

Frugal invention candidates as antecedents of frugal patents – the moderating role of frugal attributes analysed in the medical engineering technology

Frugal innovations offer companies the access to new market segments, based on some specific characteristics. Established companies may use frugal innovations to open up new market segments, be it under their own brand or under separated subbrands in their home markets or enter new markets in emerging countries. In analogy, companies from emerging countries may aim to enter markets in developed countries or protect their markets in their own country. Typically, frugal innovations focus on an existing solution (be it physical goods or services) as blueprint, then change parts of its functionality and reduce the costs, often dramatically, and focus on the performance of core features (Weyrauch and Herstatt 2016).

For many companies the questions arises how to find ideas for such frugal innovations. For this purpose, we discuss possible options, then introduce a patent-based method for the identification of frugal invention candidates and their qualification as frugal patents. We sketch a process with four steps in general (see figure 1). The first step is about the operationalization of frugal patents, resulting in an ample frugal thesaurus with five categories and many attributes. The second step comprises the patent search. The patent processing by semantic means, such as filtering in different ways and n-gram extraction, is conducted in the third step. In the fourth step, the assessment of the identified frugal patent candidates is accomplished by the analysis of the number and categories of frugal attributes in the n-grams of a patent.

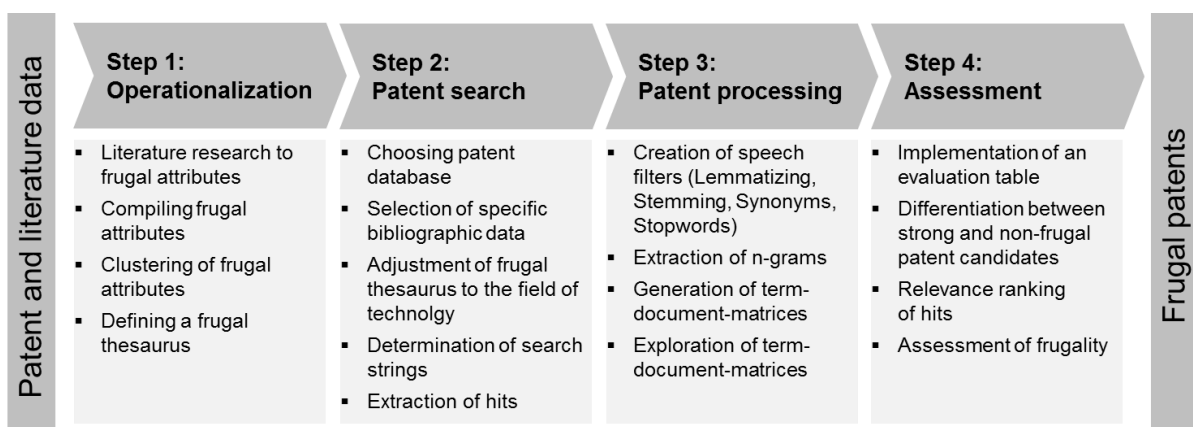


Fig. 1. Process model for identification of frugal patents in four steps. (Source: own representation)

31 We test and apply this process in the medical engineering technology. The appli-
32 cation results in four sets of frugal patents, for which a heuristic is used to in-
33 crease the precision stepwise from set to set. One of the identified patents is US
34 6,312,393 B1 with the title "*Contact device for placement in direct apposition to*
35 *the conjunctive of the eye*". It describes a contact device which is used on the
36 front part of the eye to measure physical and chemical parameters of the body
37 (USPTO, 2018). In terms of the frugality the invention stands out by describing a
38 low-cost device which is easy- and simple-to-use, easily accessible, comfortable
39 and suitable for home use and enables a simple measurement. This is especially
40 shown in two text parts. The description contains the text "*the apparatus of this*
41 *invention provides a fast, safe, virtually automatic, direct-reading, comfortable*
42 *and accurate measurement utilizing an easy-to-use, gentle, dependable and low-*
43 *cost device, which is suitable for home use*" and it includes the text "*since the ICL*
44 *is low-cost and is easily accessible manually simply by pulling down the eyelid,*
45 *the complete ICL can work as a disposable unit and be replaced as needed.*"

46 Our paper contributes to existing theory in three ways. First, the novel categori-
47 sation as well as the frugal thesaurus may help researchers understanding frugal
48 inventions and innovations better. For instance, a typology could be developed
49 by combining pairs of categories. Second, our findings enforce the notion that
50 frugal inventions can get patented which deepens the understanding that frugality
51 is not just downsizing existing solutions, but it is based on extensive engineering
52 work with novel technical solutions. Third, our method can deliver a multitude of
53 frugal patents, not only in the medical engineering technology, and by doing so,
54 provide the data for further studies.

55 From a managerial point of view, our method can be used both in an industry and
56 across industries. Within an industry, managers may use our method to search
57 for frugal patents of competitors or even third parties from whom they could obtain
58 licenses. Across industries, technology managers could use the frugal patents of
59 a different industry to simulate their research and development people. For in-
60 stance, managers in the automotive industry could use the frugal US-patent
61 6,312,393 B1 to transfer the idea of a simple and cost-effective device for acci-
62 dent prevention by early detection of a driver's health state from the medical en-
63 gineering field in their own industry.

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65 References

66 Weyrauch, T and C Herstatt (2016). What is frugal innovation? Three defining
67 criteria. *Journal of Frugal Innovation*, 2(1), 1-17.