Branded for Survival: Naming Effects on the Life Expectancy of New Companies

By Stefan Gürtler* and Barbara Miller

Companies have short lives – most start-ups are no longer in business ten years after their foundation. Numerous studies have investigated the factors that have a life-prolonging effect. What has been ignored so far is the influence of the company name. It is one of the very first marketing activities, indispensable for registration, for finding investors, and for addressing customers, and it is also the most persistent element of corporate branding. Our study of some 1,300 new companies shows higher survival probabilities for firms with explanatory and/or easy to process names. This opens new perspectives for branding research, in which survival analyses have not yet found their way in.

1. Introduction

New companies have short lives: Most start-ups fail in their infancy; according to relevant research, up to 90 % exit the market involuntarily (Bajwa et al. 2017; Boso et al. 2019; Cotterill 2013; Garcia Martinez et al. 2019). As for Switzerland, 50,454 new companies were founded in 2021 (IFJ 2022), and most of them will probably be in a state of economic „zombification”, liquidation, or bank-
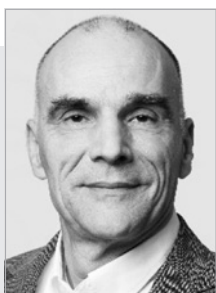
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ruptcy around their sixth business year (Kyora et al. 2018). The „liability of smallness” (Freeman et al. 1983) and „liability of newness” (Stinchcombe 1965) are their undoings, and challenge for most founders – in Switzerland and elsewhere – is not whether their companies survive, but for how long.

Relevant studies attribute firm survival to four main factors, namely resources, with a specific focus on human and financial capital, strategic/managerial decisions, product-related aspects, and contextual/environmental-related issues (Pisoni et al. 2021, meta-analysis of 74 studies). Already with the foundation of a company, momentous management decisions have to be made (Keeley and Roure 1990), and company founders often have to realize over time that their „initial choices actually constrain their future path of action” (Gans et al. 2019 p. 3).

Surprisingly, only few studies have explicitly taken care of this pivotal moment in managerial decision making. To our knowledge, the only empirical study so far focusing on the momentousness of initial choices comes from Brush et al. (2008). The authors examined the nexus of start-up location decision and market launch of the first product and concluded that start-ups domiciled in their own four walls realized faster market launches.

Initial choices also include the selection of brand elements such as name, URL, logo, slogan, key visuals, brand colors, and brand font to identify and distinguish the new brand or company (Ataman et al. 2008). All companies need a name (Smith and Chae 2016), it is the first visible step at a very early stage of the business formation process (Belenzon et al. 2017), and as the most stable and long-lasting element supporting the brand identity (Costa 2004), it shapes a company over a long period or even the entire business lifespan.

To date, however, there is a lack of studies investigating the influence of the name choice on the survival chances of new companies. This neglected aspect will be examined on 1,306 companies and their names, with which they present themselves to the public in a business directory. All companies commenced operations in the Basel agglomeration (Switzerland) between 2009 and 2011. This early date of incorporation was chosen to ensure a sufficiently long observation period for the continuation or termination of the business activity.

Our study contributes to the growing body of start-up literature by examining for the first time the importance of name choice on the survival chances of firms. The paper also adds to the still small number of studies that deal with initial choices, i.e., with early management decisions of great consequence. Finally, this paper introduces survival analysis into the literature on entrepreneurial marketing and branding activities, for which, to our knowledge, there are still no studies that link the effects of such activities with the survival chances of firms.

The rest of this paper is structured as follows: Section 2 summarizes the literature on company naming. Section 3 contains research questions and hypotheses; Section 4 introduces the data and methods used. The results are presented in Section 5 and discussed in the concluding Section 6, which also contains suggestions for further research.

2. Literature Review

Company names are the most prominent feature of a corporate brand identity (Aaker 1991; Olivares Delgado 2011). They are the most frequently presented units of information in business communication, and brand search and recall (e.g., cue: „Nike") are triggered by the company name (Kollmann and Suckow 2007; Petty 2008). Thus, company names function as effective shorthands for corporate images and performance (Keller 2003). By generating favorable associations, the company name becomes a driver of brand equity (Kapferer 2008), since company success depends in no small part on how well a new firm name is received by the public and the customers (Boyle 2003; Klink 2000).

New companies have every freedom to choose an appropriate name. But their decision bears considerable consequences: Company names are among the „most valuable assets" (Schiffman and Wisenblit 2019, p. 140) because they connect companies and audiences and combine associations and company attributes (Hillenbrand et al. 2013). Complications arise from the fact that companies in their infancy may not pay the appropriate attention to the importance and scope of naming (Merrilees 2007). They often lack the capital (Abimbola 2001), the know-how (Rode and Vallaster 2005) and the time (Wong and Merrilees 2005) for a far-sighted choice. Many companies realize after some time that a clear brand vision would have been a good investment, and then face high costs of changing their corporate naming (Bresciani and Eppler 2010). For instance, it is costly for the company and confusing for consumers when an initially introduced brand name such as Viag Interkom is replaced by a more suitable brand name such as O2. At the time of business formation, company owners would typically not „think big" enough and remain too fixated on their current market environment (Kapferer 2008; Rode and Vallaster 2005).

Technically speaking, a name choice is quite simple. According to Ainiala et al. (2016), the range of possible options contains: person names (*Kerstin's* Flower Shop), place names (*Oulu* Car Rental), other nominal descriptions (*Jupiter* Trading), expressions with lexical meaning (*Speedy Feet* Courier Service), quasi- or artificial words (*Avidox*), or acronyms and numbers (*M4*-Print). Besides these options, other sources that managers can use to create brand or company names include references to animal names, plant names, names of celebrities, and names referring to the usage situation.

Inherent and immediate value can be captured when the chosen name succeeds in triggering thought processes in the target audience (Koholi and Labahn 1997; Lockwood et al. 2019). Such effects may occur at the cognitive or at the affective level (Haack et al. 2014; Lok et al. 2017), after being triggered by signs, company and product names, language used, rhetoric, or corporate storytellings (Giorgi and Weber 2015; Lounsbury and Glynn 2001; Van Werven et al. 2019).

A company name generates cognitive resonance if it matches the audience's understanding, i.e., if it sounds familiar (Giorgi 2017), informs about the service offering (Khessina and Reis 2016), or circumscribes the company's business field (Smith and Chae 2016). The cognitive link between a new, previously unknown company name and a known business field (Glynn and Abzug 2002; Zhao et al. 2013) is applied for example by nanotechnology companies (Granqvist et al. 2013) or biotech start-ups, where names such as „Proponent Biotech" or „Crispr Therapeutics" associate with familiar business fields or technologies. Company names that generate cognitive resonance are associated with positive stakeholder evaluations (Glynn and Abzug 2002; Khessina and Reis 2016; Verhaal et al. 2015). However, the literature (e.g., Kapferer 2008) points out that many informative names are unlikely to be protectable and merely describe a company's range of services rather than differentiate it from competitors.

Names that resonate at an emotional level may escape this risk (Lounsbury and Glynn 2001; Van Werven et al. 2019). The biotech company „Medivation" has a name that borrows from the positively connoted concepts of medicine and motivation; „Alnylam Pharmaceuticals" was named after a star in Orion's belt to symbolize a distant but visible goal and a far-reaching entrepreneurial vision (Dolgin 2016). When such word creations align with the audience's knowledge, passions, desires, or aspirations (Giorgi 2017), they create a positive emotional mood (Navis and Glynn 2011), activate stakeholders, reduce uncertainty about a company or product (Ingram and Baum 1997; McDevitt 2014), and encourage the adoption of new products and ideas (Raffaelli et al. 2019).

3. Research Questions and Hypotheses

3.1. Research Questions

The wide range of naming approaches and the literally infinite number of possible verbal combinations make naming a tricky business for the entrepreneur. In theory and practice, there are no clues as to which names are to be associated with a higher probability of survival. This is surprising, since choosing an appropriate name is of paramount and long-lasting importance for a company (Schiffman and Wisenblit 2019). As mentioned, name choices have an impact on stakeholder perception and valuation, market success and stock market performance (Green and Jame 2013). A company name ultimately exerts an influence on the success, survival or exit of the company. To the best of our knowledge, no study has yet focused on the relationship between name choice and the survival in business operations. In this context, the answers to two questions are of interest:

RQ1: Does the company name influence the survival odds of new companies?

RQ2: For companies that must go out of business, is there a relationship between their choice of name and the duration of their business activity?

Both issues are based on the presumption that choosing a company name is an act with considerable influence on the course of business. Thus, company names are treated as predictors that affect the duration of business activity.

This effect results on the one hand from informativeness of the content of the name and on the other hand from the processability of this content, i.e., the ease with which the name can be grasped, memorized, and retrieved. To capture these impact factors, a limited and simple set of proxies is selected, as described in the following.

3.2. Informativeness

The most obvious naming technique is to endow company names with terms that convey meaning about the business segment (product category) or activity (Khessina and Reis 2016). The goal of this „semantic naming" (Klink 2001) is to create a link between the company name and the company's activities or characteristics (Lowrey et al. 2003).

Semantically meaningful brand names are well established in the commercial world: Goretex, Golden Toast, Bifi (to be pronounced as beefy), Bonaqa, Easy Credit or mymuesly indicate the business segment (product category). Tipp-Ex, Post-it, Car Wash, or Mr. Muscle describe the activity that the customer can perform with the products. Always, After Eight, and MediNait indicate the proper moment of product consumption. A further technique to make a brand name semantically meaningful is combining word abbreviations in a creative manner (e.g., Swatch = Swiss & Watch, Milka = Milk & Cacao, Lego = Leg Godt, Kaba = Cacao & Bananas). Meaning is also conveyed by referring to the target group e.g., Weight Watchers, Volkswagen, Elite Partner or the effect of its application, e.g. Slim Fast. Often, the brand's positioning is expressed in semantically meaningful names (e.g., Mon Cheri, Merci, Secret Escapes). Finally, many brand names contain information if they refer to the country or region of brand origin (e.g., Credit Suisse, British Airways, Delmod).

With Ainiala et al. (2016), two variants of naming semantics can be distinguished: lexical names, where the meaningful term is part of the proper name („Trans*gourmet*") and motivated proper names, where the descriptive part is attached as an appellative, e.g. supplementary name suffix („*Bank* Rohner"). Business content, business form or a combination of both can be used as fitting elements or „corporate identifiers", either in abstract or concrete form. In the case of business content, „*flower* shop" (concrete) or „*planning*" (abstract), and in the case of business form, „flower *shop*", (concrete) or „*group*" (abstract) are examples of an appellative use of brand semantics.

The use of descriptive terms in company names is subject to legal restrictions. In Switzerland, a descriptive company name must be true, must not be deceptive about the form and purpose of the business, and must not be contrary to the public interest (so-called company-purpose relationship; s. 944 of the Swiss Code of Obligations OR, s. 38 of the Commercial Register Ordinance HRegV). This also includes deception about the legal form of the company (cf. ss. 944, 950 OR), which must always be shown as part of the name. In the corresponding guidelines (Bundesamt für Justiz 2021), reference is made to another variant of trademark semantics that is missing in Ainiala et al. (2016), the place of business („*High Street* Café") or the geographical place of origin or sales („*Euro*dream"). The following study examines company listings in the localsearch business directory. This directory by default uses the company entries of the commercial registry offices. Companies that use a different name on the market must provide corresponding proof (localsearch, s. 5.3 entry provisions). Hence, the above-mentioned name restrictions apply to the majority of the companies investigated.

The effect of brand semantics, especially in its lexical use, is controversial. Lowrey et al. (2003) found a positive effect on name recall and memorability. Klink (2000) points out that the suggestiveness of activities, characteristics, or functions in company or product names depends on the language skills of the target audience. Meaningful terms can also make it difficult to form new and unique names, which affects their uniqueness and distinctiveness (Klink 2001; Lowrey et al. 2003). However, Rubenwolf and Spörrle (2011) counter that the public prefers familiar and understandable terms in real and fictitious brand names.

The present study is content with a simplified examination of name semantics: it is only generally determined

whether the company name contains references to business activity or business form – either in the name itself or in the additional rubric entry. The specific content of the reference is not investigated further. This yields hypothesis

H1: Companies that carry an informative name have a higher life expectancy than companies without this name characteristic.

3.3. Phonetic Symbolism

Endowment can be established not only using concrete terms, but names can also convey semantic information in an implicit or symbolic way (Fenko et al. 2016; Khenfer and Cuny 2021; Pathak et al. 2020; Pogacar et al. 2014; Roche et al. 2015). We focus on phonetic symbolism which builds on the resemblance between sound and meaning (Yorkston and Menon 2004, p. 43). Of the six main categories of phonetic symbolism – vowel, plosive, fricative, nasal, affricate, and approximant symbolism (ibid.) – the use of plosives (explosive sounds) in company names, i.e., consonants that interrupt the flow of air when speaking (as unvoiced plosives: K, P, T, hard C; as voiced: B, D, G, soft C), appear particularly interesting in the context of this study. Various authors suggest that their use not only generates favorable or unfavorable associations (e.g., Khenfer and Cuny 2021), but also increases the cognitive processing probability. In particular, voiceless plosives facilitate brand name memorization and improve brand recognition and recall (Cortese 1998; Klink 2000, 2001; Lowrey et al. 2003; Pogacar et al. 2014; Vanden Bergh et al. 1984). Due to the initial letter, the name of the company *Prometrix* would then be easier to process and memorize than that of the company *Virtuacom*.

Plosives are correspondingly popular: in English, three quarters of the nicknames begin with a plosive (De Klerk and Bosch 1997; Pogacar et al. 2014). In a list of dog names in the city of Zurich, unvoiced plosives as first letter are found in 34.6 % of the names, e.g. „Kaya Caballus Pink Cadillac" (Opendata.Swiss 2022). If the initial letters had been equally distributed, 26.9 % would have been expected. Leading brands have an above-average frequency of names beginning with plosives (Klink 2000), especially with the letter K (Lowrey et al. 2003). To capture a symbolic component of the company name, the hypothesis is

H2: Companies that carry a symbolically endowed name have a higher life expectancy than companies without this name characteristic.

3.4. Complexity

A central aspect of the company name is its complexity. (Low) complexity is often defined as the subjective experience of the ease with which pieces of information can be processed (e.g., Alter and Oppenheimer 2009). Short, simply structured word formations are easier to process and take account of human information process-

es in decision-making situations in which fluent and familiar stimuli are preferred (ibid.).

Non-complex brand names improve brand recall (Bao et al. 2008), investor awareness and acceptance (Chan et al. 2018; Green and Jame 2013), investment likelihood (Cooper et al. 2001), shareholder breadth, and trading volume and market valuations (Green and Jame 2013). (Low) complexity is a determinant naming requirement, especially for younger companies; for older companies, familiarization effects can facilitate the cognitive processing of non-fluent names (ibid.).

Complexity can be measured by structural characteristics, such as the length of a name and its structure. „While word length is not perfectly interchangeable with sentence complexity – for example, *complexity* can come from grammatical structure or infrequent words as well – it is a useful proxy. Using length as a manipulation of complexity allows for a simple, easily replicable word replacement algorithm" (Oppenheimer 2005, p. 141). Due to its brevity, the name of the company *Lolox* would then be easier to process and memorize than that of the company *Consultatio Sano*. We investigate the impact of complexity:

H3: Companies that carry a short name have a higher life expectancy than companies without this name characteristic.

3.5. Fluency

Words that are easy to process also consist of terms that are familiar or familiar-sounding and pronounceable. Such „fluent" terms generate a positive affective state and have a positive influence on preference for such information (ibid.). For instance, a brand name such as „Umckaloabo" (cough medicine) sounds less familiar to German-speaking patients than „Wicks Husten-Sirup". In experimental settings, familiar fictional food ingredients are found to be less harmful than non-familiar ones (Song and Schwarz 2009), and pronounceable fictional companies are considered to be more successful („Barnings" vs. „Xagibdan", Alter and Oppenheimer 2006).

A proxy that correlates with pronounceability aka fluency can be found in the lexical congruence of a company name. This approach „examines whether all the words in a company name comply with a spell-check filter, based on the idea that company names that contain dictionary words are on average easier to pronounce than proper nouns or coined expressions" (Green and Jame 2013, p. 814). Due to lexical congruence, the name of the company *Choice Pharma* would be easier to process and memorize than that of the company *Cevrepinar*. The importance of a company name's fluency leads to

H4: Companies that carry a fluent name have a higher life expectancy than companies without this name characteristic.

4. Data, Measurement, and Statistical Model

4.1. Data

The dataset comes from the Swiss address data service localsearch; it is the directory of business addresses (s. 3 entry provisions), which includes sole proprietorships, legal entities, public institutions, and authorities. Data were selected from 24 municipalities that form the „Basel agglomeration" (Schneider-Sliwa et al. 1999). From these addresses, public limited companies, limited liability companies and branches of the first two legal forms (hereafter: companies) were selected.

The business directory contains 1,306 companies with the legal status of a public limited company or a limited liability company that obtained a telephone connection in the Basel agglomeration for the first time in the period between 2009 and 2011, which is assumed to be equated with establishing a company address and starting business activities.

The subsequently estimated hazard model is based on 775 companies (59.3 %) as „events" that gave up their business connection, which is equivalent to giving up business activity at a location within the study area. 531 companies (40.7 %) are considered „censored cases" for which this „event" did not occur, i.e., which continued to maintain their connection, and thus continued their business activity. The high survival rate compared to other studies can be explained by the fact that companies with the highest risk, sole proprietorships (Ptak-Chmielewska 2013), have been excluded for methodological reasons.

4.2. Measurement of Business Activity Duration

Entries in the directory are regulated according to s. 12d and s. 21 of the Telecommunications Act of Switzerland (75.10 TCA); they are voluntary, are not checked for accuracy of content, but must correspond to the customer information. They appear in the directory with the allocation of a telephone number and remain there until the telecommunications service provider of the company deletes the number or the company requests deletion of its own accord (s. 11 entry provisions). It can be assumed that companies want to ensure their accessibility by telephone when they start their business activity and that they renounce accessibility and a chargeable connection when they terminate their business. The duration of the telephone connection is therefore equated with the duration of the business activity. This is in line with the view that the failure of new companies represents the termination or cessation of its operations (Cotterill 2013).

The use of telephone connections as proxy for business operations excludes sole proprietorships from the database, since they usually use their private telephone number that will continue to be used after the company has closed down.

From the available data set, companies were selected that were newly entered into the directory between 2009 and 2011. This results in an observation period of between 10 and 12 years which the companies have survived or in the course of which they have exited the market (*Fig. 1*). During the period in question, identical macroeconomic conditions prevailed – namely a muted recovery after the previous financial crisis (KOF 2009, 2010, 2011), so that a time-dependent investigation does not seem appropriate. Since the companies all belong to the same geo-economic area (Schneider-Sliwa et al. 1999), a space-dependent investigation is also not considered necessary.

4.3. Measurement of Rubric Entry and Informativeness

Rubric entry: It was determined whether the company entry is supplemented by a rubric entry that per se contains information on business content or business form (Ainiala et al. 2016).
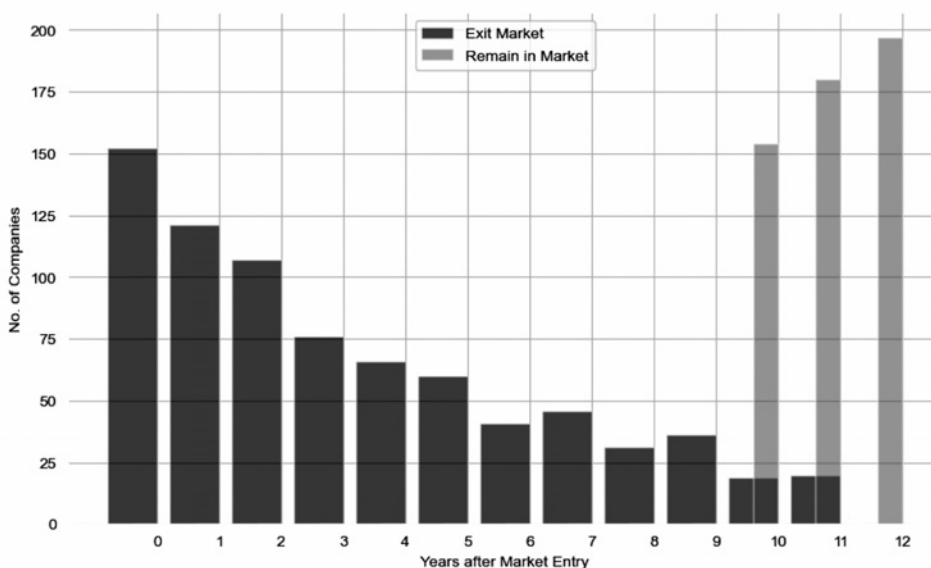

Fig. 1: Survival time of the companies studied

	Rubric Entry	Informativeness	Phonetic symbolism	Complexity (length)	Fluency (pronounceability)
Rubric Entry	1.000	.248	.004	.044	-.082
Informativeness		.000	-.009	.421	-.196
Phonetic symbolism			1.000	.023	.013
Complexity				1.000	-.077
Fluency					1.000

Tab. 1: Correlation among the model variables

Informativeness: The informativeness of the company name was determined by checking whether it contains terms from the rubric entries. Since informative components are used both as part of the proper name and as a name suffix (Ainiala et al. 2016), the names were decomposed into name components using Natural Language Processing. In the localsearch business directory, transport companies choose the rubric entry „Transporte". In the case of „Celik Transport", the informative component is added as a name suffix. In the case of the two transport companies „Ebrotrans" and „Kiefer-Trans", the business reference is added as part of the name. In the case of the transport company „Intertek Caleb Brett", no name component has any correspondence or similarity with a rubric entry, therefore the name was coded as non-informative.

In our sample, 51.5 % of the companies added a rubric entry, and 61.6 % chose an informative name. 322 companies (24.7 %) have neither an informative name nor a rubric entry, so that the business purpose and form of business are not recognizable.

4.4. Measurement of Phonetic Symbolism, Name Complexity, and Name Fluency

Phonetic Symbolism: Company names beginning with a voiceless plosive (C, K, P, T) were categorized as containing symbolic endowment. Categorization with plosives in any position in the name was omitted, since 93.2 % of all company names have a plosive.

Complexity (Length): For the length measurement of the company names, the abbreviated or written-out legal names (AG, GmbH, SA, Sàrl, Inc. etc.) were removed. The length of a company name (number of characters) was determined by counting the number of letters [1].

Fluency (Pronounceability); Fluency of a company name was determined using dictionary comparison (Agnihotri and Bhattacharia 2017; Green and Jame 2013) – rare or unique name components are marked as errors when spell-checked in a word processor. Company names were spell-checked by writing each company name into a Word document with Python win32com.client and by counting the number of words not listed in the Windows dictionary *(err in doc.SpellingErrors)*. Since Swiss companies also use English or French name components, this process was repeated three times, each time with the German(Switzerland), English(United Kingdom) and French(Switzerland) spelling checks, whereby only suggestions from the main dictionary were considered in all runs. Fluency results from the sum of erroneous terms in a company name (with zero terms equaling high lexical fluency and one or more terms equaling low lexical fluency). This favors short company names with common name parts over long company names with several non-common word parts (Green and Jame 2013). The company name „Ziegler Brennstoff" was coded as a company name with high lexical fluency, while „arNET SCM" was coded as a company name with low fluency (one or more erroneous terms).

In our sample, 20.5 % of the names contained phonetic symbolism. 32.4 % of the companies had a name with 10 letters or less, 44.0 % a name between 11 and 20 letters, and 23.6 % a name with more than 20 letters and 61.6 % chose an informative name. 34.9 % of the names had no erroneous terms, 65.1 % had one or more erroneous terms and were coded as exhibiting a low lexical fluency.

4.5. Description of Relationships

In order to provide an initial, superficial insight into data relationships, we neglected restrictions due to the measurement scales and calculated the correlations among all model variables (*Tab. 1*). The strong correlation between informativeness and complexity can be explained by the fact that some of the company names get their information content from a descriptive attachment (Ainiala et al. 2016), which inevitably lengthens the name.

4.6. Statistical Model

A wide range of models can be found in the literature for predicting a company's life expectancy based on an equally wide range of predictors.

Halabi and Lussier (2014) utilized an ordered probit model, Munos et al. (2020) Bayesian additive regression tree, random forest, boosted decision trees, support vector machine, probit model, artificial neural net, simple decision tree, and ensemble learner. Pfeiffer and Reize (1998) as well as Teng et al. (2011) applied logistic regression. Sharchilev et al. (2018) measured similar predictors of success and used gradient boosting. Silva et al. (2016) estimated a logit model, and Zbikowski and Antosiuk (2021) applied logistic regression, a support vector machine, and gradient boosting.

Among these event-time analytical models, semi-parametric Cox regression in conjunction with non-parametric Kaplan-Meier curves are considered the simplest and most popular methods. Its hazard function is independent of the underlying survival time distribution (Chatterjee and Mukhopadhyay 2013; Ptak-Chimielska 2013; Ziegler et al. 2004). The Cox proportional hazards model is widely used in clinical and economic research to investigate the association between the survival time of patients, products, or business units and one or more predictor variables. Unlike simple logit regression, Cox regression can handle right-censored observations, i.e., patients or companies that are still alive or operating at the end of an observation period.

For hazard modelling, the equation is

$$\lambda_i(t) = \lambda_0(t)\exp(\beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k)$$

with $\lambda_0(t)$ as the baseline hazard for the risk of going out of business in t when all the influence variables are equal to zero, the influence variables $x_1,...,x_k$ and the regression coefficients $\beta_1,..., \beta_k$ to be estimated (Kleinbaum 1996). Exp(*coef*) represents the Hazard Ratio (*HR*) where *HR* < 1 implying a reduction in risk of the „event" (i.e. business termination) to occur, and *HR* > 1 implying a risk increase.

Kaplan-Meier curves provide a visual understanding of how different naming components affect the companies' survival probability. A stepwise approach estimates the unconditional probability that a company will survive past time *t*, with the estimator

$$\hat{S}(t) = \prod_{t_i \leq t}\left(1 - \frac{d_i}{r_i}\right)$$

where r_i denotes the number of companies at risk immediately before time t_i, i.e., the surviving companies, and d_i as the number of companies that have gone out of business (Gelfand et al. 2016).

A quantitative approach to this assessment is provided with the Restricted Mean Survival Time (*RMST*). RMST subtracts the Kaplan Meier area of the „untreated" group from that of the „treated" group within a time period of interest, with

$$RMST(t) = \int_o^t \hat{S}(\tau)d\tau$$

This results in an estimate of the gain in survival time if a corresponding „treatment" is carried out – nota bene also in the case of non-proportional hazards, where other tests fail to detect a difference (Han and Jung 2022).

The non-time varying assumption can be tested with scaled Schoenfeld residual plots. Their interpretation is similar to the one for residual plots for linear regression – i.e., a visual inspection for the presence or absence of patterns. Any pattern would indicate that the residuals are correlated with time.

In the event of a violation, various work-arounds can be applied: (a) changing the functional form of the violating form by adding cubic terms or basis splines, (b) splitting the variable into equal-sized bins and stratifying it or (c) introducing a time-varying covariate for the variables in question (Lifelines 2022). This last method is explained in more detail in Section 5 since it was chosen to cope with the time-varying variable in the present case.

5. Results

In this section, we report our findings [2].

5.1. Preliminary Analysis

The influence of the naming strategies on these events (and on the censored cases) is initially estimated using a CoxPHFitter. The independent variables are not strongly correlated (*Tab. 2*, Variance Inflation Factor *VIF < 5.0* for all variables). The higher *VIF*-values for informativeness and complexity are explained in Section 4.5. The omnibus test of the model is significant compared to a null model with $\chi^2 = 465.098$, *df* = 7, at *p* ≤ .001. The goodness-of-fit can be measured using the concordance statistic (Harrell et al. 1982), which has become the most popular test in survival models (Therneau and Atkinson 2021). This measure assesses the accuracy of the ranking of predicted time periods (pairwise comparison of the predicted occurrence of an event versus its actual occurrence). It corresponds to the loss function AUC and is interpreted similarly: *C* = .5 is the expected result of random predictions, *C* = 1 a perfect concordance, and *C* = 0 a perfect anti-concordance. In the present case, the concordance index is *C* = .758.

Cox regressions assumes an independent (or non-conditional) relationship between the hazard and time on the level of the covariates – with the effect, that the hazard does not differ between groups, if a factor variable is included in the model (Tabachnick and Fidell 2019). An assumption test reveals though, that the variable „rubric entry" (*p* < .005) does violate the proportional hazard assumption (cf. Schoenfeld residuals in *Fig. 2*). These residuals are to be interpreted very much like residual plots in other regressions and „can essentially be thought of as the observed minus the expected values of the covariates at each failure time" (Box-Steffensmeier and Jones 2003, p. 121). The variation of the „rubric entry" influence coefficient with time (black solid smoothing spline) would be parallel to the blue horizontal dotted line if the proportional hazard assumption was satisfied.

As a correction, the obviously time-varying component „rubric entry" is modelled directly (Lifelines 2022). This is done in two steps: First, the dataset is converted into an episodic format. This transformation generates one record per company for each time interval. In the second step, an interaction term is created with the generated time intervals and the violating variable.
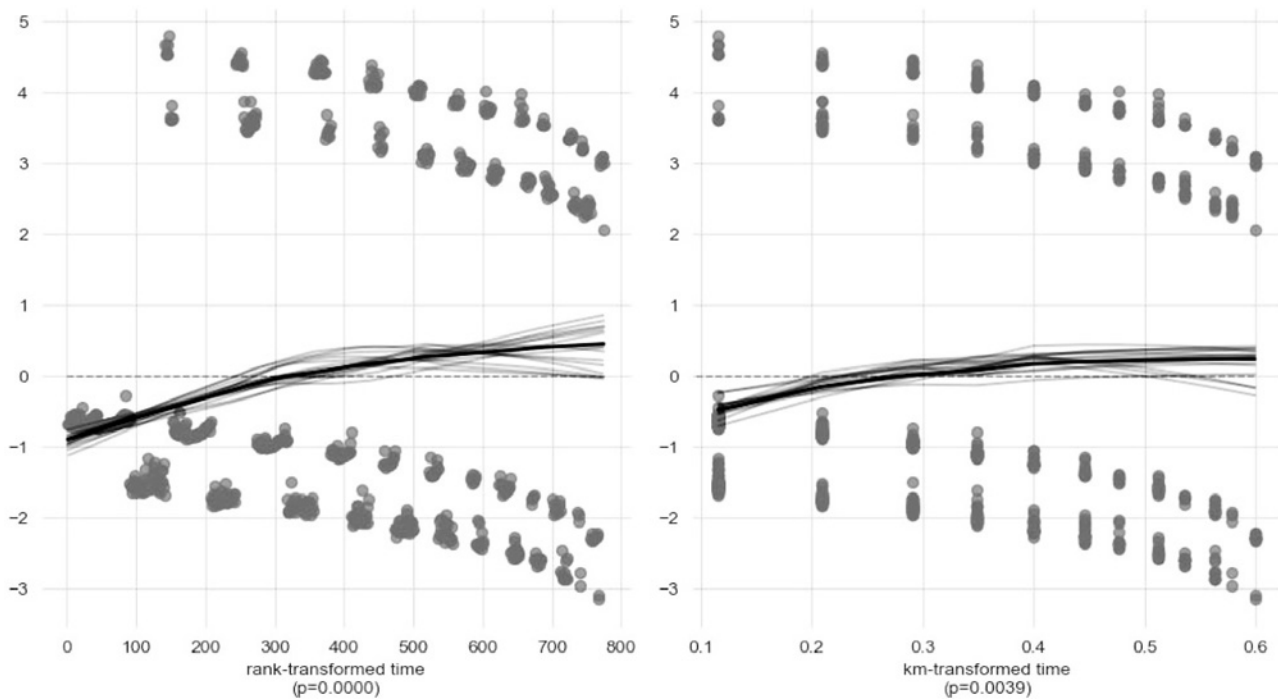
Fig. 2: Schoenfeld residual plots for „Rubric Entry" violating the proportional hazard assumption

Predictors	*coef*	exp(*coef*)	se(*coef*)	*z*	*p*	VIF
Content related:						
• Informativeness (binary)	-1.006	.336	.084	-11.949	< .0005	4.023
• Time*Rubric Entry (binary)	-.199	.819[1]	.014	-14.181	< .0005	1.973
Processability related:						
• Phonetic Symbolism (binary)	.031	1.031	.088	.349	.727	1.229
• Complexity (Length) (number of letters)	.026	1.025	.004	5.668	< .0005	4.130
• Fluency (Pronounceability) (binary)	.248	1.282	.064	3.865	< .0005	1.743

Note:[1] non-episodic value = .233 ($p < .05$)

Tab. 2: Results of the Time-Varying Cox Regression

5.2. Statistical Effects of the Name Characteristics on Survival Probability

Tab. 2 provides an overview of the naming effects on the survival probability in the sample. The effects of the individual predictors are shown in the column exp(*coef*) – it contains the hazard ratios, i.e., the predicted change in the risk for the company with an increase in the predictor by one unit. Regarding the content predictors, the increase in „rubric entry" is an addition of a rubric note to the address entry, in the case of „informativeness" the use of an explanatory proper noun and/or appellative and in the case of „phonetic symbolism" the use of a voiceless plosive (fortis) instead of another initial letter. Regarding the processability predictors, the increase in „fluency" is an additional non-common word, and in the case of „complexity" an additional letter.

5.3. Interpretation

5.3.1. Informativeness and Rubric Entry

The influence of content components was measured with two variables, as a name component or appellative that provides information about business form or business activity (informativeness) and as a rubric entry that serves the same purpose. Both components are central aspects in the relationship between company names and company survival. Explanatory terms in company names reduce the risk of going out of business by 66.4 % (cf. *Tab. 2*, 1–exp(*coef*)), whereby this relationship is significant ($p < .05$). Even more important is the addition of a rubric entry to the name, which reduces hazard risk by 76.7 % over the entire study period ($p < .05$, with the non-episodic term). *Fig. 3* contains Kaplan-Meier curves (shades areas indicate .95 confidence intervals). The upper part of this figure (name informativeness) and the middle part of this figure (rubric entry) reveal a visible difference in life expectancy for companies with and without explanatory names or rubric entries. For compa-

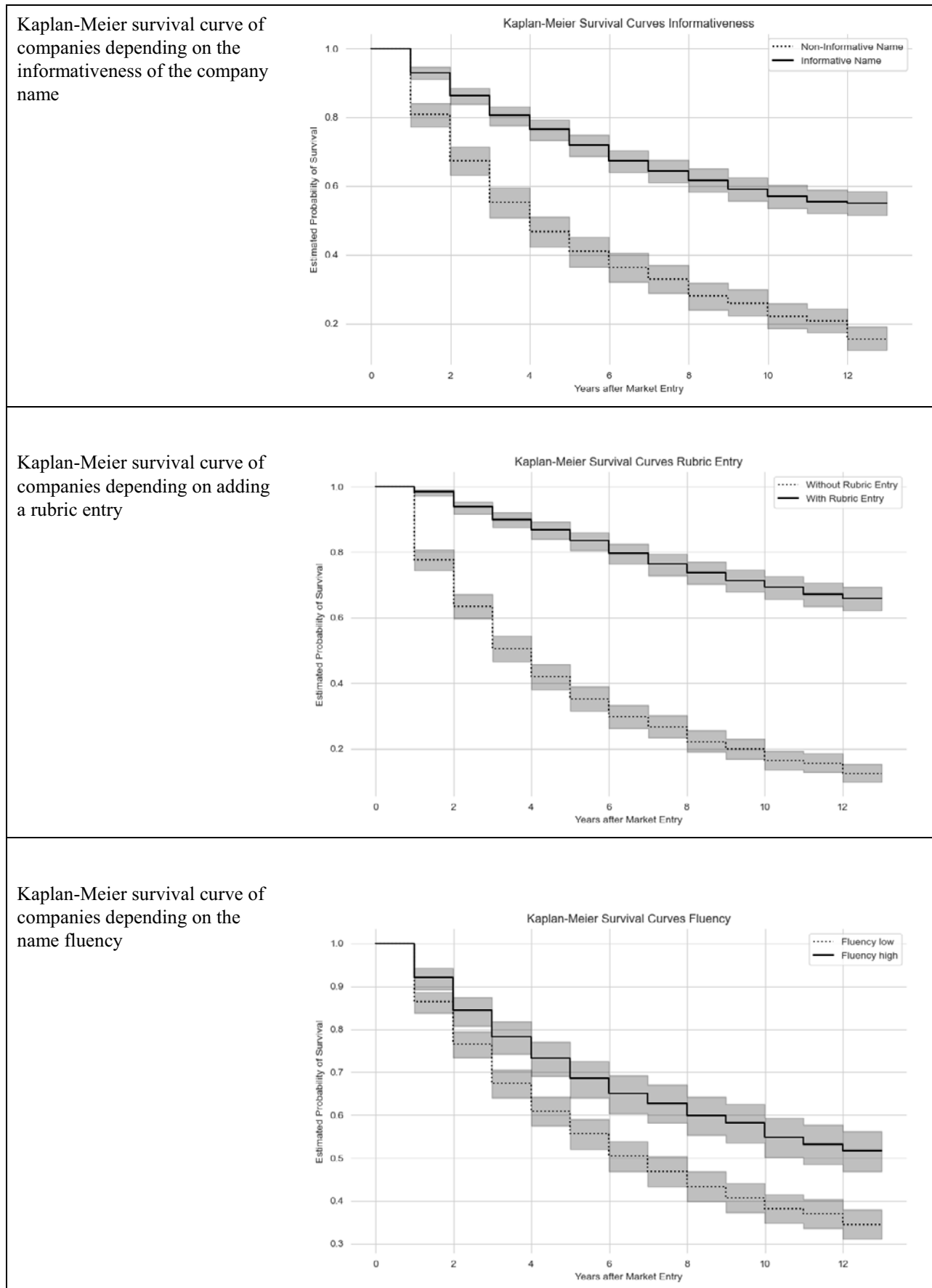| Kaplan-Meier survival curve of companies depending on the informativeness of the company name | |
| Kaplan-Meier survival curve of companies depending on adding a rubric entry | |
| Kaplan-Meier survival curve of companies depending on the name fluency | |

Fig. 3: Kaplan-Meier curves indicating survival rates in time depending on the informative content of the company name, rubric entry, and name fluency

nies with explanatory names, life expectancy improves by three and a half years over the entire study period (*RMST* = 3.561). Companies disclosing further information about their business activity in a rubric will improve their life expectancy by five and a half years (*RMST* = 5.438).

In summation, life expectancy of companies with explanatory name components is significantly higher. H1 is supported by the data.

5.3.2. Phonetic Symbolism

Because they are better memorized and generate higher brand recall (Pogacar et al. 2014), plosives are considered potential business risk reducers. Plosive C, K, P and T names are popular – they can be found in 268 companies (20.5 %); if the alphabet were equally distributed in company names, their share should be 13.4 %. In contrast to previous studies in a non-survival context (e.g. Khenfer and Cuny 2021; Pogacar et al. 2014), plosive names *increase* hazard risk, if only marginally (*exp(coef)* = 1.031, *RMST* = -.088 years). The results contradict hypothesis H2.

5.3.3. Complexity (Length of Name)

As other studies suggest (Agnihotri and Bhattacharia 2017; Alter and Oppenheimer 2009; Green and Jame 2013), the brevity of the name, and thus its reduced complexity, has a positive effect on survival. This can also be observed in this study. The extension of a name by a single letter and thus an increase in complexity leads to an increase in risk of 2.5 % (with $p < .05$, cf. *Tab. 2*). Hence, companies with short names have a lower risk of hazard. The results support H3.

5.3.4. Fluency (Pronounceability of the Name)

457 companies (35.0 %) do not use terms in proper names and appellatives that would be marked as errors in the Microsoft Word spelling checker. These names therefore consist of common terms in German, English or French and are likely to cause low cognitive processing difficulties for an average audience. For 849 companies (65.0 %), one or more words of the name are not included in the standard dictionaries of the languages mentioned and are therefore probably not familiar to the audience. Erroneous terms in the company name increase the risk of going out of business by 28.2 % (with $p < .05$, cf. *Tab. 2* and the figure in the lower part of *Fig. 3*). Again, this factor increases life expectancy in the study period by more than one and a half years (*RMST* = 1.695). Data provide evidence to H4.

5.4. Stability Checks

It might be presumed that the company names exerts different effects on the survival rate depending on the business model (operating in B2B or B2C markets or mixed markets) and value creation model (product-centric or service-centric value creation) that companies pursue (Galbraith 2005; Leek and Christodoulides 2011; Leinwand and Mainardi 2014; Shah et al. 2006). The differentiation into B2B, B2C and mixed business models follows Leek and Christodoulides (2011), the differentiation into product-centric and service-centric value creation is based on the tangibility of service. Since about one third of all companies neither have an explanatory name nor a rubric entry, only 991 of the 1,306 companies can be examined in this way with regard to its business model and 995 with regard to its value creation model. It should be noted that this eliminates companies without informative names and rubric entry, which carry an above-average risk of failure.

In order to factorize the companies along their business and value creation model, all information-bearing name components (cf. Section 4.3) and the rubric entries were combined as a bag of words, each component of the set was assigned a code on business model and value creation, and the code reassigned to the data records using string matching. The company „*Klein Treuhand* AG" offers trust *services*, and, since fiduciary services are usually offered to business and private clients, a *mixed* business model is assumed. Doubtful cases (multiple matches for one name or rubric entry) were recoded manually.

43.6 % of B2C-companies were still active in 2021, compared to 51.7 % of mixed-model companies that address both business and consumer markets. There are also differences in terms of value creation: While 48.9 % of the service-centric companies survived, only 43.0 % did so in the group of product-centric companies.

In the breakdown by business model and value-creation models, though, the hazard effects present themselves similarly to the overall picture (*Tab. 3*). Effect sizes can again be taken from the column exp(*coef*) (formula: 1 – exp(*coef*)), and they reveal only marginal differences.

6. Implications and Limitations

6.1. Implication for Theory

Business survival is presumed to be the result of many factors that can only be controlled by the company to a limited extent. One of the controllable elements is the company name, and its choice is not insignificant for the shorter or longer future of the company. The literature suggests that choosing the „right" name positively influences its processing, endowment, recognition, recall, or familiarity. However, it remained unanswered how exactly the name exerts its effect on survival or failure.

This article joins a series of studies that shed light on the relationship between name choice and company performance (Belenzon et al. 2017; Verhaal et al. 2015). The focus of our study was on the connection between the choice of name and the chance of survival and, in case of

Predictors	Total sample	Business model			Value creation model	
		B2B	B2C	Mixed	Product-centric	Service-centric
Content related:						
• Informativeness	.336*	.329*	.383*	.501*	.393*	.327*
• Time*Rubric Entry	.819*	.809*	.801*	.849*	.809*	.819*
Processability related:						
• Phonetic Symbolism	.1031	.887	1.376	1.126	1.039	1.096
• Complexity (Length)	1.025*	1.022*	1.006	1.030*	1.012	1.025*
• Fluency (Pronounceability)	1.282*	1.379*	1.339*	1.492*	1.304*	1.452*
Model:						
• Observations	1,306	483	305	203	453	542
• Events (Market Exits)	775	262	172	98	258	277
• Censoring Rate	59.3%	45.8%	43.6%	51.7%	43.0%	48.9%

Note: * $p < .05$.

Tab. 3: Estimated exp(coef), depending on data segments

business failure, the survival time of these companies. This time span is measured using entries in the Yellow Pages of the Swiss telephone data provider localsearch. The naming effects were measured using a very limited set of simple predictors.

In the present cases, we indeed found a significant correlation between naming and company success – namely informativeness and rubric entries, complexity (in the sense of name length) and fluency (in the sense of orthographic correctness of a name). For instance, choosing an informative name prolongs the restricted mean survival time (*RMST*) in a time window of 12 years by 3.6 years, and the addition of a rubric entry to the name by 5.4 years. Explanatory names seem to better at connecting company and customer (Hillenbrand et al. 2013), for example when customers search for products or services in the Yellow Pages or on the Internet. Processability-related components also make an impact: in line with Green and Jame (2013), longer names and the use of erroneous terms negatively affect the risk of a hazard in the dataset examined.

6.2. Implication for Practice

Summarizing our results, both questions RQ1 and RQ2 can be answered as follows to assist practitioners when deciding about brand names.

Does the company name influence the survival odds of said company? The choice of a company name is one of the initial choices an entrepreneur must make. The name is the first visible asset of the company, one of the longest-lasting and most valuable (Schiffman and Wisenblit 2019). Its content comprehensibility and mental processability have an impact on the probability of company survival. Firms that use names that reveal their business purpose have lower hazard risks, as do easily processable names. The Kaplan-Meier curves in *Fig. 3* give a visual

impression of this effect. New firms whose names are appropriately optimized have higher life expectancies: the estimated probability of survival in the twelfth business year after founding is around 65 % if rubric information is added, and 15 % without this additional information, and around 55 % if an explanatory name is chosen against less than 15 % without an explanatory name. Entrepreneurs would therefore do well to optimize their most valuable asset in terms of content and processing.

For companies that have to go out of business, is there a correlation between their choice of name and the length of time they have been in business? For companies that exited the market, a well-crafted name at least prolonged their business activities. This extension can be determined on the basis of the area between the Kaplan-Meier curves. The survival bonus, measured as the difference between the Restricted Mean Survival Time (*RMST*) of two groups, is three and a half years for firms with explanatory names, and one and a half years for firms with names without erroneous terms. Even if the use of the said name components does not guarantee absolute survival (this depends on many other endogenous and exogenous factors), it can have a prolonging effect on business activity.

6.3. Limitations of our Study

6.3.1. Causality

An alternative causal relationship is also conceivable: The choice of a company name is a decision that always reveals the entrepreneurial cognitions and emotions of its founders (Baron 2004; Eggers and Song 2015; Granqvist et al. 2013; Grégoire et al. 2011; Mitchell et al. 2002; Paik 2014; Parker 2013; Shepherd et al. 2015; Westhead et al. 2005). The cognitions and emotions that lead to prudent name choice may also lead to prudent company management and ultimately to long-term company suc-

cess. In this context, the company name becomes the proxy for management quality and – indirectly – for the company's chance of survival.

6.3.2. Limitations due to the Database

The dataset examined is limited both in terms of location and time. Of the approximately 600,000 active and an even larger number of hazardous Swiss companies, only around 1,300 were investigated in a narrow local perimeter over a short period of time. It would make sense to expand the study in a spatially and temporally larger perimeter to integrate more companies over a longer period of time.

Telephone directories give a fairly complete, yet not an entirely complete picture of the company landscape, as there is no obligation to register. In terms of completeness, the official Swiss company register, Zentrales Firmenregister (ZEFIX), is preferable. This dataset is not only more comprehensive, but contains additional variables on capitalization, ownership, or reasons for going out of business, which would allow a more differentiated analysis. ZEFIX, however, contain registered names, which quite often are not congruent with the names used in the public domain.

6.3.3. Limitations due to Data Validity

While the number of censored cases, i.e., the surviving companies, is likely to correspond to its actual quantity, the number of hazards should be treated with some caution. Except for sole proprietorships, which usually make business calls from their private phone and will continue to use it after failure, it makes no sense for a private or public limited company to retain a company telephone number after going out of business. However, business numbers could be deleted in case companies merely give up their fixed network connection but continue to do business. A hazard is also recorded in this study, when a company relocates, or when it is operating in the same location but under a new name. Those cases cannot be identified with the current data. However, this lack of clarity is deemed acceptable, since, in the first case, the company quits the local market (local business hazard), or, in the second case, the company name is eliminated and a customers need to familiarize themselves with a new one (local naming hazard).

Moreover, we were not able to distinguish the exits of companies due to going out of business versus due to being sold to another company. Different hazards, though, open the way to so-called competing risk models. Many hazards – e.g., liquidation due to owner's age, bankruptcy, takeover, merger, relocation of own accord or due to other use of the business property, change of name, etc. – quite often follow a decision by the management. In this „voluntary" case, naming effects are likely to have a different significance, if any, compared to a forced market exit, where the name is quite likely responsible for the lack of resonance.

Informativeness was only coded as a binary variable in the present study. As suggested by Ainiala et al. (2016), the semantic meaning of a name can be broken up into more differentiated pieces, which – in the best case – will improve the predictive power of the model. The same applies to symbolic components: in the present study, these were coded for their properties to improve processability and rememberability.

As to proportionality of hazards, various authors have pointed out that habituation may build up over time and therefore facilitate the processing and understanding of a company name (e.g., Green and Jame 2013). However, such studies do not provide any conclusive indications as to when and under what conditions such habituation occur. Such a habituation effect could occur with continued exposure through customer relationships or communication activities – and may have led to the violation of the proportional hazard assumption in this study. The inclusion of further variables – e.g., marketing spending as a proxy for brand awareness and brand recognition – might help to better understand changes in impact and to take them into account in naming policy.

Notes

[1] We did not calculate a binary variable. In the Results section, we used the number of letters as the respective independent variable of the Cox regression, and we refrained from calculating the Kaplan-Meier curve.

[2] A Jupyter Notebook containing Kaplan Meier curves, *RMST*, Cox-Regression and Time Varying Cox-Regression can be found at https://github.com/stefanguertler/Survival-Analysis.

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Keywords

Company Name, Start-up, Company Survival, Hazard model

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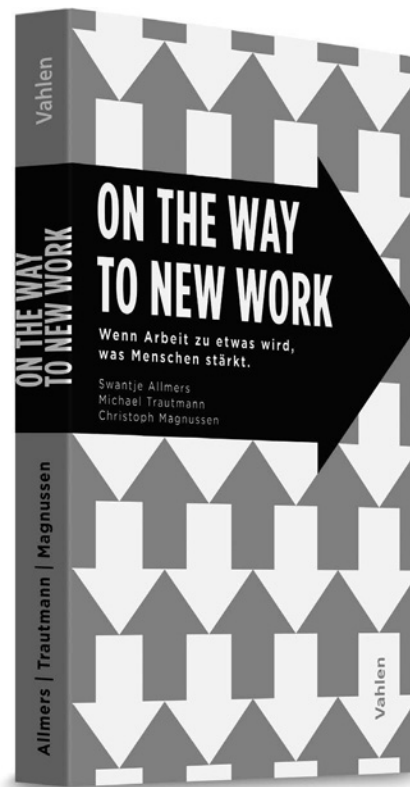
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