Market-driven Quantification of Competitive Advantage by Means of Conjoint Measurement

Improvements in time, cost and quality of products and services are the keywords for running a successful business today and building the basis for competitive advantage. The consequences of a given decision, e.g. implementation of an electronic sales channel affecting the competitive position need to be transparent before the execution of a particular measure in order to determine to what extent corporate goals may be supported. This article provides a concept for the quantification of competitve advantage. Its objective is to outline how market-related effects of a particular decision could be translated into quantified figures. Additionally, the possibilities electronic markets offer for the elicitation of customer preferences by means of conjoint measurement are discussed.

Information technology enables companies to meet current challenges stemming from changing market conditions and the resultant competitive pressure.

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Several authors have emphasized the important impact eletronic markets have on the competitive front of a company [1] [2]. The establishment of electronic markets could create substantial and sustainable competitive advantage for participating companies.

Competitive Advantage through Electronic Markets

There are several examples where companies boosted their revenues by participating in an eletronic market. One advantage for a customer may be the ease of ordering by using an electronic ordering system. As the ease of ordering is often one essential criterion for customers to choose a particular supplier, the establishment of an electronic sales channel thus offers the possibility of differentiation from competitors. Additionally, electronic markets could also reduce response time significantly. Thus, the reduction of the time span between placing an order and actual delivery through improved information flow, enables suppliers to cover a greater proportion of the market.

The above-mentioned issues highlight just some aspects of how the participation in an electronic market could improve a company's competitive position. But not all attempts untertaken in that direction have proved to be successful [3]. Since such projects often tend to bind a company's organisational and financial resources over a period of time, it is therefore imperative, besides taking strategic considerations into account, to implement a previous evaluation of market-related effects. In order to quantify the impact of information technology on the company's competitive position, suitable prognosis and valuation methods are required.

As outlined, electronic markets could significantly influence a company's market performance. Market performance may be defined as the total set of material and immaterial needs and wants-satisfying factors perceived by a customer. This definition of market performance is analogous to the generic product notion, whereby a product is understood as a bundle of utilities [4]. A company's market performance may be described in terms of key buying factors (KBF), e.g. the ease of ordering, product quality, price or response time. The participation in an electronic market could lead to changes of KBF-perfomance levels, such as a reduced response time. Should these changes be perceived by potential buyers, as well as duly acted upon during the purchasing decision, the organisation will thereby be able to differentiate itself from its competitors. The potential effect of such a differentiation on the market share could be quantified by means of a conjoint measurement (see figure 1).

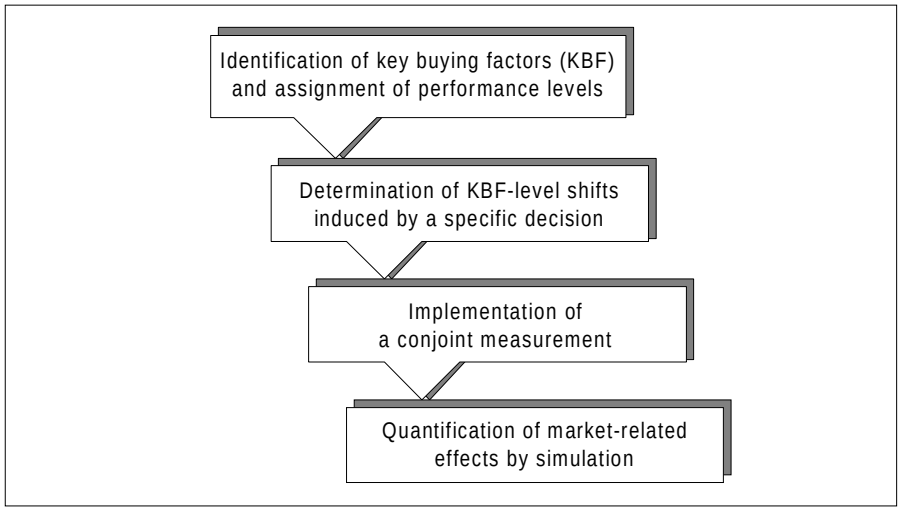

Figure 1: Market-driven quantification of competitive advantage

Conjoint Measurement

The conjoint measurement amounts to a combination of special data acquisition methods, multivariate statistical estimation and specialized evaluation procedures. Conjoint measurement looks upon an object being evaluated as a bundle of features or attributes. These attributes should capture all essential aspects of an object. Based on respondent evaluations, the conjoint measurement allows for the derivation of utility functions of attributes which, in turn, establish a total object value [5].

In order to quantify the market effects of a specific decision, suitable KBF describing the dimensions of the market performance are to be selected. A set of levels is assigned to each KBF. These represent different levels of performance. Based on the KBF and their assigned levels, respondents are asked to evaluate several alternative market performances in terms of their desirability. Two methods currently exist for the acquisition of data, within the context of a conjoint measurement. In the trade-off-approach, the respondent is required to arrange all level combinations of two KBFs, in terms of their preference. The full-profile approach requires the respondents to make paired comparisons, by selecting their preferred KBF combinations each characterized by a single performance level for every KBF. Based on these ratings, a utility contribution per KBF-level or, repectively, a utility function for each KBF, may be determined. Several statistical estimation procedures, e.g. ordinary least squares (OLS), monotone analysis of variance (Monanova) or multiple dummy regression, lend themselves to calculating these utility functions [6]. A utility function quantifies the relation between the respondents overall assessment of the market performance and each KBF describing the market performance.

Market Simulation

By transfering the derived utility functions into a simulation model, it is possible to evaluate the effects of KBF-level changes expected by a specific decision, e.g. enhancing the ease of ordering, in

terms of potential market share gains. Should the relevant market volumes be known, the related revenue effects may be determined.

The specification of a simulation scenario is the starting point of the market evaluation. A scenario consists of at least two market performances defined by the KBF-levels used in the conjoint design. The market performance of competitors is specified by means of competitive benchmarking. Based on the scenario, the total utility for each specified market performance and for each respondent is calculated in the simulation model. These total market performance utilities establish the basis for the prediction of the respondents' choice behaviour.

There are two different approaches for the prediction of the choice behaviour: a deterministic model and a probability model. The deterministic model assumes that a respondent will always select the market performance with the highest overall utility. In the case of the probability model, the 'winner takes it all'-assumption is replaced by a probability function. Assuming that the predicted choice behaviour reflects the condition of the entire market, a market share distribution could be derived with the simulation model. By calibrating the simulation model with the actual market shares, it is possible to improve the forecasts [7].

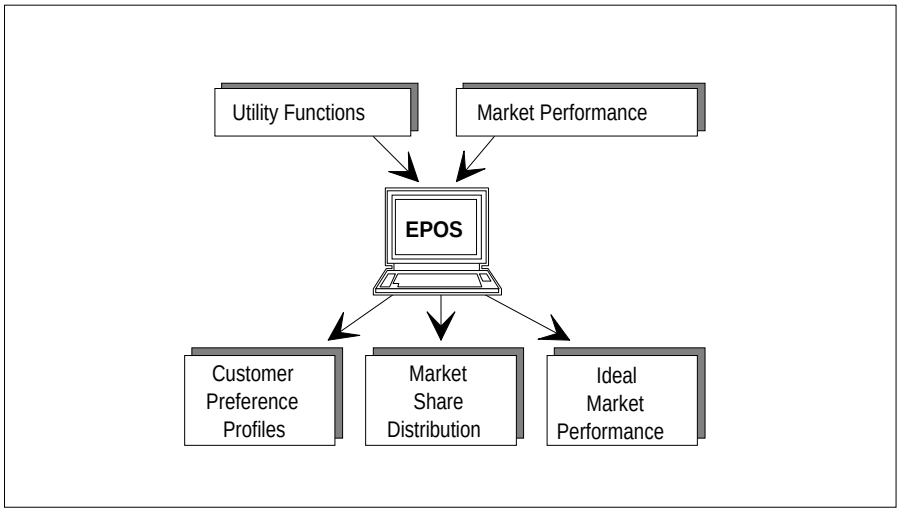

Figure 2: The structure of 'EPOS' (Erlösprognosesystem / revenue forecasting system)

Prototype 'EPOS'

Within the scope of the concept outlined above, the decision-support system 'EPOS' (acronym for Erlösprognosesystem) has been implemented. 'EPOS' administers the interview data and supports several evaluation procedures. It enables a user to interactively determine the market impact of a particular decision in terms of potential market share gains. Additionally, it is possible to use the system for the evaluation of pricing strategies, the determination of an ideal market performance and a market segmentation. The structure of 'EPOS' is shown in figure 2.

The entire concept has been applied for the quantification of the market impact induced by an intended reorganisation of the order management in a machine tool company. The planning is for the order management to be supported by a computer system. The evaluation shows that a reduction in response time and an increase in the deliveries on time caused by the reorganisation would significantly improve the competitive position of the company resulting in potential market share gains.

Utilizing Electronic Markets for Conjoint Measurement

The growing importance of electronic markets offers new dimensions for the use of conjoint measurement and, thus, the elicitation of customers' preferences. Normally, conjoint studies demand a lot of time to ascertain all required data. The most time-consuming part is the implementation of interviews with suitable respondents. As it is possible for service providers of electronic markets to record all transactions carried out on the market, e.g. passenger name records in the case of computer reservation systems, and to keep track of all offers on the market, a conjoint measurement based on these existing data may be implemented. Doing so would provide several advantages in comparison to the conventional procedure of conjoint measurement.

Above all, the calculation of utility functions would be based on real buying decisions. Inaccuracies resulting from the experimental situation in an interview are avoided. In addtion to that, external effects influencing choice behaviour, e.g. sales promotion, have less influence on the preference structure. As, normally, a representitive sample of customers in a particular market is interviewed in a conjoint analysis, using data from electronic markets, could allow for the analysis of the entire population of customers. All said, it should be possible to predict more reliable and valid utility functions.

Another aspect concerns the more or less static nature of conventional conjoint measurement. The utility functions reflect the preference structure of a respondent at a specific moment. Changing preferences could be recognized only if another costly study was implemented. Utilizing customer name records and transaction files offers the possibility of observing changes of preferences over a period of time. Thus, the conjoint measurement could be enhanced as a concept for a dynamic analysis of preferences.

Exploiting Individual Preference Profiles

As described above, individual preference profiles of customers could be constructed by means of conjoint measurement using existing data from electronic markets. Electronic market service providers could sell these individual preference profiles of their customers as an additional service. Having individual preference profiles, companies could implement new pricing strategies, improve their market segmentation and the customizing of products and services. Where customer name records and transaction files are used as a basis for the calculation of individual utility functions, data protection issues neccessarely have to be taken into account. ■

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