



# MARKET SEGMENTATION A Neural Network Application

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**Abstract:** The objective of the research is to consider a self-organizing neural network for segmenting the international tourist market to Cape Town, South Africa. A backpropagation neural network is used to complement the segmentation by generating additional knowledge based on input–output relationship and sensitivity analyses. The findings of the self-organizing neural network indicate three clusters, which are visually confirmed by developing a comparative model based on the test data set. The research also demonstrated that Cape Metropolitan Tourism could deploy the neural network models and track the changing behavior of tourists within and between segments. Marketing implications for the Cape are also highlighted. **Keywords:** segmentation, SOM neural network, input–output analysis, sensitivity analysis, deployment. © 2005 Elsevier Ltd. All rights reserved.

**Résumé:** Segmentation du marché: une application du réseau neuronal. Le but de la recherche est de considérer un réseau neuronal auto-organisateur pour segmenter le marché touristique international à Cape Town, en Afrique du Sud. On utilise un réseau neuronal de rétropropagation pour compléter la segmentation en générant des connaissances complémentaires basées sur une relation input–output et des analyses de sensibilité. Les résultats du réseau neuronal auto-organisateur indiquent trois groupes qu'on confirme visuellement en développant un modèle comparatif basé sur l'ensemble des données d'essai. La recherche a montré aussi que le Tourisme Métropolitain du Cap pourrait utiliser les modèles de réseau neuronal et suivre la trace du comportement changeant des touristes dans et entre les segments. On souligne aussi les implications de marketing pour le Cap. **Mots-clés:** segmentation, réseau neuronal, analyse input–output, analyse de sensibilité, utilisation. © 2005 Elsevier Ltd. All rights reserved.

## INTRODUCTION

Marketing an international tourism destination such as Cape Town in South Africa has never been more dynamic, competitive, and important than it is today. Successful marketing requires careful planning and comprehensive analysis of data and information obtained from tourists that frequent destinations and those that do not. There is no shortcut to establishing a positioning strategy that could deliver a valuable experience to tourists.

The ability to identify and serve tourists and create a dialogue with them has become a necessity for destination organizations such as

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Cape Metropolitan Tourism (hereafter referred to as Cape Metro Tourism). Managing the tourist relationship has become an essential part of attracting those with specific profiles to a destination. All activities around the tourist “touch points”—which aim to identify, attract, and retain the most valuable tourists for a destination and its enterprises—should be considered. The end result is to enhance retention and loyalty and sustain growth from profitable tourists. It is important to determine what it takes to encourage them to purchase the product/service that a destination offers. A need exists to understand their behavior and thus more in-depth knowledge about the homogeneous characteristics of groups is required over and above evaluating overall arrivals, expenditure figures and trip characteristics.

Marketing strategists of destination organizations often encounter the problem of how to appropriately segment the market and package differentiated products and services for target segments. Segmentation is a methodological process of dividing a market into distinct groups that might require separate experiences or marketing service mixes (Venu-gopal and Baets 1994). Customer clustering is one of the most important techniques used to identify these segments (Saarenvirta 1998). Various clustering techniques are used as part of a methodology to identify segments, which become the foci of marketing strategy. The basis of this generally includes the identification and assessment of various tourist characteristics (such as demographics, socioeconomic factors, and geographic location) and product related behavioral characteristics (such as purchase behavior, consumption behavior, and attitudes towards and preference for attractions, experiences and services). Target marketing is a strategy that aims at grouping a destination’s markets into segments so as to aim at one or more of these by developing products and marketing programs tailored to each (Kotler 2001).

Inadequate segmentation and clustering problems could cause a tourism destination organization, such as Cape Metro Tourism, to either miss a strategic marketing opportunity or not cash-in on the rewards of a tactical campaign. Market segmentation has developed as a methodology to identify target segments, with the outcomes of the process used to help understand tourists’ relationship with the destination.

The objective of the research is to consider the use of a self-organizing (SOM) neural network for segmenting the international tourist market to Cape Town. A backpropagation (BP) neural network (based on the output provided by the former) was also used to complement the process by generating additional market knowledge about the relationship between the inputs used and the macrosegments obtained from the application of the SOM model. Input–output relationship and sensitivity analyses were used for the purpose of extracting additional market knowledge about the macrosegments.

## NEURAL NETWORKS AND MARKET SEGMENTATION

The need for in-depth knowledge of segments remains an essential element of understanding the homogeneous behavior of groups of

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