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Graphical tools for regional analysis of weakpoints in the sales network - An example of the automotive industry

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1 Tasks of automobile sales

Successful sale of motor vehicles on the German market is based on several factors. Besides a reasonable product and price policy the dealer network plays an important role. The regional structure of sales and service locations has to consider the number of customers, behavior of competitors and local characteristics. The management of the automotive industry thereby has the choice between alternative distribution channels and they are able to separate the sales from the service business and they can optimize the scale of contract dealers.

In order to support the planning and decision process of the structuring of dealer networks the companies usually go back to a large database. For this purpose regional market data of the sales of various manufacturers and product segments are available as well as demographic data of clients. At dealer level additional databases with regular customers and potential buyers are available. The sales management therefore has to face the problem to establish an analysis showing the weaknesses of the regional sales network derived out of a high number of information as a basis for the resulting marketing activities.

2 Analytical opportunities of Geographical Information Systems

Today's Geographical Information Systems (GIS) enable an overall view of the sales structure with support of regional data. Normally a country is divided into zip code areas that serve as smallest spatial elements. Some of these regions form one local market area which is under responsibility of one dealer. Further dealer area aggregations result in outlets of area managers and major sales regions.

Sales results of these market territories can be visualized by GIS taking different data in consideration. Common forms of visualization are the following:

colouring of areas, the ranges of market share corresponding to different colours, e.g. light to dark

bar charts and **pie charts** within the different regions to compare e.g. the shares of several product segments

graduated circles or symbols with various sizes relating to the attached data, e.g. total market shown as well as

dot density presentation, whereas one dot representing a specific number of elements of one attribute, e.g. delivered vehicles.

GIS can produce thematic maps which consist of several layers. The bottom layer consists mostly out of raster or vector maps that show the infrastructure of roads and streets and topography. The upper layers include the boundaries, locations and data which can either be shown as area colouring or as bar charts.

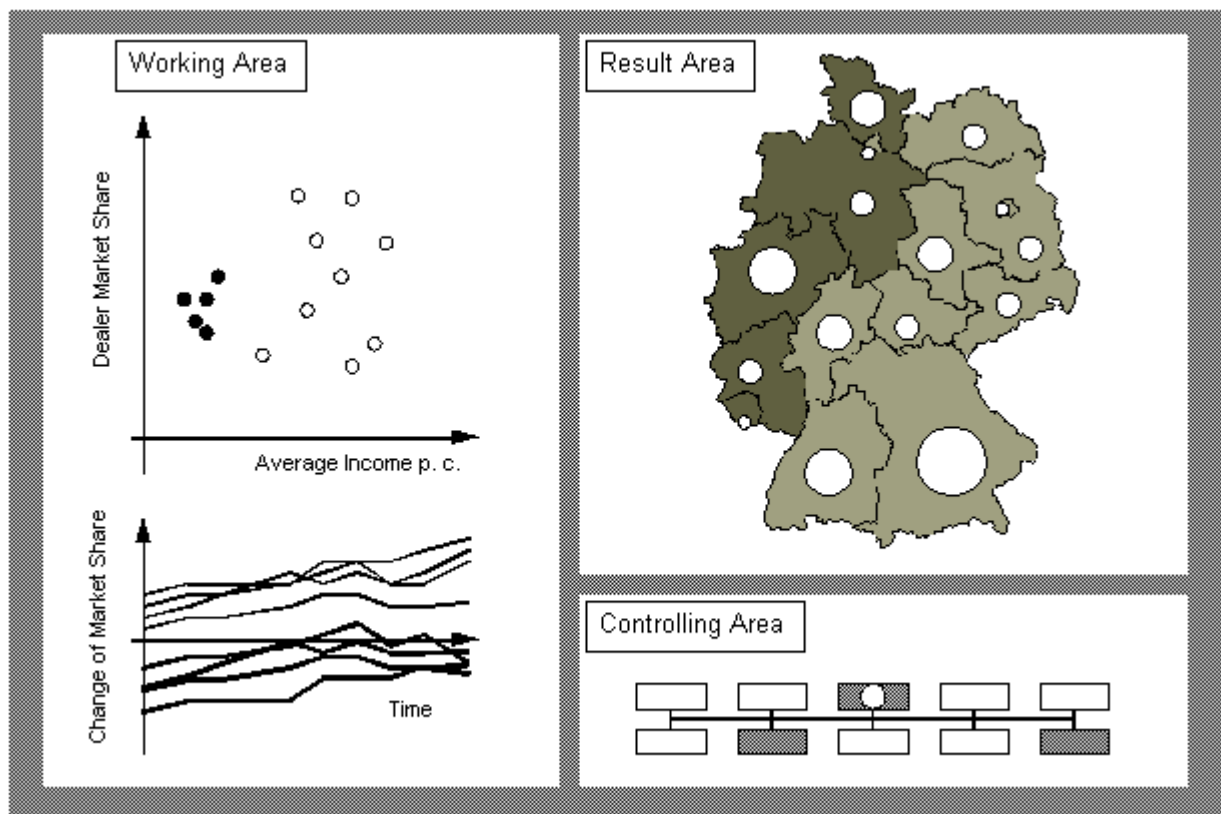
By means of these techniques a detailed regional market analysis can be established. However, in practice GIS are only used visualizing elementary values, such as market share of the own make as well as the

changes to a previous period. Therefore business decisions are focussing only on the selection of areas that are highlighted at this simple investigation.

3 Necessity of the multidimensional regional analysis and first attempts

The reality, however, is more complex than the reduction to two considered dimensions and is only approximately describable by a large data base. This can consist of e.g. the values of twenty suppliers in ten product segments and fifty time periods. This example results in 10.000 attributes in the combination of the three factors. In order to get a general view of the sales area including its high number of belonging attributes a change between different thematic maps is necessary. This becomes the main drawback of the regional analysis: Either maps are visually overloaded with data or the overall view gets lost by a change of several maps. Several attempts have been made for comprehensible visualization of multidimensional data. One remarkable proposal in this field are the 'Chernoff faces'. Since it lays in nature that human beings are trained to differentiate characters or moods from faces, it should not be difficult for an observer of a map to recognize value ranges which are represented by head size and the shape of eyes, nose and mouth. In every single area the map would show a Chernoff face with specific several attributes.

The work of Monmonier presented under the name 'Geographic Brushing' has better prospects in the field of multidimensional visualization. In this concept a scatterplot matrix is facing a map. One region corresponds to a dot within the matrix. The user can either mark dots in the scatterplot which are highlighted simultaneously on the map or he can choose them vice versa on the map.



Picture 1: Overview of the combined elements

4 New types of analysis by combined visualization

In order to establish a comprehensive regional weakpoint analysis the user should have the opportunity to get an overall view of the area to be analyzed. Therefore the most striking values have to be pre-selected by the system e.g. on a basis of maximum deviation. Also the dependencies of these values have to be accessible to the user. On a map specific regions should be chosen according to their characteristics. In addition it has to be checked which data is available and how its values look like in the corresponding region.

For the user of such a computer aided planning and decision system the following program modules are proposed to be available:

(1) **Result Area:** The regional map of the analysis area contains the representation of approx. five data dimensions which are elaborated at the time of the analysis of the user as particular relevant. Simultaneously these areas are marked which are particularly remarkable (e.g. below average).

(2) **Working Area:** The user can visualize attributes of his own choice on different diagrams. He can transfer relevant dimensions of his own choice to the result area and can choose elements with a large deviation which are displayed at the same time in the map.

(3) **Controlling Area:** Due to a high number of possible attributes it is necessary that the user gets an impression how the data dimensions are connected and which data he has regarded in his past analysis.

These three modules are simultaneously to the user's disposal. The use of this tool may look as the following:

The user has to face an empty thematic map which neither contains visualized data nor marked areas. The working area contains a portfolio diagram resp. a time series axis without value. The essential information source at this time is the controlling area with the possible attributes (data about supplier, product segments, consumer structure) and their connections that are represented in either tree- or net-diagram layouts.

In a first step the user chooses the possible dimension which he considers as the most important. This may be the market share of the own brand in relation to the total market. These values firstly appear in the working area with the following possible visualization:

considering the **time series** representation, one line corresponds to the course of the market share in one area for some periods

the **bar charts** show the actual values of the market share per region in comparison to each other

the **portfolio** representation enables the graphical positioning of the areas resp. two values after the selection of an additional dimension

After the user considers the actual dimension and their distribution as to be relevant for his own objective he transfers it into the result area. He also recognizes the spatial distribution on the map. He now has the possibility to mark important areas in the working area or directly on the map.

After the end of this first run the controlling area shows possible attributes which have not been analyzed, they have been left uncoloured. These can be examined in the working area and may be transferred to the result area. However, it should not contain more than five dimensions. A complete and relevant total picture of the market situation should be developed after several runs. On this basis outstanding areas are marked.

5 Background knowledge for intelligent visualization

In order to provide an easy-to-use software interface and to support the user to explore the relevant information, the program has to answer following questions with its build-in capabilities:

Which are the interrelations and dependencies between the data? Even if the mode of action of the car market cannot be predicted in detail, several market mechanisms can be formulated and visualized. By that the user gets a better understanding in the way he analyses the data. For this purpose a knowledge base has to be assembled to the system.

Which data can be combined in an ingenious way to work out the regional characteristics? Based on the fundamental market mechanisms some expressive data comparisons can be proposed, e.g. a portfolio with income of clients and market share of luxury segment cars. These combinations can be stored in tables.

Which values are suitable for which kind of diagramm? Data from earlier periods e.g. are determined for visualization in time series and not for direct comparison in a fixed period. Also these diagramm-defaults should be stored in tables.

6 Sound results also with a complex data base

The gained market transparency is basis for changes of the sales network structure. Decisions or investments can be made with a higher certainty by the concentration on important parameters and regions under consideration using as many data as possible.

The described visualization technique is based on known ways of representation. However, through permanent and tight combination of the elements and the workflow oriented support of the investigation procedure the user gets the possibility to discover also complex connections in one regional market analysis.

List of references

Hearnshaw, H.M.; David, J.U.: Visualization in Geographical Information Systems. Chichester 1994.

MacEachren, A.M.; Fraser Taylor, D.R.: Visualization in Modern Cartography. Great Yarmouth 1994.

Monmonier, M.: Mapping it out: expository cartography for the humanities and social sciences. Chicago 1993.