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Residents' Appreciation of Cultural Heritage in Tourist Centres - A Micro-simulation Modelling Approach to Amsterdam

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RESIDENTS' APPRECIATION OF CULTURAL HERITAGE IN TOURIST CENTRES

A MICRO-SIMULATION MODELLING APPROACH TO AMSTERDAM

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Abstract

This paper addresses the question of the value attached by residents of tourist places to the wealth of cultural heritage in their city. Particular attention is given to the impact of various types of information (ranging from traditional to advanced ICT sources) on the residents' valuation of cultural heritage. Based on an extensive survey among inhabitants of Amsterdam, a two-stage analytical approach is adopted: (i) an econometric (ordered logit) modelling approach to identify the most prominent vectors of the residents' appreciation of cultural heritage; (ii) a micro-simulation modelling approach to generate a comprehensive picture of the value set of inhabitants regarding the cultural heritage in their city. This information may also serve as a basis for urban strategies on tourism policy, cultural heritage planning and information services management.

* Tinbergen Institute, The Netherlands.

Keywords: Cultural Heritage, Residents, Tourism, Ordered Logit Model, Microsimulation, ICT, Amsterdam

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1. Tourism and Cultural Heritage: A Multidimensional Phenomenon

Tourism has over the past decades turned into a rapidly rising international trade sector. Clearly, the tourist market does not have a uniform economic constellation; it has developed into a highly segmented sector, with a great diversity of travel motives, expenditure patterns, visits to cultural heritage, socio-economic characteristics, and ecological implications (see e.g., Frochot and Morrison 2010, Hsieh et al. 1997, Johns and Gyimothy 2002, Matias et al. 2011). This diversified tourism market evokes interesting challenges for tourism marketing strategies (see Buhalis 2000, Fusco Girard and Nijkamp 2009, Kotler et al. 1999, Middleton 2000), in which ecological and cultural heritage tourism have gained an increasingly more prominent place in modern economic research. It should be added that – next to the pluriform nature of the demand side of tourism − also the supply side exhibits a great differentiation. An important aspect in terms of both physical or cultural characteristics of destination areas is the behavioural or attitudinal characteristics of residents in tourist centers. Especially the latter factor has in the past years enjoyed increasing and profound attention, as the identity of a place or the liveability in a tourist area is often perceived in different ways by different groups of residents. Some groups of residents may be proud of their city as a place of interest to foreigners, while others perceive a large influx of tourists as an intrusion of their quality of life, their place identity or their sense of quiet. A third group of residents may see significant tourist flows as a source of unprecedented revenue generation. Therefore, a micro-oriented analysis of how residents perceive the tourist attractions in their city, particularly cultural heritage, is justified.

For a tourist destination, the above observations lead to cumbersome trade-offs. For example, a question of strategic importance is: what is the optimal size and mix of heterogeneous tourist flows so as to maximize local benefits from visitors' expenditures without jeopardizing the interest of citizens in their own cultural heritage? This question has far-reaching implications for tourism marketing (see e.g., Czinkota and Kotabe 2001, Formica and Littlefield 2000), especially from the perspective of a tourism destination image and the choice sets involved (see also Crompton and Ankomah 1993). Tourism volume and composition in a destination area has of course spatial and socio-economic consequences for residents who usually also have a high degree of taste variety for the type of tourists attracted to their place. However, in many cases

the appreciation of residents for visitors is part of a much broader set of choice and preference attributes of their local environment, such as noise, crowding effects, politico-cultural heritage, local entertainment, etc.(see also Neuts and Nijkamp 2012).

It is therefore, important to investigate the perceptions and preferences of residents in a tourist place from a much broader perspective that is geared toward their total complex view on their living environment. And hence, the focus of our research will be on preferences, attitudes and appreciations of locals in a major tourist place, namely Amsterdam[1]. We will address in particular cultural heritage attractiveness in the city. The methodology employed in our applied work is based on micro-simulation (MS) in the context of ordered choice modelling.

The paper is organized as follows. Section 2 will offer a concise overview of the economics of urban cultural heritage. In Section 3 a brief record will be offered of the methodological framework and the data base used for the city of Amsterdam. Next, Sections 4 and 5 will briefly introduce the econometric modelling and micro-simulation approach as our main analytical apparatus, followed by a brief presentation of empirical results in each section concerned (Section 6). Section 7 will interpret the various findings. Finally, Section 8 will offer some concluding remarks.

2. Cultural Heritage as an Urban Resource

Modern cities are not only characterized by contemporary architecture and built environment; they house also a wealth of physical – and often non-physical – assets that map out the history of that place. The Acropolis in Athens, the Forum Romanum in Rome, the Bastille in Paris, the Tower Bridge in London or the Anne Frank house in Amsterdam, they refer to particular episodes or historical features of these cities.

In our global economic environment, the articulation and understanding of cultural heritage values – as a welfare-enhancing resource of today's world − have acquired a greater importance, both scientifically and politically. Cultural heritage is a resource that is as diverse in appearance as it is rich in scope. It includes a collection of (non-)physical and (in)tangible artefacts which refer to historical-cultural heritage, performing arts, theatres and museums,

[1] It should be noted that a parallel research trajectory has been undertaken on the appreciation and views of visitors and tourists in Amsterdam. The findings have been described in Van Leeuwen and Nijkamp (2010)

attractive cultural urban 'ambiance', or ecological values of urban areas that have an explicit and recognized connotation to the past of a place or area and may be seen as a self-identifying landmark for that area (see e.g. Fusco Girard and Nijkamp 2009, Nijkamp 2012, Riganti and Nijkamp 2009, Throsby 1999, Snowball 2008).

The awareness of the value and increased interest in cultural heritage plays a central role in creating new urban vitality, focussing on improvements in new lifestyles and cultural developments in our modern society. In addition, cultural heritage is increasingly seen as a foundation for the emergence of the creative sector (see e.g. Kourtit et al. 2011).

Many modern cities (e.g., Paris, Barcelona, Florence, Genoa, Athens, Amsterdam, Marrakesh, Acapulco, etc.) pay a great deal of attention to their cultural heritage, which is considered to be a sustainable urban resource for accelerated urban economic growth, with far-reaching implications for the quality of life in a broad sense (the so-called 'XXQ' concept; see Nijkamp, 2009). It is used as a critical component of the quality-of-life image for marketing purposes to create positive images of the city to current and potential investors, employers, residents, and visitors. Consequently, the presence of a great diversity of cultural heritage prompts historical and cultural areas, places or cities to transform their territories in ways that generate economic benefits from visitors and tourists. Local cultural heritage may thus create local economic advantages from recreation and tourism.

The abundant presence of urban cultural resources and tourist facilities in many cities contributes to an innovative urban climate that attracts a new world cluster of talented 'creative minds' (such as new residents or tourists, investors and businesses) in a vibrant environment in modern and globally networked cities. This means that cultural heritage, tangible as well as intangible, does not only include cultural and social values contributing to inspiring visions, but it is also a great potential for urban development and delivers significant economic impacts. Indeed, it is a fact that the cultural sector represents increasingly a productive branch, which is growing in importance. Therefore, the historico-cultural or cultural heritage capital of a city is frequently regarded as a key element – in particular, the exclusive linkage to the 'sense of place' and the occurrence of (spatial-) economic externalities in the supply of this capital good − for regional and urban economic development. From this perspective, cultural heritage tourism is often regarded as an important contributor to sustainable urban development. Consequently,

cultural heritage is a vital dimension to the countries' overall progress and an important urban source for sustainable development and the social and economic interests of the population for each host community (Holden 2000; Girard et al. 2008), even though various shifts in entrepreneurial ramifications may take place in our turbulent economic environment.

In general, culture has become a crucial urban resource in a post-industrial economy, as reflected in the use of cultural heritage in the development strategies of the European Union and other national and international bodies (see Kourtit et al. 2012). Cultural heritage – a broad container concept – has a hate-love relationship with modern tourism. Firstly, it acts as an attraction force for people from different places of origin, while it stimulates local socio-economic development and reinforces a sense of local identity and pride. On the other hand, vast volumes of tourist flows may be at odds with ecologically-benign developments of localities and may negatively affect social cohesion at a local level.

Cultural values may be enriched by enhancing the quality or attractiveness of a place for visitors. This capacity to attract people and new activities does not only depend on the attributes of cultural heritage itself, but also on other complementary resources, services, or material and immaterial constituents. Clearly, all relevant positive and negative economic, environmental, social and cultural impacts in the short, medium and long term are to be properly managed in order to identify and implement win-win projects or plans.

3. Cultural Heritage and ICT

As there is also competition among cities for attracting cultural visitors, specific marketing and supporting vehicles and tools are to be used. One of them is the use of ICT devices that offer so-called e-services (e.g., e-tours, video-channels, interactive maps (with information on all kind of activities), online booking facilities (accommodation, attractions, on stage information), e-forum/e-participation, full virtual tours including unique selling points of the city and its surroundings (linked to the city portals), and downloadable/printable contents (also on mobile devices)). Through the access to various ICT tools, many places become more accessible. The increased use of ICT has thus resulted in a significant change in the structure of the cultural industry, Not only for tourists but also for residents. Internet and cyberspace have changed radically the way people live, and interact socially among each other. It creates and

fosters new market opportunities for traditional local small and medium-sized enterprises (SMEs). It is important to stimulate market expansion towards global e-markets for those SMEs, for instance, by providing local and traditional product and services to customers and businesses world-wide without making extra costs (cost-efficient).

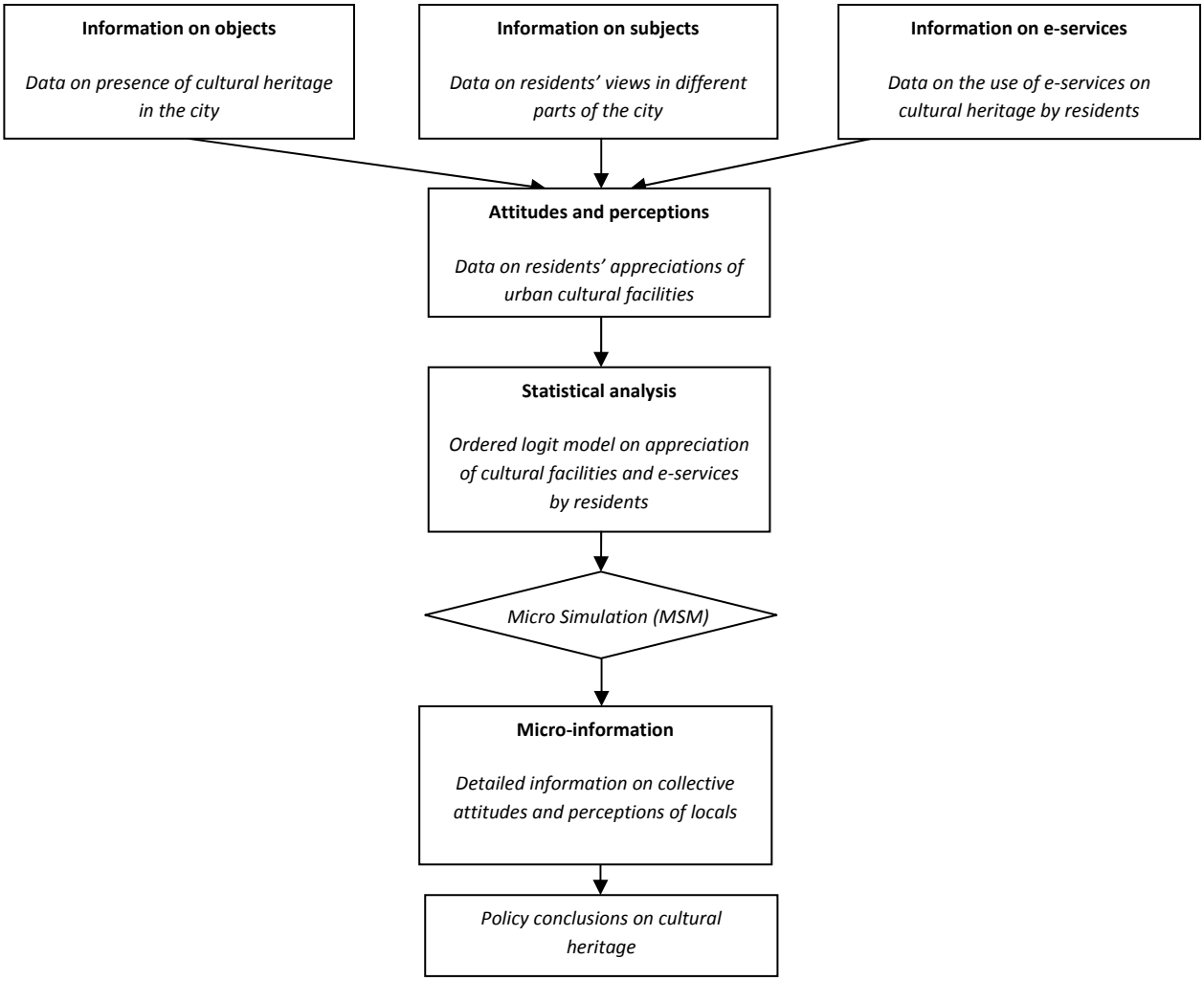
Thus, ICT can support place-branding planning and help the city's stakeholders (urban decision makers, city marketeers, but also private companies and representatives of civic organizations) to promote the city's cultural sites and activities so as to maximize the number of visitors. It is likely to affect also the creation of economic value of urban resources, such as cultural heritage. As a consequence, several cities in Europe have enhanced their ICT capabilities. Research on e-governance and (public and private) e-services is booming at present. The European Commission (2005) has argued that Europe needs efficient, effective, inclusive and open governments in order to offer high-quality services for citizens and business. E-services may incorporate personalized information in the form of a 'tourist profile', a personalized travel plan, or information on sub-sites dedicated to specific types of tourists or residents. For example, the city of Amsterdam already offers many multi-lingual e-services on various cultural facilities.

In general, e-services in a global world appear to be powerful and competitive tools in the regional or urban tourist industry (Kourtit et al. 2011). Intense competition among cities and business heightens the need for strong brand identity, for developing new marketing and strategic priorities for creative and innovative urban development, and for attracting potential (cultural) visitors from all over the world. Tourism will affect clearly the economic position and well-being of residents in a tourist place, in both a positive and a negative way. This issue will be further explored in our paper, by offering a modeling study on the micro views of inhabitants of Amsterdam on the cultural tourist facilities in the city.

4. Methodology and Data Base

The city of Amsterdam attracts millions of visitors every year, mainly as a result of its unique cultural heritage, its political-economic constellation, and its historical architecture. In our research we aim to depict the perceptions and preferences of residents regarding the presence of cultural tourism amenities in the city centre of Amsterdam, which attracts on a structural basis many foreign visitors. Tourism policy aims to encourage foreign tourism (e.g., through the use of

e-services), but residents may have different views, given the many positive, but also many negative externalities (e.g., crowding) involved. Now our specific research question is: which empirical conclusions can be inferred from a closer analysis of the individual preferences of the inhabitants regarding the cultural amenities in Amsterdam, from the perspective of a multiplicity of e-services offered in our modern ICT age? This research question is mapped out in more detail



in Figure 1.

Our research on the perceptions and preferences of the residents of Amsterdam regarding the importance of cultural amenities and the information provided by e-services on these amenities is based on a survey (on-line, face-to-face interviews, stand-alone laptops) among

approx. 650 inhabitants which took place in 2007 (ISAAC D1.4 2007). The types of cultural tourism amenities distinguished were: 1) architecture; 2) monuments; 3) museums; 4) urban landscape; 5) cultural events; 6) traditions; 7) local customs; and 8) knowledge. The preferences are measured on a five-point scale, in which 5 relates to a strong appreciation and 1 to a very weak appreciation.

When looking at the appreciation of the locals of Amsterdam for the various above mentioned types of cultural heritage variables (see Figure 2), it turns out that residents appreciate the architecture and urban landscape in the city rather high, while local customs get the lowest score.

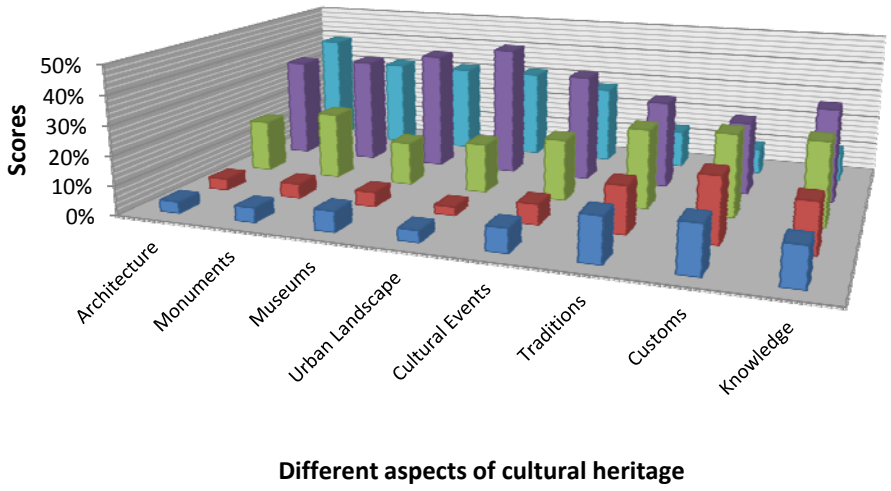


Figure 2. Appreciation of different aspects of cultural heritage by Amsterdam residents on a scale of 1-5

Furthermore, we are interested in whether the access to and use of up-to-date information on the wealth of cultural amenities concerned played a role in the appreciation of these amenities by the residents. To that end, the following types of e-services were distinguished; 1) interactive maps; 2) personalized information; 3) booking systems; 4) journey planner; 5) e-forum; 6) virtual tours; and 7) interactive games.

From the total sample of approx. 650 respondents, 73% appeared to use on a regular basis one or more types of the above mentioned e-services distinguished. The total appreciation of various categories of e-services is given in Figure 3. This figure shows that more traditional types of e-services enjoy a higher usage, although the younger generation turns out to have a

clear preference for modern information channels such as interactive games. In general, the older age cohort is less interested in using e-services.

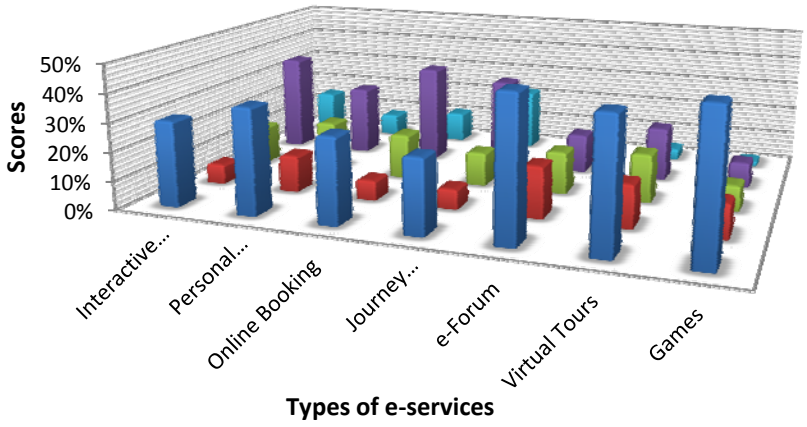


Figure 3. Appreciation of different e-services by Amsterdam residents on a scale of 1-5

In the next section, we will proceed with our statistical analysis of the appreciation of cultural tourist facilities in Amsterdam by estimating an econometric model – an ordered logit choice model – in order to offer an appropriate explanatory framework.

4. An Ordered Logit Model for the Residents' Appreciation of Cultural Tourism Amenities

Based on our sample of about 650 residents in the city of Amsterdam, the appreciation of locals for the above mentioned 8 classes of cultural heritage was estimated by using an ordered logit choice model. Since the preferences were measured on a categorical 5-point scale, ranging from very important to totally irrelevant, the data might be handled by both descriptive statistical analysis and by explanatory ordered choice models in which the dependent variable has a limited number of ordered outcomes (see Greene and Hensher 2008; Train 2003). In our case we will use more specifically an ordered logit model in which the error terms are assumed to have an independent and identically distributed Gumbel distribution. The explanatory factors used in the model are: Access to and use of e-services; Age; Being employed; Education level; Gender; Resident in the City (South of the river IJ); Resident in Amsterdam-North (North of the river IJ).

The estimation results are given in Table 1. It appears that the use of *e-services* has an ambiguous impact on the appreciation of cultural heritage (CH), except for cultural events and museums. *Age* has a significant and positive influence on the evaluation of tangible cultural

heritage variables (e.g., architecture, monuments and urban landscape), but a negative impact on intangible forms (e.g., cultural events, traditions, local customs, and knowledge). Thus, younger locals appreciate intangible aspects more than the older cohorts do. Having a *job* has in almost all cases a positive and significant impact on the appreciation of cultural amenities, while *education* has mostly a clearly positive effect on the appreciation of tangible types of cultural heritage. There is a clear *gender* effect in the results: women tend to have a higher appreciation for tangible cultural tourism amenities, in particular architecture, museums and urban landscape. Finally, *location* matters: residents in the more isolated part of the city, i.e. Amsterdam-North, attach a lower value to the urban architecture, while the more centrally located inhabitants of Amsterdam appear to appreciate monuments and museums in the centre.

Table 1. Coefficients of the ordered logit models estimating the preferences of residents in Amsterdam for different types of CH

	Architecture	**Monuments**	**Museums**	**Urban Landscape**	**Cultural events**	**Traditions**	**Customs**	**Knowledge**
E-service	-0.055 (0.177)	-0.084 (0.194)	0.419** (0.191)	0.116 (0.179)	0.852*** (0.189)	-0.029 (0.194)	-0.163 (0.186)	0.074 (0.171)
Age	0.379*** (0.105)	0.293*** (0.104)	0.148 (0.097)	0.284*** (0.095)	-0.284*** (0.107)	-0.299*** (0.100)	-0.198** (0.101)	-0.017 (0.100)
Employed	0.457*** (0.166)	0.709*** (0.165)	0.252 (0.168)	0.530*** (0.158)	0.333** (0.160)	0.394** (0.159)	0.489*** (0.164)	0.459*** (0.154)
Education	0.146** (0.069)	-0.004 (0.071)	0.196*** (0.073)	0.041 (0.070)	-0.037 (0.073)	-0.189** (0.074)	-0.101 (0.068)	-0.228*** (0.073)
Gender	0.368** (0.156)	0.034 (0.153)	0.701*** (0.157)	0.497*** (0.151)	0.240 (0.155)	0.157 (0.149)	-0.016 (0.150)	-0.179 (0.152)
Amsterdam North	-0.342* (0.182)	-0.055 (0.175)	0.001 (0.176)	-	-	-	-	-
City Centre	0.209 (0.202)	0.326* (0.194)	0.377* 0.214	-	-	-	-	-
Observations	*622*	*623*	*624*	*618*	*624*	*616*	*613*	*618*
Log Likelihood	*-760.542*	*-829.271*	*-777.158*	*-768.495*	*-822.815*	*-918.777*	*-912.382*	*-921.623*
Restricted log likelihood	*-789.741*	*-852.335*	*-804.291*	*-786.973*	*-844.906*	*-928.772*	*-918.926*	*-931.061*
McFadden pseudo-R^2	*0.037*	*0.027*	*0.034*	*0.023*	*0.026*	*0.011*	*0.007*	*0.010*

Legend: *Significant at *** 0.01, ** 0.05 and * 0.10 levels.*

The next step is to perform an econometric analysis on the appreciation of the various classes of e-services used by the residents of Amsterdam. The explanatory variables have already been described above. The results in Table 2 show that, not surprisingly, *having access to and using e-services in general* appears to lead to a positive value attached to various types of e-

services available. Next, *higher educated* people appreciate interactive types of e-services (e.g., e-forum, interactive games) more than lower educated people do. Traditional e-services (e.g., interactive maps, booking services) are often higher valued by higher educated inhabitants. There is a clear *gender* effect: women appreciate in particular journey planners and booking services, while men attach a higher value to e-forums and interactive games. *Age* plays also a role, in the sense that older people appreciate less various types of e-services. Having a *job* appears to have a positive effect on the evaluation of e-services, in particular personal information, booking services and interactive games. Finally, there is also a clear *neighbourhood* effect: residents from Amsterdam-North appreciate most e-services higher than centrally-located residents, a plausible result given their more isolated location.

Table 2. Coefficients of the ordered logit models estimating the preferences of residents in Amsterdam for different types of ES

	Interactive map	**Personalised information**	**Booking service**	**Journey planner**	**e-Forum**	**Virtual Tours**	**Interactive games**
E-service	0.901***	0.687***	1.456***	0.714***	0.333	0.661***	-0.165
	(0.180)	(0.196)	(0.185)	(0.192)	(0.209)	(0.206)	(0.230)
Education							
	0.129*	-0.040	0.151**	0.133*	-0.175**	-0.165**	-0.475***
	(0.072)	(0.071)	(0.071)	(0.072)	(0.073)	(0.072)	(0.089)
Gender							
	0.018	0.062	0.362**	0.641***	-0.406***	-0.235	-0.569***
	(0.149)	(0.148)	(0.154)	(0.154)	(0.152)	(0.153)	(0.188)
Age							
	-0.492***	-0.496***	-0.289***	-0.598***	-0.261**	-0.181	-0.513***
	(0.110)	(0.105)	(0.098)	(0.104)	(0.107)	(0.111)	(0.137)
Employed							
	0.159	0.500***	0.436***	0.172	0.284*	0.449***	0.639***
	(0.167)	(0.156)	(0.156)	(0.159)	(0.169)	(0.161)	(0.216)
North							
	0.518***	0.421**	0.350**	0.528***	0.285	0.330**	0.328
	(0.171)	(0.174)	(0.177)	(0.174)	(0.181)	(0.180)	(0.212)
City Centre							
	0.380*	0.379*	0.405**	-0.239	-0.244	-0.049	-0.263
	(0.203)	(0.196)	(0.201)	(0.199)	(0.199)	(0.203)	(0.264)
Observations	*622*	*622*	*622*	*622*	*622*	*622*	*622*
Log Likelihood	*-961.551*	*-984.550*	*-934.874*	*-915.257*	*-877.182*	*-936.038*	*-613.484*
Restricted log likelihood	*-987.316*	*-1001.983*	*-976.242*	*-950.697*	*-903.941*	*-949.968*	*-647.860*
McFadden pseudo-R^2	*0.026*	*0.017*	*0.042*	*0.037*	*0.019*	*0.015*	*0.053*

Legend: *Significant at *** 0.01, ** 0.05 and * 0.10 levels.*

Based on these findings of which personal and spatial characteristics are most closely related to certain preferences for cultural heritage and e-services, we can now design the microsimulation approach.

5. Micro-Simulation as a Macroscope

5.1. Introduction

Micro-simulation (MSM) is essentially a type of multi-agent analysis (Hewitt 1977, Bousquet and Le Page 2004), in which decision-making units – such as households – are represented by individual agents, while the interaction with their environment is represented by spatial data. Through the collective focus on individual decision-making entities, it is possible to incorporate – or to simulate – social interactions and non-monetary influences as group processes (see Orcutt 1957, Clarke and Holms 1987, Matthews et al. 2007). MS aims to generate synthetic data by tracing the impact of interventions on a representative – hypothetical – sample of micro-units. It does so by replacing the effects of behaviour in a real environment, as mapped out by empirical data or empirically validated models. In this way, conditional questions ('*what….if….*') can be addressed. In addition to this static approach, also long-term trend analysis can be treated by MS experiments. The transition rules in MS experiments can be either deterministic or probabilistic (see Ballas et al. 2005a). In a spatial context, spatial MS may be instrumental to *"paint a picture of the possible or most probable life of households at various geographical scales"* (Ballas et al. 2005b, p 14).

One of the major advantages of (spatial) MS is its ability to link various data sources. Another advantage is the consistent treatment of individual behaviour and micro processes. A wide variety of (spatial) MS models has been generated in the past years, for instance, in the area of household travel behaviour (Jonnalagedda et al. 2001), regional policy impact assessment (Rephann and Holm 2004), spatial impact analysis (Ballas et al. 2005a), transportation networks (Veldhuisen et al. 2000), local retail developments (van Leeuwen 2010), the spatial demography of tourism (Lundgren 2004), and so forth.

5.2 Simulating the residents of Amsterdam

In this contribution, MSM will be applied to the spatial analysis of the appreciation of various categories of cultural heritage as expressed by various residents in different districts of Amsterdam. The spatial unit of the MSM experiment will be the neighbourhood level (or

district). In total, Amsterdam consists of 14 such neighbourhoods. We included only the population of 15 years and older, the so-called working population, and the elderly. This resulted

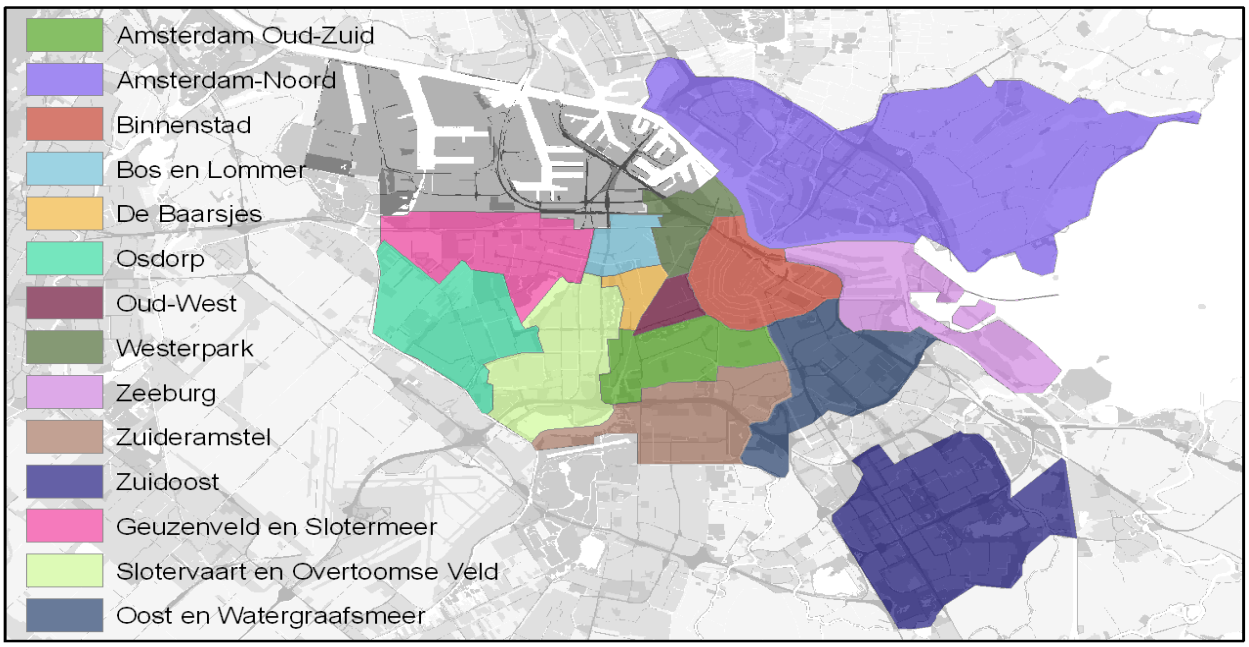


Figure 4. Neighbourhood districts in Amsterdam

in a population of almost 620,000 citizens. Figure 4 shows the location of the 14 neighbourhoods in Amsterdam.

An important step in the MSM approach is the selection of the main variables that will be sued to project or simulate the questionnaire results to fit the total population of Amsterdam. These main variables are called constraint variables'. We distinguish four constraint variables: gender, age, employment and education[2]. We will now pay more attention to these four constraint variables.[3]

Gender: To calculate the total number of men and women in each neighbourhood we used data from the Neighbourhood Statistics from 2007.

Age: For the constraint variable age, we mainly used information from O+S Amsterdam at the neighbourhood level. To convert the age classes to the relevant classes used in the

[2] Unfortunately, it is not possible to include the relevant constraint variable income. Income would have been a useful constraint variable to include more neighbourhood differences, but unfortunately this question has such a low response in the survey, that we were forced otherwise to exclude 20 per cent of our micro population.

[3] The total values (the constraints) are all derived from the Neighbourhood Statistics 2007 from Statistics Netherlands and information from O+S Amsterdam.

questionnaire, we assumed that the number of tourists is equally distributed over the number of years in the class. For example, when the age class included 16-25 years, we assume that 10 per cent of the persons in this class has the age of 16. For a precise estimation of the number of persons aged 15-18 years, we combined information from Statistics Netherlands with the O+S Amsterdam data.

Employment: For the constraint variable employment, we used information from the Neighbourhood Statistics about the share of the working population which is registered as a student, the share of the working population that is employed, and the share of the total population that is retired. The rest of the population is classified as 'other'.

Education: Education is an important variable, as it has a different effect on the appreciation of tangible and intangible CH, while also the education levels can differ considerably between prosperous and less prosperous neighbourhoods, as income does. This will add more heterogeneity to the results at the neighbourhood level. For the constraints, we used data from O+S Amsterdam about the share of lower educated persons (pre-high-school and high-school) and the share of higher educated persons (bachelor and higher). We decided to keep young students with only a high-school diploma out of the group of low educated persons.

When we compare the distribution of the values of the constraint variables according to external statistics on the totals with the distribution of the values according to the micro-population, we find some differences. The share of females is very large, the share of 18-34 years old very large, as well as the share of elderly is rather small, the share of students is rather large and of retired people rather small. The share of employed persons is comparable to the actual situation. The aim of the MS exercise is now to reweight the micro-population, and then to replicate the actual population as much as possible, given that we know the total values from the external statistics.

Table 3. Comparison of the actual population according to external statistics with the micro population (questionnaire results)

Constraint	Class	External Statistics		Micro population	
		#	%	#	%
Gender	Male	304628	49	265	42
	Female	314191	51	369	58
Age	15-17	14858	2	22	3

	18-34	209121	34	330	52
	35-54	231481	37	186	29
	>54	163359	26	97	15
Employment	Student	32092	5	193	30
	Employed	342319	55	344	54
	Retired	96574	16	38	6
Education	Low	230399	36	90	14
	High	193865	32	366	58
Total		618819	100	635	100

When performing a micro simulation it is important to undertake a sensitivity analysis to evaluate the quality of the simulation outcomes. This is done by comparing the simulation results with the external statistics. Overall, it appears that that gender has been simulated very well in our experiment. Only in the city centre the simulated number of women is slightly too high. The simulation of the age of the residents was a little bit more difficult: the number of persons between 35-54 years old is somewhat underestimated (by around 3 per cent). The level of education shows a general overestimation of the number of lower educated persons, in particular in the neighbourhoods Zuid-Oost and Zuideramstel (9 and 12 percent, respectively). When interpreting the results, we should keep such observations in mind.

5.3 Detailed picture of the resident population in Amsterdam

The MSM allows us to obtain a detailed picture of the population of Amsterdam based on combined personal characteristics that are not publicly available. In Figure 5, we see clear differences between neighbourhoods in terms of educational level and age. We can observe some clear spatial patterns. First, most residents that live further away from the city centre are older and have a lower educational degree ((pre-)high school, vocational). People living in the city centre, especially in neighbourhoods Binnenstad, Oud-Zuid and Oud-West, are often having a relatively high degree. We know from previous research (see e.g., De Wolff & Slijpe 1973) that income and high degree of education are strongly correlated. Since the property values in the city centre are substantially higher than in the neighbourhoods that are more distant from the centre, people living in the city centre need in general a higher income to be able to afford housing. Therefore, it is logical that the people with a high educational degree tend to live in the city centre. Furthermore, we see that in general older people tend to live in the city centre

neighbourhoods. This can be explained by the fact that older people also tend to have higher incomes and therefore, they can afford to live in the centre. In 2007, five neighbourhoods of Amsterdam are marked as '*probleemwijk*' (problematic neighbourhood) by the former minister of Living, Neighbourhoods and Integration (Vogelaar). These neighbourhoods are found in Bos and Lommer, Noord, parts of Osdorp and Zuidoost. It is therefore, not surprising that we observe in these neighbourhoods a relatively high share (70%) of older people that have a low educational degree.

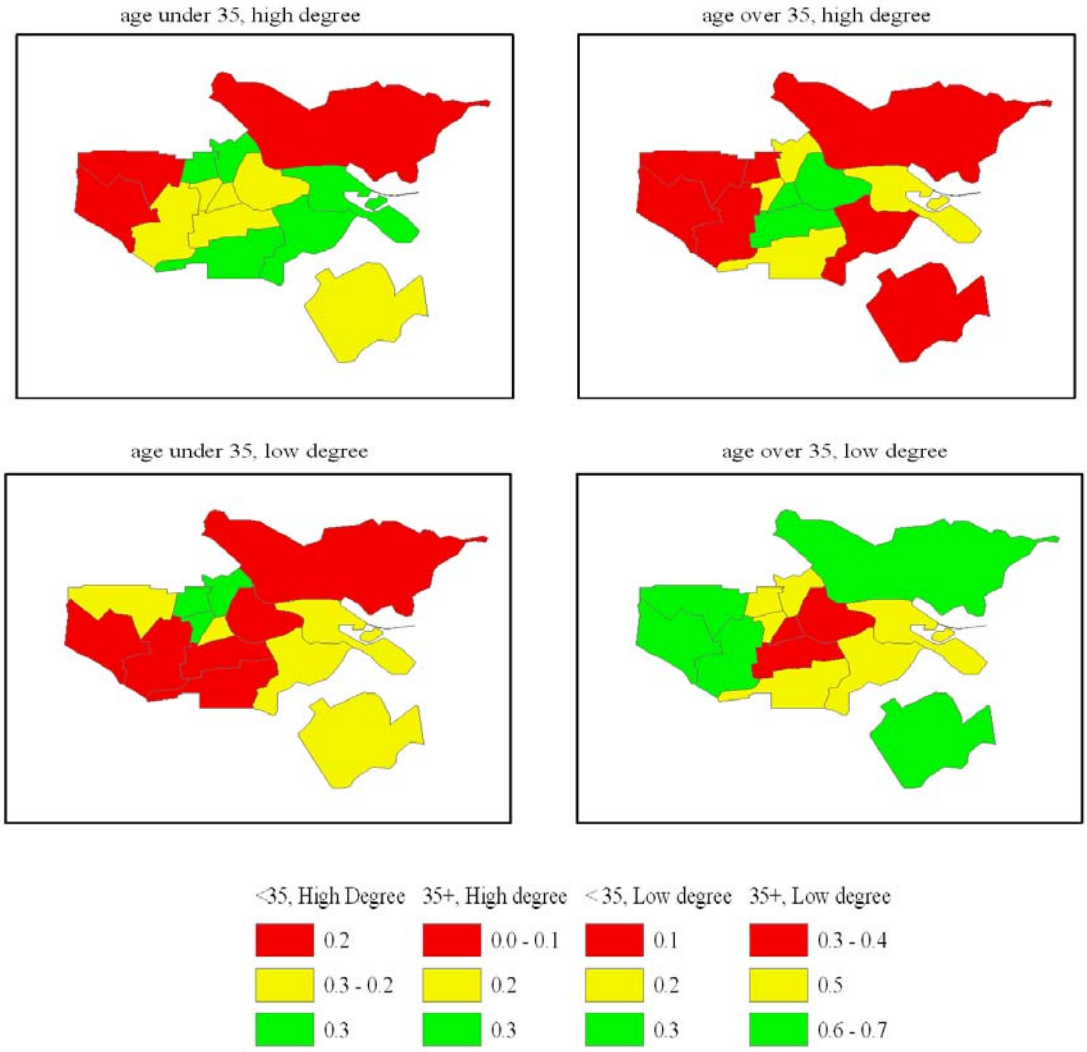


Figure 5. Age and educational level of Amsterdam residents

We can now relate this information to the use of e-services in various areas in Amsterdam, as shown in Figure 6. In general, 65% of the population of Amsterdam uses these services. We observe also notable spatial differences. In the neighbourhoods that are further away from the city centre (e.g. Osdorp, Geuzenveld, Noord, Zuidoost) people use less e-services. This pattern is to some extent correlated with the pattern we saw in Figure 5; apparently, people who have a higher degree tend to use more e-services. Looking at the spatial differences in membership of a cultural organisation, we find a rather similar pattern: people living in the centre are more often member of such a civic association.

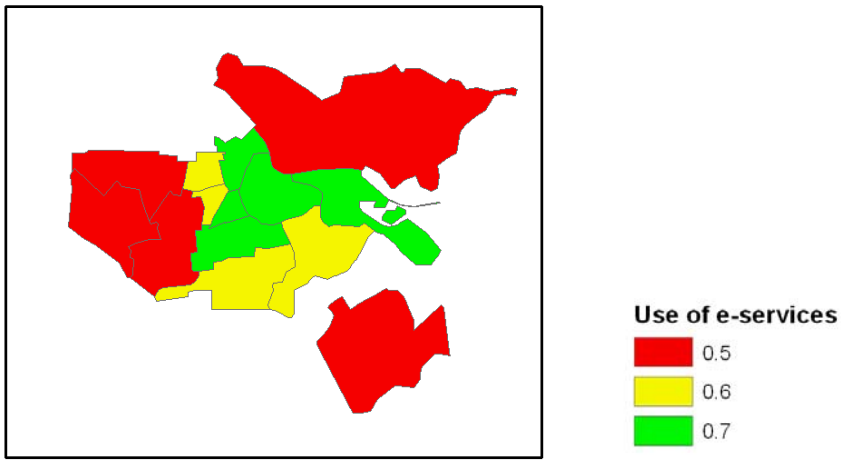


Figure 6. Spatial map of the use of e-services by residents of Amsterdam

To summarise, residents living in the city centre of Amsterdam use in general more e-services and are more often a member of a cultural heritage association, while residents living in the North, West or South of Amsterdam, use e-services less often or have a membership of a cultural organisation. In promoting cultural heritage and supporting e-services, the municipality of Amsterdam may have to take into account that there are differences in income, education degree and social participation between individuals and neighbourhoods. In promoting cultural heritage and supporting it, is probably wise to focus on specific target groups of residents. For example, a policy can be implemented to engage residents in these neighbourhoods characterized by social problems, for instance, older and lower educated people, more with cultural heritage and supporting e-services.

5.4 Residents

5.4.1. Cultural heritage

Figure 2 showed the overall appreciation of different aspects of CH. Using the results of the MSM experiment, we can observe whether there is a difference in appreciation for CH between district neighbourhoods. From the data it becomes clear that in general the differences in valuation between the neighbourhoods are rather small. But, despite these small differences, we can observe some spatial regularities. These are summarised in Figure 7. The red maps show the share of residents that valued the different CH aspects with a 1 or 2 score (low preference), the green maps the share of residents that valued the CH with a 4 or 5 (high preference). The darker the colour, the higher is the share. We see that in general residents from the city centre (Binnenstad, Oud-Zuid, Oud-West) value different aspects of CH higher than residents from neighbourhoods that are more distant from the city centre. It was already argued that this is could be related to the fact that much CH is actually located in the centre of Amsterdam. The spatial difference in appreciation may be explained by the fact that residents living in the centre experience CH in their everyday life, because they live nearby. However, it may also be that residents that are interested in CH are willing to pay more to live in the centre to be able to enjoy CH more often (a sorting effect). Furthermore, our results also reveal that people with higher incomes tend to appreciate CH somewhat higher than people with lower incomes. Since a lot of the residents of the city centre are high-income earners, this can explain the higher appreciation of e-services by people from the neighbourhoods that are located in the centre of Amsterdam.

An exception to the above mentioned pattern is the appreciation of intangible aspects of CH (knowledge, traditions, and local customs). We see that in general people from the neighbourhoods that are more distant to the city centre are appreciating the intangible aspects of CH more. However, only 40 per cent appears to like the intangible aspects of CH.

5.4.2. E-services

Earlier we saw that, in general, CH is highly appreciated by the inhabitants of Amsterdam. However, when looking at the appreciation of e-services we see more or less the opposite. Many residents care apparently less about the supporting e-services than about the CH itself. The spatial differences in appreciation of e-services are bigger than the differences in appreciation of CH (see Figure 8).

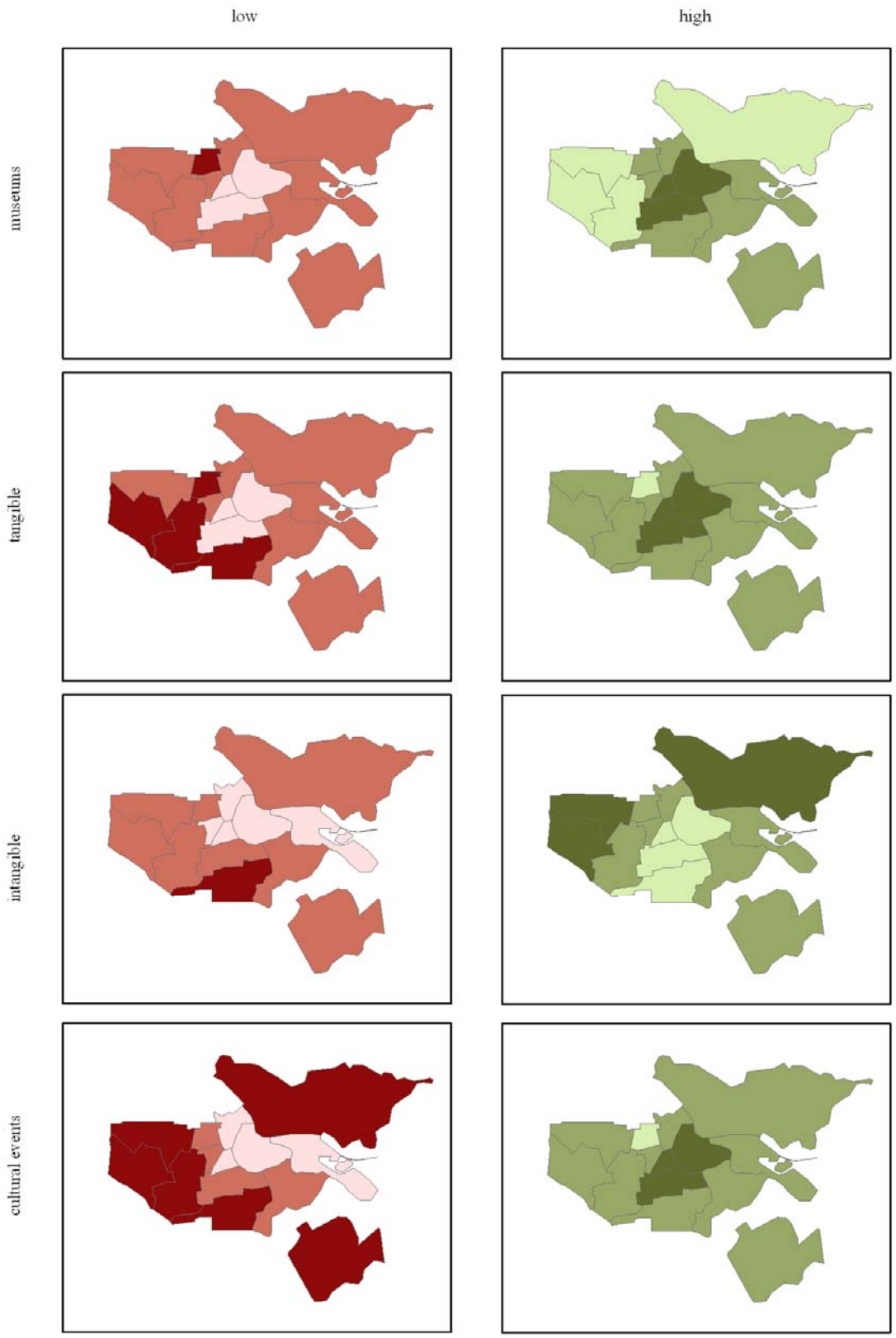


Figure 7. Spatial differences in preferences (low and high) of residents for different aspects of CH

In case of journey planners and online booking services, people living in or nearby the centre value these e-services higher than people who live further away from the centre. For example, only 40 per cent of the residents vote 4 or 5 in neighbourhoods like Amsterdam Noord, Geuzenveld and Osdorp, while at least 50 per cent of the residents in neighbourhoods like Oud-Zuid, Oud-West and Zeeburg vote 4 or 5 for online booking services. Looking at virtual tours, we see that neighbourhoods that are more distant from the city centre are having more residents that like virtual tours. Clearly, some 25 per cent of the residents living in the neighbourhoods of Amsterdam Noord, Osdorp, Geuzenveld and Zuidoost appears to appreciate virtual tours. Still, the share of people that like this e-service is much lower than, for example, the booking services.

In previous results we also saw that the educational level and the appreciation of interactive games are negatively related. In neighbourhoods where the average educational degree is higher, the appreciation of interactive games is apparently lower. For example, in the Binnenstad, Oud-Zuid, Oud-West and Zuideramstel neighbourhoods in Amsterdam, the percentage of high income earners and high-educated people is higher. Still, only around 12.5 per cent of the residents of Amsterdam-Noord and Geuzenveld/Osdorp appears to like interactive games. To conclude, there are clear spatial differences in the appreciation of e-services. However, these differences can be explained by individual-specific characteristics (e.g. income, gender). In providing supporting e-services to a specific target group, it is important to take these specific characteristics into account.

5.5 Target groups residents

A way to positively affect the attitude of residents towards visitors and tourist might be to involve them more directly in local CH attractions. For the residents, the appreciation for tangible forms of CH (architecture, monuments, museums and urban landscape) is on average around 4, for intangible forms of CH (traditions, local customs and knowledge) around 3, and for cultural events around 4.

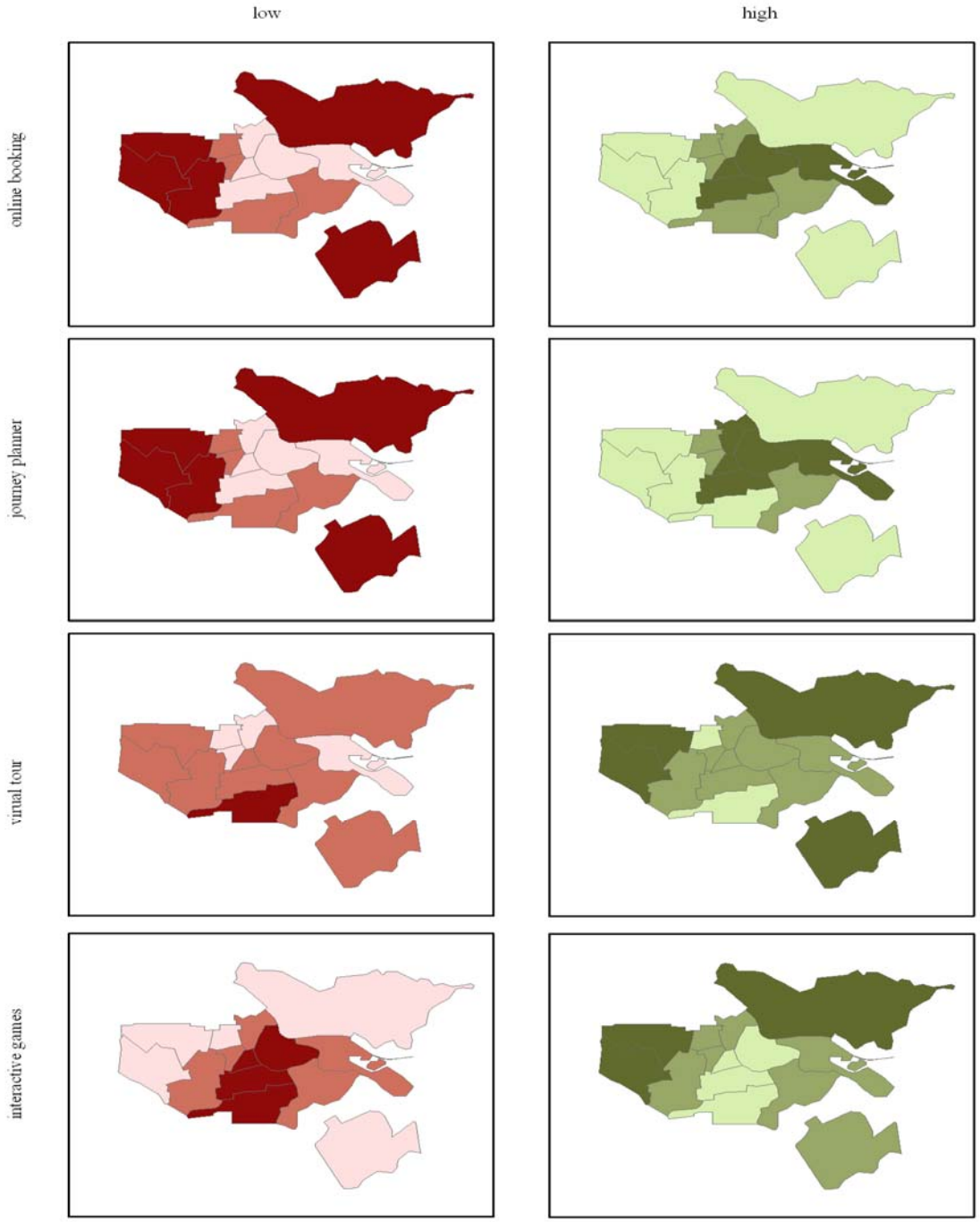


Figure 8. Spatial differences in preferences of residents for different elements of ES

The easiest way to attract more visitors to CH sites is to address those that are already interested in CH, and therefore we selected in our MS model those persons that already did use

e-services and that valued tangible CH higher than a score 4.5, intangible CH higher than a score 4, and cultural events with a score 5 (see also Table 4).

It appears that 16 per cent of the total Amsterdam population might be considered as a target group for e-services promoting tangible CH. This equals around 100,000 locals. The differences per neighbourhood are not very big. However, the highest participation percentage can be found in the city centre and Oud-west (20 per cent), the lowest in the neighbourhood Noord (13 per cent). Most of those residents appears to between 18-34 years old. Concerning the locals that appreciate intangible CH, we find that 13 per cent of the Amsterdam population belongs to the target group, which equals around 82,000 persons. Those persons are even more evenly spread over the different neighbourhoods of Amsterdam.

The largest group of persons that could be affected by the CH platform are those that are very much interested in cultural events: 26 per cent of the Amsterdam population or 160,000 persons. Most of those persons are between 18-34 years old, but when we look at the share of persons within each age group, it appears that around 30 percent of the group between 15-17 years old belongs to the target group, 38 per cent of the persons between 18-34, 21 per cent of the persons between 35-54, and 16 per cent of the persons older than 55.

Table 4. Percentage of the Amsterdam population that belongs to the target group for Tangible CH, Intangible CH and/or Cultural Events

	Tangible CH	**Intangible CH**	**Cultural Events**	**Total**
Tangible CH	7	3	4	14
Intangible CH	3	0	13	16
Cultural Events	4	13	9	26

Only around 3 per cent of the Amsterdam population belongs to all three target groups, 13 per cent belongs to either the Intangible CH or the Cultural Events target group, and 4 per cent to the Tangible CH and Cultural Events target group. This suggests that it is preferable to focus on the one hand on residents that are interested inTangible CH and on the other hand on residents interested in Intangible CH and Cultural Events, of which most of them are interested in cultural events.

It is also interesting to explore which e-services may be important to attract these target groups.When looking at the target group for Tangible CH, it appears from Table 5 that those people prefer in particular an online booking system and a journey planner; furthermore, they

appreciate interactive maps. The target group for Intangible CH prefers in particular a journey planner, as well as interactive maps. Half of them also appreciates online booking systems, which means that this kind of e-service is slightly less important for Intangible CH. Compared to the other target groups, the persons interested in Intangible CH enjoy more often interactive games and an e-forum. Also the Cultural Events target group mostly favours a journey planner; furthermore, they appreciate online booking systems and interactive maps.

Table 5. Appreciation of e-services by persons in the three target groups

	Interactive map	Personal information	Online booking	Journey planner	E-forum	Virtual tours	Interactive games
Low value (1+2)							
Tangible	13	14	5	11	20	12	20
Intangible	9	10	11	8	17	10	33
Cultural Events	8	5	9	5	11	9	29
High value (4+5)							
Tangible	64	45	70	71	11	29	12
Intangible	65	38	51	72	28	36	27
Cultural Events	62	42	63	74	23	30	17

From the above results it appears that the preferences of people in the distinct target groups are not very different. Most of them would appreciate a journey planner, but also interactive maps and online booking systems are appreciated by more than half of these locals. However, persons interested in Intangible CH also like interactive games, and those interested in Intangible CH and Cultural Events appear to appreciate also an e-forum.

6. Conclusions and Lessons

Modern cities with a relative abundance of cultural heritage tend to enhance the quality or attractiveness of a place for both visitors and residents. An effective use of ICT allows cities to build their own brand images, develop new products, promote their visitors' resources and expand their customer base so as to ultimately increase the visitors' revenues and to contribute to local development. ICT offers cities an online vehicle to market their cultural diversity, and heritage, as well as to facilitate the marketing and provision of associated CH products.

In addition, ES could be used to involve residents in local CH. This might serve two purposes: (i) to stimulate an increase in the number of visitors to CH sites; (ii) to positively

affect the attitude of residents towards tourists. A systematic definition and mapping of a rich diversity of perceptional and attitudinal elements that characterize the (current or future) profile of a city (a place's innovative positioning and branding strategy and its related objectives) for various stakeholders (e.g., residents, businesses and visitors) is feasible.

Our research on the spatial distribution of CH elements in Amsterdam shows a strong CH concentration in the city centre. Our MS model indicates that all residents of Amsterdam, including those also the ones living in the outskirts of the city, appreciate CH more or less to the same extent. This means that when new CH elements or activities are planned, locations outside the city centre could be successful as well. For example, intangible forms of CH are also appreciated by residents living in the North and in the West of Amsterdam. A recommendation would be to also develop the 'Hidden Treasures' project in these neighbourhoods (namely, the development of an integrated collection of less well known CH assets outside the city centre). According to our analysis, useful e-services to promote 'Hidden Treasures' would be a journey planner for local visitors, as well as a multilingual E-forum.

In our empirical investigation, we have defined distinct target groups for the residents of Amsterdam. It appears that 16 per cent of the total Amsterdam population could be considered as a target group for e-services promoting Tangible CH. This equals around 100,000 persons. The differences between neighbourhoods where these persons live are not very large. However, the highest percentages can be found in the city centre and Oud-west, the lowest in the neighbourhood Noord. Most of those residents are between 18-34 years old. Concerning the persons that appreciate Intangible CH, 13 per cent of the Amsterdam population appears to belong to the target group, which is around 82,000 persons. These persons are rather evenly spread over the different neighbourhoods of Amsterdam as well. The largest group of persons that could be affected by the CH platform are those that are particularly interested in cultural events: 26 per cent of the Amsterdam population, or 160,000 persons in total. Most of those persons turn out to be relatively young.

The main policy focus of Amsterdam is to develop more CH attractions or activities outside the centre to attract more residents. It is then important to know that in the district south-west of the centre, residents are more interested in Tangible CH, and that these residents can be best reached by conventional e-services. In the North and West of Amsterdam, the use of

Intangible CH elements can be increased as well, while in this case interactive e-services are the best tools to attract additional visitors.

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