Available online at www.sciencedirect.com
SCIENCE DIRECT®
Landscape and Urban Planning 71 (2005) 175–189
LANDSCAPE AND URBAN PLANNING
This article is also available online at:
www.elsevier.com/locate/landurbplan

Scenarios for the Austrian food chain in 2020 and its landscape impacts

Marianne Penker*, Hans Karl Wytrzens

Rural Development Group, Institute of Agricultural Economics, University of Natural Resources and Applied Life Sciences (BOKU), Feistmantelstr. 4, 1180 Vienna, Austria

Received 2 July 2003; received in revised form 27 February 2004; accepted 1 March 2004

Abstract

How the future landscape will look depends particularly on the outcome of the socio-economically motivated decisions of farmers, food processors, retailers and consumers, all members of the food supply chain. However, a long-term perspective on the food supply chain and its landscape effects is confronted with a great deal of uncertainty and data constraints. These difficulties can be partly avoided by using the personal judgements of agents whose decisions control the structure of present and future food supply chains. A well-established agent-based method for dealing with and describing variation in the future is the method of scenario planning. The aim of this paper is to present the application of the scenario approach to the Austrian food supply chain in 2020 and its landscape impacts. A critical discussion of the scenarios should reflect their explanatory power regarding future development options for landscapes. The first section of the paper outlines the interactions between society, the food supply chain and the landscape in a conceptual model. It describes the applied scenario technique and the research setting involving agents from agriculture, the food industry, retailing, gastronomy, and consumer organisations. Four scenarios for the food chain in 2020 are presented (Liberal Market Scenario, Protective Policy Scenario, Fast World Scenario, Slow World Scenario) and their respective consequences and strategies are discussed. The scenario technique used is found to be a useful means of gathering and structuring disperse expert knowledge. The paper concludes that—despite some methodological limitations—scenarios can deal with uncertainty concerning the socio-economic driving forces of landscape change and therefore can be used as a preliminary step in formulating robust strategies for landscape management.

Keywords: Food supply chain; Landscape development; Scenarios; Long term perspective; Austria

1. Introduction

"Due to ongoing changes, interest in the future development of rural landscapes is rather high" (Tress and Tress, 2003, p. 173). But, despite being a continuous process, landscape change is only partly predictable, as it is a mixture of autonomous development and human activities (Palang et al., 2000, p. 92). "European landscapes reflect the human interventions of the past, just as actual interventions will be reflected in the landscape of the future" (Van Mansvelt, 1997). Therefore, the future development of landscapes will depend a lot on land use and its driving forces. Austrian rural landscapes are mainly shaped by the farmers' interventions for food production, which in turn are driven by the demands of food processors,

* Corresponding author. Tel.: +43-1-47654-3580; fax: +43-1-47654-3592.
E-mail address: penker@boku.ac.at (M. Penker).

0169-2046/$20.00 © 2004 Elsevier B.V. All rights reserved.
doi:10.1016/j.landurbplan.2004.03.002

the influence of retailers and current consumer preferences. The present and future behaviour of the food chain agents hence forms a decisive socio-economic driving force for landscape development.

Middle to long-term perspectives on the behaviour of the food chain agents, its causalities and landscape impacts are confronted with a great deal of uncertainty and data constraints. The main information available to deal with this uncertainty is the personal judgement of practitioners and experts within the food chain itself. An agent-based method for dealing with and describing variation in the future is the method of scenario planning (Dunlop, 2001). A scenario process is a structured discourse on the future by stakeholders and experts. By designing consistent future images, the scenario approach intends to sketch a broad spectrum of possible developments options. Thus, the scenario process might also be a useful tool for coping with the complexity in future landscapes development. The aim of this paper is to demonstrate the application of the scenario method to the Austrian food supply chain and its socio-economic driving forces for landscape change. The authors intend to outline the participatory process, its outcome, the strengths and limitations of the scenario approach and its applicability in research, planning and policy making.

The scenario process presented here is a standalone module within a larger, interdisciplinary project entitled 'Fast Food–Slow Food: Food Chain Management and Cultural Landscapes' (Favry et al., 2002). This interdisciplinary project analysed the landscape effects of different patterns of food production and consumption in order to identify sustainable ways to manage food chains. Both the scenario process, as well the larger project, were managed by Helmut Hiess and financed by the Austrian Federal Ministry for Education, Science and Culture within the 'Cultural Landscape Research Programme'.

This paper starts by outlining a conceptual model of the interactions between society, the food chain and the landscape. The next section describes the applied scenario technique and the research setting. Thereafter, four scenarios for the food chain in 2020 and its landscape impacts are presented and discussed. The paper concludes with some remarks on the limitations and strengths of the scenario method and on its applicability with regard to long-term landscape perspectives in policymaking, planning and research.

2. Model of the interactions between society, the food chain and the landscape

A conceptual model provides the framework for the scenarios (see Fig. 1). It describes the interactions between society, the food supply chain and the landscape. At the core of the model is the behaviour of the various agents, which can be categorised into agricultural producers, food processors, food retailers/wholesalers (traders) and consumers.

Each agent faces a specific range of alternative behavioural choices. The producer, for example, can farm conventionally or organically, or run a specialised or diversified farm enterprise. Each behavioural alternative is symbolised using f_1, f_2, f_3 and f_n for the producer, p_1, p_2, p_3 and p_n for the processor (commercial processing, industrial processing, different levels of processing), t_1, t_2, t_3 and t_n for the trader (network of outlets, direct delivery, catalogue sales, e-commerce and other forms of retailing) and c_1, c_2, c_3 and c_n for the consumer (eating out, convenience food, different forms of storing, preparing and consuming food). The agents choose between alternative behavioural options in accordance with the prevailing political, technological, macroeconomic and socio-cultural framework but are also interdependent on the behaviour of the other agents in the food chain. Thus, alternative supply chains develop within the range of possibilities (f_n, p_n, t_n, c_n).

This paper is based on the hypothesis that the food chain—with its component sectors—'communicates' with the landscape through transport flows and flows of material and energy. At each stage in the chain, the relevant agent induces different flows of energy and materials, dependent on the behavioural choice made. They do this by removing resources from the landscape, and adding solid, liquid and gaseous waste (the vertical arrows). The economic interactions between the different stages in the chain also cause different flows of goods, information and money (horizontal arrow). The landscape effects of the induced flows of material, substances and transport depend on their quantity, quality, spatial distribution, and concentration. The relevance of these flows to the landscape is ultimately expressed in the impact on the ecological, economic and socio-cultural landscape sphere.

The ecological sphere includes the environmental factors soil, water, and air (climate). They have