

LINEAR MODEL FOR BRAND PORTFOLIO OPTIMIZATION

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Abstract

Research purpose. The aim of the paper is to create a model that allows building an optimal brand portfolio, allowing an organisation to achieve its goals. The created model is based on the bivalent programming theory. A mathematical model of optimum brand portfolio is created based on linear programming with restricting conditions being the maximum acceptable risk level and budget. The basic types of resources and basic types of relations between brands are explained, which are part of the process of brand portfolio optimization.

Design / Methodology / Approach. Knowledge and many years of experience of mainly economic disciplines were used for the selection of characteristics for brand portfolio specified in this article. Our assumptions were based mainly on project portfolio management, operational analysis and linear programming as well as tools and methods of graph theory.

Findings. Brand portfolio management such as creating, planning, organising and then maintaining a successful brand is a costly and long-term process involving effective marketing strategies and decisions. The prerequisite for brand portfolio creation is deciding on the number and type of brands. A properly constructed brand portfolio is a prerequisite for achieving business goals.

Originality / Value / Practical implications. Brand portfolio optimisation requires sufficient attention; however, rather than the selection of the highest number of brands, it should be based on compilation of a set, according to pre-defined priorities, which would provide the best possible means to meet the company's goals for the current limitations. It should be implemented upon objective rules (in our case maximum allowable risk level and available budget). Frequent changes in the brand portfolio structure are not beneficial since they reduce the ability for the company to achieve its targets and represent excessive use of resources. In addition, qualitative brand characteristics have to be respected in the brand portfolio management, but this was not covered in our research.

Keywords: Brand strategy; Brand portfolio; Optimisation; Resources.

JEL codes: M31; M39; L19.

Introduction

“A brand is a very broad concept. It is a combination of everything that customer takes into account in the purchasing decision-making process. It is not only a trademark but also the associations that arise in the minds of consumers when remembering a specific brand. The brand strikes an emotion in consumers. This is a combination of consumer experience with the brand since the very first ‘touch’ of the product” (Krizanova et al., 2013).

In today's marketing practice, many companies simultaneously apply the strategy of multiple brands that collectively consume disposable resources of different kinds. Existing brands need to be planned and managed not only as separate entities, but also as one great whole by using advanced management methods and approaches. All brands, regardless of their success and the life cycle, are part of the brand portfolio. One brand does not allow comprehensive coverage of the whole market, especially if the market is significantly differentiated. If the company wants to increase its market share, it must choose a multi-brand strategy for building its own brand portfolio. The growth of the company is usually

accompanied by creation of new brands, if the company wants to penetrate new market segments or apply new distribution channels.

“In general, current managerial trends highlight innovation as a possible relevant source of brand value. The presence of innovation has an impact on perceived brand value as well as that the character of sector has an impact on brand innovation” (Kliestikova & Kovacova, 2017).

The aim of the paper is to create model that allows building an optimal brand portfolio that will enable a company to achieve its goal. The created model will be based on the bivalent programming theory.

Literature Review

The brand portfolio management and optimisation issues are the subject of interest of many studies, especially foreign publications. The brand portfolio literature provides an understanding about key factors that lead to the creation of a successful brand portfolio.

“By means of a strong brand, the company can establish strong and positive relationships with their customers” (Majerova & Kliestik, 2015). Many large companies operating in consumer markets own and sell several brands; they create a brand portfolio (Morgan & Rego, 2009; Dacin & Smith 1994).

Åsberg (2015) defines brand portfolio as “a team of brands working together toward a common goal, thus enhancing firm profits by the strategic positioning of each brand in relation to all other brands in the portfolio”. “A brand portfolio is a set of different (sub-)brands that a particular firm offers to customers” (Keller, 2012). There are two basic types of brand portfolios: (i) branded house portfolio containing (sub-)brands that share and/or are endorsed by the same master brand name; (ii) house of brands portfolio contains several independent brands (Aaker & Joachimsthaler, 2000).

One of the important fact is that managers of a brand’s portfolios must understand every direct communication on behalf of (sub-)brands. This approach will affect the coherence of the whole portfolio. Nguyen et al. (2018) states that “the path to coherence is consistency in the message making, especially with respect to design, personality, and status of the (sub-)brands. However, the coherence between (sub-)brands in a house of brands portfolio may not be necessarily applauded.”

DelVecchio (2000) finds that “the number of products affiliated with a brand portfolio and the quality variance of these products play an important role in affecting consumer impressions of the brand portfolio reliability. One of the main benefits of a well-managed brand portfolio strategy is to provide the link of a firm’s products to its overall consumer’s perceptions about the company.” Chailan (2008) states that “a brand portfolio goes beyond this question of a hierarchical or competitive relationship between one brand with another, in order to examine ways of coexistence and the balance between several brands that are incorporated within a single company, whatever the brand architecture may be.” “In terms of a wide business strategy, firms are motivated to be concerned with brand portfolio management because it provides the structure and discipline needed to support and enable a successful strategy for the company. In this sense, brand portfolio becomes particularly salient when a company confronts pressing growth goals or pending mergers, acquisitions, and alliances” (Hsu et al., 2010). “Brand portfolio strategy can be understood as how firms manage their brands and sub-brands within a targeted market, considering the consumer’s price and quality perceptions and the competition within the targeted market” (Santos, 2018).

“Many large companies in consumer markets own and market an array of different brands (brand portfolio) and routinely address strategic questions related to brand portfolio management, such as what brands to create or acquire, which ones to modify and which ones to leverage. However, managers generally devote relatively less managerial time, attention and effort to the strategic decision of whether to keep (retain) or kill (discard or discontinue) a weak brand in the portfolio” (Varadrajana et al., 2006).

Brand portfolio management is a very difficult task because companies must deal not only with a single brand but also communicate, collaborate and coordinate a set of (sub-)brands. If (sub-)brands are managed not as whole, but separately and independently, allocation of resources may be at less than the optimal level. Accordingly, the portfolio may lose its focus (Aaker, 1996; Kayande et al., 2007).

“On the other hand the literature often suggests that larger brand portfolios are inefficient because they lower manufacturing and distribution economies” (Hill et al., 2005).

Based on the literature and empirical research the concepts of project portfolio optimization and project portfolio were defined by authors.

It is possible to perceive **brand portfolio optimisation** as a process related to the assessment and selection of new brands with a concurrent allowance for currently existing brands in order to create a brand that would lead to fulfilling goals of a company smoothly, without exceeding the actual availability of resources or breaching other considered limitations. Creation of the optimum brand portfolio may be one of the key factors of the company’s success. The output of optimisation is in the form of decisions regarding inclusion of brands into the portfolio or exclusion of brands from the portfolio.

The **optimum brand portfolio** is defined as a sub-set of brands, which is compiled from an initial set of brands that meet all the stipulated limiting conditions and helps a company achieve the highest possible profit (benefits) or other criteria. Since it is the optimum solution, from the initial set, it is not possible to create other sub-sets that would meet all the limiting conditions and, at the same time, achieve the best possible benefit represented by the objective function.

The development of the current market environment, the formation of micro-markets, the impact of competition and globalisation determine the need to create the brand portfolio that will be able to meet customer-specific requirements and expectations. There is much information about the brand portfolio issue in the literature focussing especially on the advantages and disadvantages of maintaining a brand portfolio, assessing their success, strategic decisions, brand portfolio management process, etc. However, there is no mention of specific approaches, tools and techniques that will allow to building an optimal brand portfolio. These findings were one of the main motives for our research. The main interest was to create a tool that allows construction of a project portfolio based on the predefined criteria.

Methodology

Different potential profitability, financial and capacity limits generally do not allow support for all the brands. It is therefore necessary to make a proper selection and to include into the portfolio only those brands whose effect and mutual relations will ensure fulfilment of anticipated expectations. The purpose of the article is to create a model that allows building an optimal brand portfolio enabling the company to achieve its goal. The model must clearly identify which brand will be part of the portfolio and which will not. One of the options is to apply integer programming with a bivalence variable, which is the starting point for the compiled model. This tool allows selecting brands based on a predefined criteria and creating a portfolio with the potential to achieve the highest benefits. In addition, other optimisation approaches can be applied using group decision methods, pair matching, algorithms based on artificial intelligence, etc.

The general formula of bivalent programming can be written as:

$$f(x) = \sum_{j=1}^n c_j \cdot x_j \rightarrow \text{ext} \in \{\min; \max\} \quad (1)$$

where:

- $f(x)$ - criterial function representing the total value of the brand portfolio (net present value, profit, etc.)
- c_j - j -th brand evaluation
- x_j - bivalent variable $\{0,1\}$
- n - the number of brands that are being considered for portfolio creation

The second component of bivalent programming consists of boundaries in the form of linear equations or inequalities:

$$\sum_{j=1}^n a_{ij} \cdot x_j \leq b_i, \quad i = 1, \dots, m \quad (2)$$

$$x_j \in D_j, \quad j = 1, \dots, n$$

where:

- a_{ij} - j -th claim to i -th source
- b_i - availability of i -th restriction

The D_j set has the following form:

$$D_j = \{0, 1\}, \quad j = 1, \dots, n$$

There are these possible brand states:

1. The new brand will be included into the portfolio.
2. The new brand will not be included into the portfolio.
3. The existing brand will be retained in the portfolio.
4. The existing brand will be excluded from the portfolio.

In addition, it is also possible to sell the brand or link brands together. But this model does not solve this option.

Based on these assumptions and mathematical notation, we will build on our brand portfolio optimisation model.

Results

The objective function may be expressed by any mathematical function expressing such portfolio value, which is the highest or lowest value necessary to satisfy a particular problem. Most of the time, the objective value is expressed as a value of total profitability, costs, risk and time requirements. The limiting conditions are generally limited resource capacities, necessarily required by brands included in the portfolio. In this case, the resource is defined as financial resources, human beings, allocated time units. It is necessary to recognise two types of basic resources:

1. *Global cumulative resources* Z_G – It is one resource for all the brands defined in an initial plan. It is characterised by a single attribute; one numeric value - amount of capacity (budget) allocated for all the brands whereby cumulated requirement for resources of this kind can't exceed the available capacity. The attribute of global cumulative resource can be expressed as follows: $Z_G = \{capacity\}$.
2. *Segment-specific resource* Z_S – It is an order of resources with a defined order and various capacity. Each of the considered brands must have a segment defined (period of time) in which it will be applied. The cumulated requirement of resources within a segment must not exceed its capacity whereby for each period, there may be other capacity of available resources defined. The attribute of segment-specific source can be expressed as follows: $Z_S = [\{capacity\}, \{capacity\}, \dots, \{capacity\}]$.

There may be also further limiting conditions such as mutual relations between brands, influencing conditions of their implementation, resource spending demands or influencing the value of objective function.

A brand is understood as an inseparable element, implemented either completely or not at all. Therefore, the optimum brand portfolio may not include brands that would not be implemented to the full extent.

The mathematical expression of optimum brand portfolio:

$$Z = \sum_{i=1}^n \left(x_i \text{profit}_i + K_i x_i \prod_{j=1}^{m^i} x_j^i + K'_i x_i \prod_{j=1}^{m'^i} x_j'^i \right) \quad (3)$$

Relation (3) represents a linear objective (criterion) function expressing a particular effect of brand portfolio that can be maximised or minimised. If objective function represents the level of total profit, the ambition will be to find its top limit (maximum) while meeting all the defined limiting conditions (restrictions). The selected economic criterion of objective function must be additive to secure a condition of possibility to add values of such criterion for all the considered projects.

In case of limiting conditions:

$$\sum_{i=1}^n \left(x_i \text{risk}_i + K_i x_i \prod_{j=1}^{m^i} x_j^i + K'_i x_i \prod_{j=1}^{m'^i} x_j'^i \right) \leq \text{maximum allowable risk level} \quad (4)$$

$$\sum_{i=1}^n \left(x_i \text{cost}_i + K_i x_i \prod_{j=1}^{m^i} x_j^i + K'_i x_i \prod_{j=1}^{m'^i} x_j'^i \right) \leq \text{budget} \quad (5)$$

$$x_i \in \{0,1\}$$

For mandatory, correlative and exclusive dependencies:

$x_i + x_j \leq 1$ brand i and brand j are exclusively dependent

$x_i - x_j \leq 0$ brand j is mandatory for brand i

$x_i - x_j = 0$ brands i and j are mutually dependent

where:

- n - number of initial brands
- x_i - decision variable of brand i , binary variable with range of values $x_i \in \{0,1\}$, value 0 means exclusion of a brand from the resulting portfolio and value 1 means inclusion of the particular brand into the resulting portfolio
- profit_i - expected profit achieved from brand i
- cost_i - anticipated costs for implementation of brand i
- risk_i - expected risk in implementation of brand i
- K_i - value of support for brand i , $K_i > 0$ if support of brand i is not defined, then $K_i = 0$
- K'_i - value of negative influence to brand i , $K'_i < 0$ if value of negative influence of brand i is not defined, then $K'_i = 0$
- $\{x_1^i, \dots, x_m^i\}$ - decision variables supporting brands of the supported brand i
- $\{x_1'^i, \dots, x_{m'}'^i\}$ - decision variables of the negatively influenced brand i
- m_i - number of supporting brands in a particular defined supporting dependency for support of brand i
- m'_i - number of negatively influencing brands of a negatively influencing dependency of negatively influenced brand i
- Z - objective maximisation function

For requirements of the presented mathematical model of optimum brand portfolio, it is possible to identify five basic types of relations between brands from which the optimum portfolio is created:

1. Mutual dependency: This dependency assumes implementation of all the brands or none of them; it is a 1:1 type of relation.
2. Mandatory dependency: It stipulates which brands are mandatory for other brands; implementation of a particular brand allows implementation of another brand. Yet again, it is a 1:1 type of relation.
3. Exclusive dependency: It enables implementation of a single brand from the particular relation only; it is a 1:1 type of relation, i. e., the resulting portfolio will include one brand at most, of brands being in the exclusive relation.
4. Supporting relation: Implementation of one brand determines the increase of profit generated in other brands or decrease of costs or risks, supporting dependency is a 1: N type of relation.
5. Negatively influencing relation: Implementation of one brand determines reduction of profit generated by other brand or increase of costs or risks, negatively influencing dependency is a 1: N type of relation.

Dependencies 1–3 belong to the category of dependencies influencing implementation of a brand and dependencies 4 and 5 belong to the group of dependencies influencing the brand attributes. Figure 1 shows further specification of the types of relations.

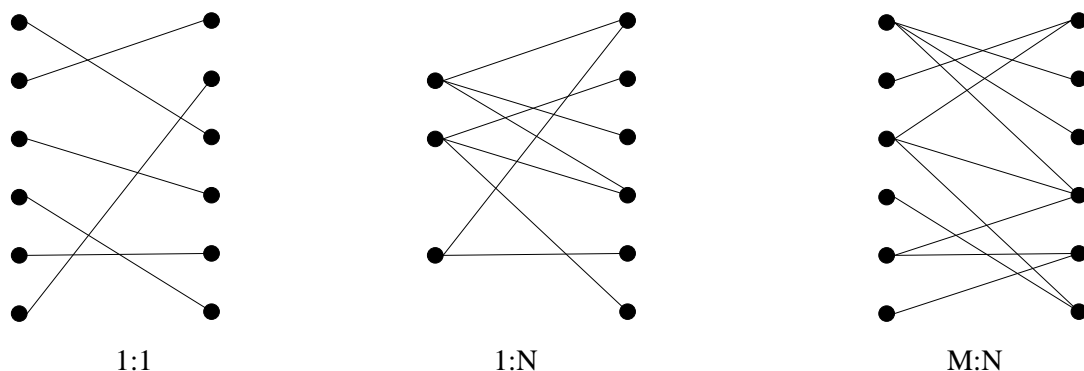


Fig. 1. Types of relations between brands (Source: own processing)

Each company tends to select an optimisation method that is most suitable for its specific conditions and nature of brands. In some cases, it is convenient to apply methods based on quantitative brand characteristics while in other cases methods it is based on qualitative evaluation. It is a priority of an evaluating subject to select the most promising brands according to evaluation criteria that also meet the limiting conditions.

Kral & Bartosova (2017) state that “successful application of multi-brand strategy involves building of a solid position in minds of customers at target markets for brands included in the portfolio. Portfolio should not comprise of independent brands, however, it should reflect the global market dominance.

When creating the portfolio, we recommend applying mainly the following key principles:

1. Synchronize brands in the portfolio with specific customer requirements and ideas.
2. Synchronize brand positioning strategy with generic competitive strategy, product category and market position.
3. Characteristics emphasized in the brand positioning should correspond to each other to create a reliable and trustful brand.

4. One property could be applied to more than one brand within the portfolio – some properties are appealing for each brand and could be applied to more brands in the portfolio.
5. Make strategic decisions related to the portfolio upon results of the continuous monitoring of environment and brand diagnostics only.”

It should be noted that this is a multi-criteria optimization model. This model can only be applied using information technology. Selected input parameters are relatively reliably detectable at the company management level. The proposed model is an open system that allows change variables according to availability of direct requirement of the evaluator.

Conclusions

Optimisation and subsequent brand management are important activities for many companies striving to make efficient use of their limited resources. Brand portfolio optimisation requires sufficient attention; however, rather than select the highest number of brands, it should be based on compilation of a set, according to pre-defined priorities, which would provide the best possible way to meet the company's goals within the current limitations. It should be implemented upon objective rules. Frequent changes in the brand portfolio structure are not beneficial since they reduce the ability to achieve company's targets as well and represent excessive use of resources.

Knowledge and many years of experience of mainly economic disciplines were used for the selection of characteristics for brand portfolio specified in this article. Theoretically, if brand portfolio consists of only a single brand, we can talk about the least demanding brand portfolio management. By adding more brands to the portfolio, there is a gradual increase of complexity of the entire system. This is clear by the influence of several brands as well as the influence of interactions, mutual relations and dependences.

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