accompanying the analysis of the risk of brand capital loss resulting from risk assessment and the specificity of the subject of assessment. It was proposed to adopt a definition of risk as a feature of a situation in which it is possible to quantify threats. The research focused on considerations regarding possible approaches for a measurable indicator for the assessment of the level of risk based on conditions of relative market balance and lack of global threats to the industry of a given brand. The article proposed to modify the customer life-time value indicator to estimate the expected value of the customer's loss, as one of the indicators of brand capital loss. An example was provided showing the possibility of using a simplified customer decision model based on Markov processes to estimate changes in the probability of losing a customer over time.

Keywords: brand, brand capital, risk, risk analysis.

1. INTRODUCTION

A brand is like trust in business, it facilitates a lot of things. This concise comparison explains the observed, dynamic development of knowledge concerning the building, measuring and managing brand capital. However, this phenomenon would not really exist if it was not for the measurable effects of return on marketing investments. The search for selected offerings in source literature devoted to marketing issues made it possible to notice that understanding the need to successively increase the brand capital has slightly dominated the concern for its loss – it is difficult to find examples of literature devoted to the risk of losing brand capital.

A general, comprehensive method of brand capital assessment was also not found. Perhaps this is because in multi-criteria assessments it is extremely important and difficult to estimate the right relations between the criteria, which correspond to the needs of the evaluator. Moreover, the ability to make an expert diagnosis of the current state of a brand capital, on the basis of many economic indicators and the results of broadly understood marketing research, is just the easiest condition to meet, needed to forecast its change in the long term. This leads to the assumption that the majority of problems in analysing the risk of losing brand capital are related to the selection of measurable indicators allowing for risk evaluation. The signalled state of affairs leads us to take a specific risk of making a judgement on a few reflections and observations regarding the observed problems within the discussed potential scientific exploration area.

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The aim of this article was to identify, describe and explain, the essence of selected problems of risk analysis, related to the possibility of losing the positive effects for the brand owner resulting from its possession, and to discuss proposals for general possibilities of overcoming selected, noticed difficulties at this stage of risk management. The considerations were limited to a relatively stable market situation[2]. The emergence of "external" threats destabilising the brand-specific industry, such as e.g. new inventions and technological innovations triggering revolutionary changes in customers' needs, creates a situation in which, in practice, it is sufficient to identify threats to the loss of brand capital without a quantitative, comprehensive assessment of the risk this phenomenon entails (as this risk is usually unacceptable). The analysis of such situations also goes beyond the subject matter of this article.

It has been noted that many important problems in the analysis of this risk concern methodological, axiological and even ontological aspects (here e.g. related to the difficulty of determining the ontological existence of a risk definition), as well as arise from the specificity of the brand itself and the loss of brand capital.

2. BRAND, ITS FUNCTIONS AND CAPITAL

A brand, in essence, is a company sign – a graphic symbol or a trade mark – recognised on the market, allowing to identify a producer, service provider or seller (owner). In a broader sense, it can be treated as a mental shortcut referring directly to the image of the brand owner. A successful form of a graphic sign associated with a given brand is usually a catalyst for building this positive image. A strong brand, representing an owner whose image is consistent with reality and sufficiently recognisable, may perform several more important, positive functions, understood as an objective effect of its presence on the market. The following functions of the brand can be mentioned here:

- protective – safeguarding against imitation or counterfeiting of a legally protected trademark;
- informational – informing about the origin of the product and its consumer's membership in the group of the brand products users;
- emotional – being a source of personal satisfaction of the consumer derived from possession;
- promotional – it is an element of brand promotion itself, through the presence of a graphic sign in public space;
- guarantee – informing about the guaranteed, potential product quality;
- limiting the buyer's risk – increasing the sense of certainty of choice made by the buyer in the most often multi-criteria product assessment;
- limiting the risk of the brand owner – consumer loyalty to the brand allows to limit the risks of market functioning (e.g. investment decisions taken);
- added value – allows to obtain an inflated, market-acceptable sales price of products (services), limit expenditure on their promotion.

The quality of these functions is an indicator of the brand's strength and represents a contractual value for both the owner and the consumer. The difference in the marketing

[2] Market stability is understood here as the ability to return to the balance lost as a result of disturbances. This stability is an important assumption as it allows to identify probability distributions characterising market phenomena using statistical tools.

behaviour of the customer caused by the perception of the brand is called customer-based brand capital. The basic components of this capital are "(1) the differentiating effect, (2) brand awareness, (3) consumer response to marketing. They set out the general direction of its construction" (Keller, 2015).

Diversified characters of brands and the multifaceted nature of their functions cause the phenomenon of loss of brand capital to be understood ambiguously. For the purposes of the considerations being the content of this article, it has been assumed that the loss of a brand capital is a market phenomenon, connected with the disturbance of its functioning on the market in aspects of many of the above mentioned functions, and sometimes with the reversal of their positive perception (e.g. an auto-advertising may become an anti-advertisement), which in consequence is connected with the loss of a brand capital and losses for its owner. However, due to the assumed generality of considerations, it is also assumed that the degree of weakening of the brand capital and the related extent of losses can be assessed by an owner according to subjective criteria. The source literature offers descriptions of a number of methods for measuring the results of a brand capital, allowing to indirectly deduce its strength, but as Kelvin L. Keller (2015) claims, a comprehensive, quantitative method of evaluating this capital using a single indicator has not yet been developed.

3. RISK ESSENCE AND RISK ANALYSIS, SELECTED AUTOGENOUS RISK ANALYSIS PROBLEMS

Risk management is already a common practice in almost every company wishing to meet ISO standards (e.g. PN-ISO 31000:2018-08). In the light of the guidelines of these standards, modern risk management deals with situations in which measurable risk and immeasurable uncertainty are assessed, which, intrinsically, gives rise to certain methodological difficulties.

Before explaining the essence of risk analysis, it is worth defining the concept of risk itself, as the practice of defining it in many risk management methods is controversial, and the regulating nature of these definitions may have negative consequences also for the risk assessment itself. This is particularly important in view of the Basel Committee on Banking Supervision's definition of various types of risks by means of risk[3].

The source of formal difficulties, transferred to the practice of risk management, is the ambiguity of understanding risk as an ontological entity – the concept becomes a term after defining it. The definition usually narrows down the original meaning of the concept for communication in a given area of knowledge. Over time, the term displaces the original meaning of the concept from users' awareness, becoming the cause of difficulties in verbal communication, consisting of reification, i.e. interlocutors having difficulty in distinguishing name from a referent (reality from the model, e.g. risk from risk measures). Risk is a classic example of this, and over-restricting the meaning of a key term may also narrow down the scope of risk assessment.

There are many definitions of risk in standardisation documents and risk management source literature, referring to these and other ontological categories. For example, according

[3] Resolution No. 8/2013 of the Polish Financial Supervision Authority of 8 January 2013 regarding the management of operational risk in banks assumes, as the Basel Committee of Banking Supervision, that operational risk is to be understood as the risk of loss resulting from maladjusted or unreliable internal processes, people and technical systems or from external events.

to ISO 31000: 2012 standard "risk is the result of uncertainty in striving to achieve a goal". It can be noted that: there can be many effects of uncertainty; the definition does not specify whether this effect is to be measurable; when there is an effect there is no longer any risk, since there is a specific loss; the uncertainty itself needs to be defined[4]. An example of the identification of risk with the possibility[5] of adverse events is the definition given by Ladislav Tempnan (2002) or William D. Rowe (1977). There are many examples of perceiving risk as a danger. For example, according to Maria Sierpińska and Tomasz Jachna "Risk is usually defined as the danger of loss (...)". (Sierpińska and Jachna, 2005). If we notice that taking risk is the exact factor that exposes to danger, then in the quoted fragment of the definition the effect is identified with the cause (because a danger is in fact a state of danger).

As a result of standardisation, the most common interpretation is the perception of risk as a combination of the quantitative probability of loss occurrence and the severity of that loss. E.g. "Risk means the frequency of accidents and incidents leading to harm and the severity of that harm" (Commission, 2013, p. L,121/11). In many known risk assessment methodologies developed according to the guidelines (PN-ISO 31000:2018-08), in practice, the concept of risk – R is reduced to one indicator expressed as a relationship:

$$R = P \cdot L; \tag{1}$$

where: P is the probability of loss occurrence; L – value of loss.

The discussed narrowing formally allows to boil the risk assessment down to the acceptance as a criterion for its assessment – the result obtained using the relation (1). It is easy to see the awkwardness consisting in the risk becoming, in this situation, the same construct as the risk assessment criterion.

An attempt to solve this problem is the author's proposal for the definition of risk in the following wording: a risk is a feature of a situation in which a projected random development may bring about only negative, negative or positive effects, and the probability distribution of these effects is known, identified with acceptable accuracy (Makowski, 2016).

The Definition referring to one of the basic ontic categories, which is a feature of a situation, is a proposal that eliminates the difficulty of determining what risk is. The knowledge of probability distributions of state variables describing the forecasted situation is a condition for effective forecasting (risk assessment). The essence of forecasting, as opposed to prediction, is a quantitative description of a fragment of the future with a specific error. Random consequences may be interpreted in relation to both speculative and pure risk. In light of this definition there is no need to limit the interpretation of risk to one indicator.

Within the material scope of risk management undertakings, a set of analytical-assessment and planning-control activities can be distinguished (Sienkiewicz, 2006). E.g.

[4] Note that F.H. Knight, the progenitor of risk research, published his concept of measurable and immeasurable uncertainty in *Uncertainty & Profit* as early as 1921, where he called the former the risk and the latter the uncertainty in a strict sense – thus uncertainty is a category that needs to be defined on par with risk.

[5] Possibility is also an ambiguous concept. It is also sometimes interpreted as e.g. an option, a chance, a solution, probability, which does not ensure unambiguous perception of risk.

according to the regulations of the PN-ISO 31000:2018-08 standard, risk analysis is an element of the risk assessment stage and is preceded by risk identification activities. This is illustrated in Fig. 1.

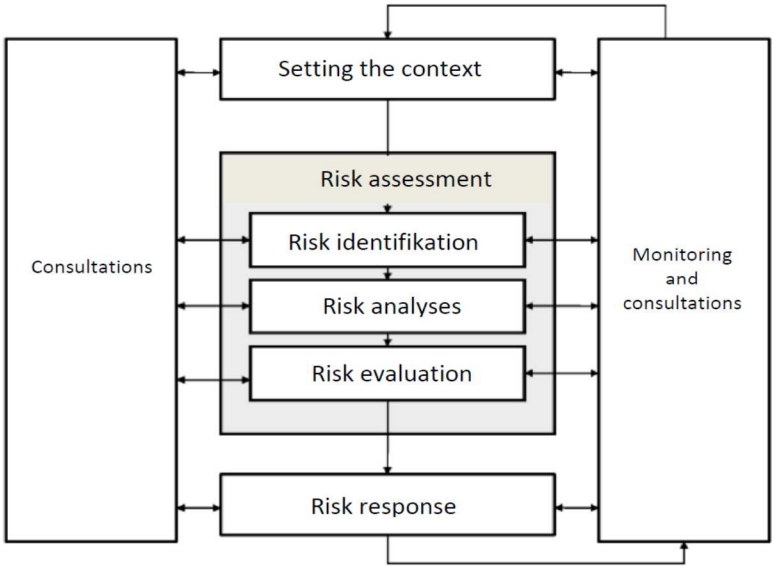

Fig. 1. General scheme of the risk management process

Source: own elaboration based on (PN-ISO 31000:2018-08).

The essence of risk analysis in this context will be to select and estimate the values of indicators allowing for risk evaluation and it is treated as such here (despite the existence of many other interpretations).

In the light of the discussed standardisation requirements, it is generally accepted to present the results of risk assessment in the form of a risk matrix on which the assessed risk can be located in the probability and loss coordinates. The advantage of the risk matrix is the preservation of information about the nature of the risk resulting from the relationship between P and L, and this is of key importance in the choice of risk management strategy (as the value of the risk index alone does not determine this). However, this form may cause excessive simplification in risk assessment practice. For example, when the nature of the losses incurred has a different distribution than a binomial. This is also important in the context of assessing the risk of loss of brand capital and its weakening.

If expert methods of probability estimation are omitted (according to Bruno de Finetti's (1975) subjective theory, probability is a person's opinion), then in the case of loss of brand capital, which usually happens very rarely to a particular owner in similar circumstances, it is difficult to estimate the probability of such an event applying a frequency interpretation.

The classic statistics based on the estimation of probability distribution parameters due to the required retrospective nature of the research material becomes futile here[6]. It would

[6] In the formal sense, frequency probability does not exist in relation to bringing a random variable to effect, which maps a phenomenon that has never happened before.

be necessary to have a verified model that maps the phenomenon in question, taking into account not only known threats but also those that may occur hypothetically. The postulate of the possibility of forecasting, resulting directly from the content of the proposed definition of risk, creates in practice a serious methodological problem with regard to forecasting of the so-called extreme events.

Another autogenic problem of risk analysis is related to finding an answer to the question: which of the known interpretations of probability should be assumed?

In the analysis of extreme situations on the market (usually occurring rarely), the parameters of dispersion of the probability distribution of losses, characterizing the riskiness of the situation, also leap to prominence. The more "flatter" this distribution is, the more likely the extreme events are. In the source literature, however, one can find criticism of the achievements to date in risk assessment according to the criteria of average value and standard deviation of the probability distribution of losses (Kaczmarek, 2010).

4. SELECTED PROBLEMS OF THE METHODOLOGICAL LAYER GENERATED BY THE SPECIFICITY OF THE SUBJECT OF RISK ANALYSIS

In practice, it is difficult to reliably assess the loss of brand capital by directly estimating the risk as the product of probability and losses, mainly due to the difficulty of estimating the probability of its occurrence. Moreover, if we notice that probability may be a function of time, and changes in its value may be significant within the assumed time horizon of an assessment, then the discussed difficulties increase even more, often excluding the sense of evaluating direct risk according to the discussed standards. Thus, there arises a problem of assessing the risk of loss of brand capital by other methods, using indicators that indirectly characterise this risk (e.g. based on the intensity of symptoms that are precursors to the discussed phenomenon).

Negative market phenomena for brand owners forced the necessity to implement risk management systems in the management of companies, where the specificity of threats and the definition of their undesirable effects (losses) resulted in the separation of many types of risks (e.g.: market, operational, credit, investment, bankruptcy, legal), as well as methods of their assessment. It can be argued that brand capital or its elements play a significant role as important variables in models for the evaluation of the levels of these risks. Therefore, their control becomes an obvious priority for assessing the risk of loss of brand capital.

The question arises: in a relatively stable market situation, do the indicators describing the economic condition of a company allow drawing conclusions on the risk of losing brand capital? For the conditions of the discussed market situation, companies should calculate market and operational risk resulting from internal and external operating conditions, which may cause random losses. The often mentioned measure of risk is then the so-called – *VaR* (*Value at Risk*) – critical value of losses and the probability of exceeding this value $P = \alpha$ (α should not be greater than 1÷5%). The idea of typical distribution of losses and interpretation of *VaR* is presented in Fig. 2. There is a possibility to apply a certain analogy here, consisting in determining this critical *VaR* loss related to brand capital loss. If it were easy to single out the impact of conditions originating only from the deteriorating functioning of the brand on the probable losses of its owner and identify such a distribution, including the *VaR* probability component, then the problem of assessment could be theoretically solved, but it would not allow to avoid the known disadvantages of this

approach. In practice, all known methods of identification of the discussed *VaR* distribution use records of observations of mainly expected (normative) losses, rarely the ones of excessive nature (Fig. 2), situated in the so-called "chain of decomposition", i.e. the most significant area. As a result, in this area the model of probability distribution of losses is the least accurate. This very defect is the source of the fundamental problem of unreliability in the application of this approach.

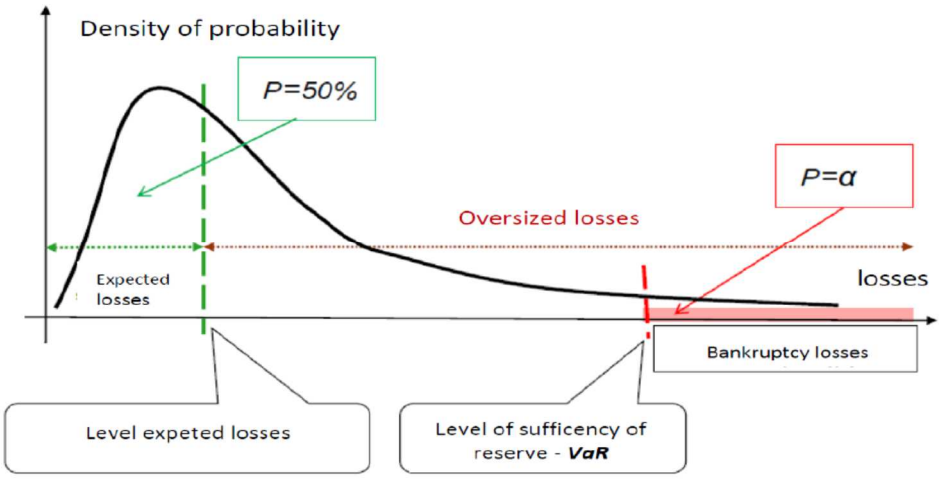

Fig. 2. Loss distribution, interpretation of *VaR* as a measure of operational risk (example)

Source: own study based on (Brink, 2002).

Frequently, the loss of a brand capital is the result of the owner's bankruptcy (it does not have to result only from the loss of a brand, and in some situations the loss of brand may be due to the owner's bankruptcy). Forecasting methods may be helpful in analysing the risk of bankruptcy because of their predictive effectiveness (usually one year), giving the brand owner time to react. In the assessment of credit risk, banks have predictive and effective bankruptcy models. Among others, Polish bankruptcy models are known, such as the "Poznań" model, the Mączyńska and Zawadzki model, the Wierzba model, the Appenzeller and Szarzec model and others. These models refer to such variables as those occurring e.g. in the Mączynska and Zawadzki model:

$$Z = 9.478X1 + 3.613X2 + 3.246X3 + 0.455X4 + 0.802X5 - 2.478; \quad (2)$$

where: X1 – operating result / total assets; X2 – equity / total assets; X3 – (net result + depreciation) / total liabilities; X4 – current assets / current liabilities; X5 – sales revenue / total assets (Kisielińska and Waszkowski, 2010). These variables are the content of companies' economic reports summarising mostly annual operating effects and, similarly to the description of *VaR*, it is difficult to isolate the impact of brand functions on the values of these variables. It follows from the above considerations that the bad condition of the brand owner's company has an obvious impact on the current and future capital of the brand, but forecasting the loss of this capital is of secondary importance in view of the real

possibility of bankruptcy. That is why it is so difficult to find descriptions of methods of deducting the risk of losing brand capital on the basis of economic effect indicators of the company.

In this situation, facing the problem of assessing the risk in question, it seems reasonable to refer to the basic components of customer-based brand capital (differential effect, brand knowledge, consumer's response to marketing). A customer, especially when making market decisions about changing a given brand to another one, expresses subjective knowledge about the brand, shows explicitly negative reaction to marketing, including promotional offers, and deprives the brand owner of part of the differentiating effect. Therefore, the forecasted loss of existing customers may be, in relatively stable market conditions, an indirect indicator of the risk of losing the brand capital, although it is worth noting that certain brands may lose customers periodically due to a decrease in their purchasing power, e.g. in periods of economic crises, and this does not mean a weakening of the power of these brands. The influx of new customers, although significant, does not inform so well about the situation of the brand, as the new customer may have incomplete knowledge about the brand.

Contemporary marketing research allows for precise profiling of customers in the light of many criteria, effecting multifaceted segmentation of customers. Whereas, the use of classifiers (e.g. Bayes) allows to forecast, in the case of the representatives of the segmentations made, also their typical market behaviour in terms of probabilities. It is also possible to estimate e.g. the migration rate – the probability that a customer (with a given profile) will stop cooperating within the assessment horizon.

Analytical marketing has defined many indicators reflecting the effects of work of marketing managers. In terms of assessing the risk of losing a customer, the customer life time value (CLTV) indicator, calculated on the basis of relationships, seems particularly interesting:

$$CLTV = -AC + \sum_{n=1}^{N} \frac{(M_n - C_n)P^n}{(1+r)^n}; \tag{3}$$

where: *AC* – means the cost of acquiring a customer; *Mn* – means the margin achieved on transactions with a given customer in the nth period; *Cn* – the cost of marketing and service in the nth period; *P* – probability that the customer will not stop cooperating in the next year, *N* – total number of years or other periods, *r* – discount rate (Jeffery, 2015).

The essence of the relationship (3), may be used after necessary modifications (taking into account the customer's loss event) to estimate the risk level of losing a customer using the indicator marked here with an abbreviation – *FRLC (Forecasted Risk of Losing a Customer)*, the value of which is proposed to be estimated based on the following dependency:

$$FRLC = AC + \sum_{n=1}^{N} \frac{(M_n - C_n)(1-P)^n}{(1+r)^n} \tag{4}$$

Dependency (4) allows for an estimation of partial risk of lost value in customers representing segments obtained as a result of profiling, which in total should give an assessment of the risk of lost value in customers as an indicator of brand capital impairment.

A certain disadvantage of this approach is the need to verify possible changes in the value of data for the calculation over time.

One of the key objectives of the risk assessment is to warn as early as possible about the possibility of the risks materialising in the form of losses. The observation that in assessing the risk of loss of brand capital the quantitative aspect is important, but the expected time after which it may occur is no less significant, raises further methodological problems due to the fact that, as a rule, a larger forecast horizon determines its lower credibility. This forces the assessment procedures to be repeated periodically on the basis of updated empirical data.

5. CUSTOMER DECISION MODEL

In certain situations, it is possible to make "customer value" dependent on the expected time of cooperation with a given company. The example below shows a situation for which a decision model of an average customer (simplified for the purposes of this article) has been developed, by means of which an attempt has been made to explain the essence of the proposed approach enabling an assessment of the expected probability of losing a customer (migration rate) as a function of time. This in turn should make it possible (e.g. for the owner), regarding a certain critical value of this probability, to estimate the expected time available to achieve it. This time can be used to implement risk mitigation measures. Determining the expected time of cooperation with an average customer also simplifies the assessment of CLTV values.

Companies such as banks, mobile phone operators, cable TV operators etc. – to mitigate fluctuations in the migration rate of their customers – use fixed-term contracts, the termination of which imposes certain encumbrances on the customers. The decision of the customer of such companies to continue cooperation is therefore particularly mature and important from the point of view of assessing her/his satisfaction with the quality of this cooperation. Let us consider a simplified decision-making model of an average customer of a company of this type (Fig. 3), whose contract for a definite period of time at *t=0* transformed into a contract for an indefinite period of time.

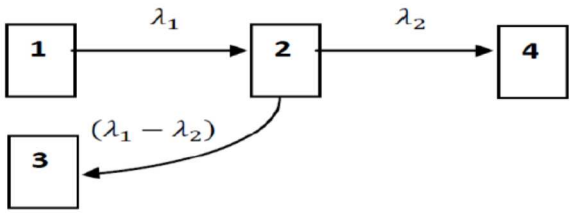

Fig. 3. A graph of the decision model for an average company's customer

Source: Own study.

This state is reflected by the vertex [1] of the graph in Fig. 3. If a customer is satisfied with the contract, she/he may not change it. Otherwise, she/he can go e.g. to the customer service office – vertex [2], where she/he receives a new cooperation offer. If the customer decides to accept it, vertex [3], she/he continues a new contract for a fixed period of time. She/he may also resign from the services of a given brand – vertex [4]. The likelihood of the customer's transition to particular states from *t1* to *t2* depends on the difference (*t2 – t1*)

and does not depend on the initial moment, meeting the criteria of Markov's discrete processes. Moreover, intensities of transitions between states (*λ1* and *λ2*) are known. Thus, in the first approximation, identification of the model can be made on the basis of acceptance of assumptions for Markov's stochastic processes, although the empirical verification would of course be advisable by all means.

Let us also assume that the assessment horizon is shorter than a typical fixed-term contract period.

In the simplified model, it is assumed that the intensities of *λ1* and *λ2* passages are constants, which facilitates the analysis. In the case of observed strong trends increasing over time, especially *λ2(t)*, it is obvious that undertakings inhibiting this trend must be implemented immediately and the risk of losing the customer is not accepted. Whereas, an insignificant intensity trend can be approximated in certain time intervals by means of constants and the analysis of the model's behaviour in the designated periods can be carried out as for a stationary model. In turn, decreasing *λ1* and *λ2* trends indicate that brand capital is strengthening.

To obtain forecasts of the values of the discussed intensities on the basis of observation results, known time series forecasting models can be used. The analysis of time series as a field of knowledge offers many efficiently predictive classes of models, such as autoregressive models, with a moving average and numerous methods of smoothing out fluctuations: seasonal, pertaining to economic conditions, as well as accidental obtained empirical research material.

The *λ1* and *λ2* intensities were defined as follows:

$$\lambda_1 = \frac{k_1}{K} \tag{5}$$

$$\lambda_2 = \frac{k_2}{K} \tag{6}$$

where: K – known number of customers with the status of state [1], during the time horizon of the analysis (e.g. during the year); k_1 – forecasted intensity of the number of customers willing to resign from the contract for an indefinite period of time in the calculation unit of time – *T* (e.g. a week); k_2 – forecasted intensity of the number of customers willing to accept a new offer of cooperation for a definite period of time in the unit of time *T*.

For a graph in Fig. 3, the following arrangement of Kolmogorov's differential equations can be arranged in light of the assumptions described above:

$$\begin{cases} P_1'(t) = -\lambda_1 P_1(t) \\ P_2'(t) = \lambda_1 P_1(t) - \lambda_2 P_2(t) - (\lambda_1 - \lambda_2) P_2(t) \\ P_3'(t) = (\lambda_1 - \lambda_2) P_2(t) \\ P_4'(t) = \lambda_2 P_2(t) \end{cases} \tag{7}$$

where: *P1(t)* – probability of state [1] continuing; *P2(t)* – probability of transitioning from state [1] to state [2]; *P3(t)* – probability of transitioning from state [2] to state [3]; *P4(t)* – probability of transitioning from state [2] to [4] (probability of losing customers).

For the model under consideration the following initial conditions can be assumed for *t=0*: $P_1(0) = 1$ and $P_2(0) = P_3(0) = P_4(0) = 0$.

By transforming Laplace's differential equations system (7) and taking into account the initial conditions, the following algebraic system of equations was obtained:

$$\begin{cases} sP_1(s) - 1 = -\lambda_1 P_1(s) \\ sP_2(s) = \lambda_1 P_1(s) - \lambda_1 P_2(s) \\ sP_3(s) = (\lambda_1 - \lambda_2) P_2(s) \\ sP_4(s) = \lambda_2 P_2(s) \end{cases} \tag{8}$$

where: *s* – Laplace's operator.

For example, Lapace's transformation was obtained with regard to the said probability of losing the customer described by the following relation:

$$P_4(s) = \frac{\lambda_2}{s\lambda_1} - \frac{\lambda_2}{\lambda_1(s+\lambda_1)} - \frac{\lambda_2}{\lambda_1(s+\lambda_1)^2} \tag{9}$$

By performing a reverse transformation of Laplace's dependency (9), the original was obtained:

$$P_4(t) = \frac{\lambda_2}{\lambda_1}\left[1 - e^{-\lambda_1 t}(1 + \lambda_1 t)\right] \tag{10}$$

Dependency (10) allows to estimate the limit value of probability of losing the customer (so-called absorbing state for $t \to \infty$, $P_4 = \lambda_2/\lambda_1$). It also allows for estimating the time (tkr) needed to reach the value of P_4 considered critical – $P_4(t_{kr}) = P_{kr}$, i.e. below which it is still unprofitable to improve the promotional offer. This may be important e.g. in decisions related to the implementation of promotional undertakings – increasing the value of intensity (λ_1-λ_2). It is easy to notice that models of this type also facilitate factoring (of "what if" type).

An example of a dependency diagram (10), describing the nature of changes in time in the value of the probability of losing a customer – P4(t) is presented in Fig. 4. The diagram was made for: annual assessment horizon; T – weekly assessment time unit; K=50 thousand; λ_1=0.015; λ_2=0.0045 and accepted P_{kr}=0.12. For the discussed example, this probability does not reach the value considered critical within the assessment horizon – which means no need to implement a new promotional offer. Apart from the threshold value of probability, the time needed to achieve it is also important. This confirms the thesis that taking into account the time factor may have a significant impact on risk assessment.

Practical applications usually require more complex models, mapping more decision-making situations, moreover, not necessarily describing stationary processes. Their creation and use may be supported by the observed dynamic development of numerical methods of solving the calculus problems.

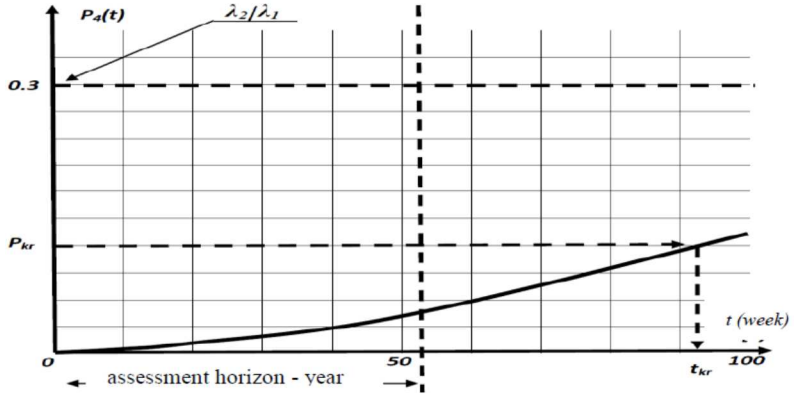

Fig. 4. Example of a graph for $P_4(t)$

Source: Own study.

6. CONCLUSION

The loss of a brand capital may have irreversible consequences, hence the possibility of analysing the risk of losing it seems to be an important management problem. Extracting the risk of loss of brand capital aggregated in market and operational risk assessments may give interesting results useful for marketing departments of companies. Although the specificity of each brand requires the development of dedicated methods for analysing the risk of losing its capital, the selected problems of this process outlined in this article are of such a general nature that they may contribute to triggering a discussion among those interested in this issue, which would be a source of genuine satisfaction for the author.

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