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Collaborating with Local Communities to Identify Improvement Priorities for Historic Urban Landscape Based on Residents' Satisfaction: An Application of Asymmetric Impact-Performance Analysis in Dandong, China

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Abstract: In the process of urbanization and globalization, urban conservation reinforces the links among past, present, and future, which enhances local identity and is indispensable for urban sustainability. The concept of Historic Urban Landscape (HUL), as both a notion and an approach, has been playing an increasingly important role in urban conservation discourse. Prioritizing actions is one of the pivotal procedures to perform the HUL approach. Instead of simply focusing on values selected and graded by experts, more attention should be paid to local residents' satisfaction. A collaborative approach involving communities to prioritize actions in urban conservation and regeneration is proposed. Using the data from residents in the old town of Dandong, China, this study pioneers the application of the Asymmetric Impact-Performance Analysis (AIPA) technique in the urban conservation field. HUL attributes are categorized into basic factors, excitement factors, and performance factors based on their potential asymmetric impact on residents' satisfaction. By taking performance levels of the attributes into consideration, this study further identifies improvement priorities for HUL, which helps planners and city managers to make rational choices in managing historic cities.

Keywords: urban conservation; Historic Urban Landscape; human perception; heritage management; Asymmetric Impact-Performance Analysis; community engagement

1. Introduction

From the perspective of the cultural landscape, cities are the results of historical layering [1], where natural and cultural values and attributes were intertwined and accumulated over time by generations of communities under ever-changing contexts [2]. The urban landscape has been constantly changed by dynamic forces according to the changing demands during the process of urban development [3]. It is the fundamental living environment for urban residents. However, this kind of living environment is facing the crisis of lacking character and identity caused by urbanization and globalization. Furthermore, the imbalance between heritage preservation and urban development has been having negative impacts on residents' life quality in heritage sites.

As the link between history and present, urban heritage is an integral component of local identity. Urban heritages together with the memories and associations inherent in them are the evidence that addresses how urban landscape has been continuously shaped and changed [4]. Both tangible and intangible urban heritage are precious and have the potential to be drivers of social cohesion and urban regeneration [5].

Urban conservation has been a focus in urban planning, architecture, and other related fields since it was developed after the French Revolution [2]. Along with the evolution of this idea, the motivations for conservation have been changing over time. Urban conservation has gone through "Antiquarian Bias", "Commemorative Bias", and "Aesthetic Bias" in both academia and practice during the past three centuries, while a new bias is emerging in the 21st century which focuses on the relationships between different things, as well as between things and people, rather than things themselves [6]. This current trend is to see the human environment as a cultural landscape with an intention to manage it within the landscape discourse, which is called "Ecological Bias". From this holistic view, urban conservation and urban development are no longer incompatible with each other, since their joint aim is to enhance the human environment and allow communities to prosper. It has become increasingly clear that urban conservation is a key resource and an indispensable part of urban sustainability [7].

The culmination of this new trend came in 2011 when Recommendation on the Historic Urban Landscape was declared [1] and commonly accepted. The concept of Historic Urban Landscape (HUL) was first set out at a UNESCO conference in Vienna in 2005 [8], thus HUL, as a new approach as well as a new notion, has been playing an increasingly important role in urban conservation discourse [9]. The HUL approach provides a fresh view of seeing and interpreting cities and suggests landscape approaches to identify, preserve, and manage historic areas within comprehensive urban contexts [1]. HUL can also be seen as an object of protection, namely, city or parts of it can be taken as HUL when the HUL approach is applied [10]. The proposition of the HUL notion served as a catalyst to trigger discussion, meanwhile, the approach has been evolving and new methods and tools for urban conservation are needed [9].

Prioritizing management actions is one of the crucial procedures to perform the HUL approach [1]. Although studies in the heritage preservation field offer important insights, the traditional assessment methods based on heritage value have a limited capacity to deal with HUL. Except for the values selected and graded by experts from outside the community, the values created and attached by people who live and work there should also be properly preserved. The goal of HUL conservation is to preserve the human environment and enhance its quality. Local residents, as part of the landscape [11], are the ones who are actually using and continuously shaping this living environment, therefore, their requirements and expectations need to be prioritized and addressed. Inherent in this thinking is that communities should be involved in discussions as well as educated to better understand and conserve local heritage, and more attention should be paid to residents' satisfaction on HUL in terms of prioritizing actions in the urban conservation and regeneration process.

Using the data from residents in the old town of Dandong, China, this study employs the Asymmetric Impact-Performance Analysis (AIPA) technique to identify improvement priorities for managing HUL. It classifies HUL attributes into basic factors, excitement factors, and performance factors based on their potential asymmetric impact on residents' satisfaction. By taking the performance of the attributes into consideration, improvement priorities for HUL conservation and regeneration are further identified.

In the next part of this paper, the interaction mechanism between urban environmental quality and residents' satisfaction is introduced. The selection of the influential factors and analysis techniques for priority assessment are described as well. The survey method is presented in the last subsection of the next part. Afterward, AIPA is implemented and the results are discussed. The limitations of this study and policy implications are discussed in the Discussion section. The final part summarizes the research and highlights the key findings.

2. Materials and Methods

2.1. Residents' Satisfaction as an Indicator of Urban Environmental Quality

The cultural landscape is the integration of environment and culture groups [12]. Urban landscape, as a type of cultural landscape, is a significant setting for human activities, where people and landscape are interdependent [13]. The landscape shaped by urban residents could be considered as their unwitting biography, which is the reflection of their values and aspirations in the tangible and visible form [14]. The urban landscape is also a window into urban residents' evolving relationship with the environment, inextricably tied to which is that of the landscape as a process, rather than merely as a product [15]. Human attachment to a specific place and how people find identity in it are linked to this understanding [4]. Such a view of landscape focuses not only on the tangible ways in which people shape and structure their landscapes through time, but also seeks to understand the intangible aspects that people bring to the shaping of landscape [13]. Thus, the nature of urban landscape is the interaction between urban residents and the urban environment.

The causality is difficult to define in the relationship between humans and the environment, because it is a dynamic interactional process rather than a static one [16]. In the context of a built-environment, the person–environment relationship is about the degree of congruence between urban residents and their everyday surroundings [17–19]. The sense of gratification is produced by an internal psychological–physiological mechanism, which needs to be engaged by external phenomena [19].

Some concepts enjoy great public popularity in the discussion of the person-environment relationship, such as environmental quality, livability, wellbeing, and sustainability. Although these concepts overlap and serve a similar purpose, they have different focuses. Livability and environmental quality are related to the objective environment, while wellbeing and quality of life are from the perspective of the person. Sustainability concerns more about the future, while other concepts, such as livability, have an emphasis on the here and now [16]. In the Historic Urban Landscape paradigm, urban conservation is supposed to contribute to the wellbeing of communities and the livability and sustainability of cities and to achieve this, urban heritage and its setting are seen as key resources [1].

For concepts concerning objective and subjective aspects, there are objective indicators describing the environments [20] and subjective indicators describing how environmental conditions are perceived and evaluated by people [21]. These two types of indicators measure different things and their correlation is weak [22], despite that, objective conditions have an influence on subjective wellbeing [23]. Although no conclusive evidence was found to support the superiority of either type of indicator over the other in terms of validity and reliability [19], there has been criticism of the universality of objective indicators such as livability indexes. The problem is that livability actually stands for something different to different people, while the livability indexes, produced through assigning weights to the objective characteristics, are artificial constructs figured up by experts based on some normative ideals [24]. For urban residents, urban environment quality is a behavior-related function of the interaction between the characteristics of both people and environment rather than an inherent attribute of the objective environment [19], which means that people's judgement about the environment have more influence on the perception of environmental quality than the objective characteristics [25].

The study on interaction effects between person and environment is made operational in the context of satisfaction research. Satisfaction with life or environment is produced from a process [16] in which the discordance between expectations and actual performance plays a key role in making satisfaction judgments [26]. Campbell's model, in which satisfaction with different domains add up to be the overall satisfaction [21], is the most general example.

Since HUL involves the urban environment people live in [1], residents' satisfaction with HUL, similar to residential satisfaction, can be seen as a domain of life satisfaction. An environment can only be effective if it is adopted by users [27], inherent in which is that residents' feelings and thoughts about their living environment offer important insights [28]. It is primary to manage cities as good places

for people to live [29]. Urban residents are active co-producers of the urban environment, therefore, residents' satisfaction is of great priority in place managing [30].

2.2. Selection of the Factors Influence Residents' Satisfaction with HUL

The built environment could be considered as a service to the people in it [31], which is provided by governments and developers. According to previous researches on customer satisfaction in the hospitality field, overall satisfaction comes out of the assessment of the performances of all the attributes that constitute the research subject [32,33]. It is impossible and unnecessary to focus on all the attributes reflecting the real dimensionality of a construct [29], therefore, it is vital to find key influential factors of residents' satisfaction with HUL.

In empirical studies on the relationships between built environments and life satisfaction, scholars found greenspace, open space, land use, resident pride, and other perceived environment characteristics such as safety and cohesion as important factors [34–38].

Numerous studies have dealt with the relationship between environmental characteristics and residential satisfaction, which is a specific domain of life satisfaction. Personal and social factors, together with physical attributes, have been identified to be associated with residents' satisfaction [39–41]. Hur, Nasar and Chun [39] claimed that building density and vegetation rate are two salient attributes to affect satisfaction. Cao [42] pointed out that density, diversity, design, and environmental amenities are key measures of residential neighborhoods. Kaplan [43] indicated that the presence of various forms of natural elements has positive effects on neighborhood satisfaction. The function and structure of the landscape are related to human perception and satisfaction, which has been proved by many scholars [44–46]. Five key elements of a city, which are paths, edges, districts, nodes, and landmarks, were distinguished by Lynch [47], who also developed a theory of good city form [48] through proposing principles including vitality, sense, fit, access, and control. Smith, Nelischer, and Perkins [20] summarized the quality and needs principles of urban communities, such as character, connection, mobility, and diversity, based on Lynch's theory and quality principles derived from professional publications. In the context of HUL, some attributes, such as a sense of place, identity, historic center, dynamic integrity, continuity, and human factor, have been the focus of scholarly work [9,10,13,49,50].

Because of the absence of measurement scale designed for the influence of HUL on residents' subjective perception, the related dimensions and attributes in this research were developed based upon information covering satisfaction with the built environment, residential satisfaction, urban planning principles, and HUL requirements as discussed above. Three experts from heritage preservation and urban planning fields formed a focus group to designate and validate the measurement scale. Seventeen attributes in three dimensions were selected to be presented in the final questionnaire (Figure 1).

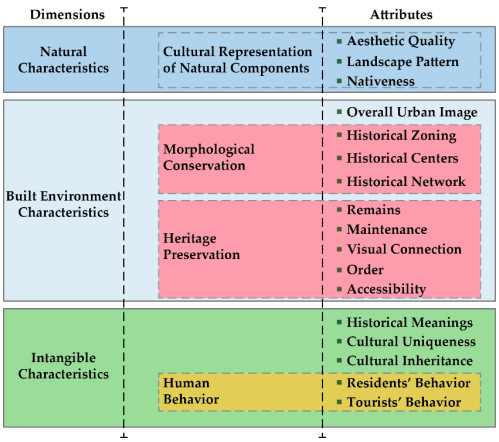

Figure 1. Dimensions and attributes selected by the focus group.

2.3. Analysis Techniques for the Priority Assessment of Attributes

In improving the quality of attributes, because of limited resources, researchers suggest that resource allocation decisions should be made based on the priority assessment of attributes [51]. There are various attribute-level techniques to identify improvement priorities. Action grid analysis, which is well known as importance-performance analysis (IPA), is a simple and visual technique with considerable popularity [52–54]. In IPA, the attributes of the research subject are divided into four categories based on their performance and importance, which are derived from customer surveys [55]. Four categories of attributes fall in different quadrants of the action grid and each quadrant stands for a specific strategy [56,57]. IPA is based on the assumption that positive and negative performances of an attribute may have linear and symmetric impacts on satisfaction [58]. However, an asymmetric relationship has been verified by many scholars [59–62], which means that the positive performance of an attribute can have a more significant impact on overall satisfaction than negative performance and vice versa.

The three-factor theory of customer satisfaction, first proposed by Kano [63] and improved by other scholars [59,64], indicates that satisfaction is not a unidimensional concept, and the reverse side of dissatisfaction is not necessarily satisfaction [51]. Based on this theory, attributes can be categorized into three groups according to their asymmetric impacts, which are basic factors, performance factors, and excitement factors (Figure 2). Basic factors bring up dissatisfaction when expectations are not fulfilled but have a less identifiable influence on satisfaction if fulfilled or even exceeded [31]. In contrast, excitement factors influence satisfaction linearly and lead to delight but they do not have the potential to arouse dissatisfaction when absent [33]. Performance factors lead to both gratification and disappointment because the relationship between these attributes' performance and overall satisfaction, different from basic and excitement factors, is symmetric [51].

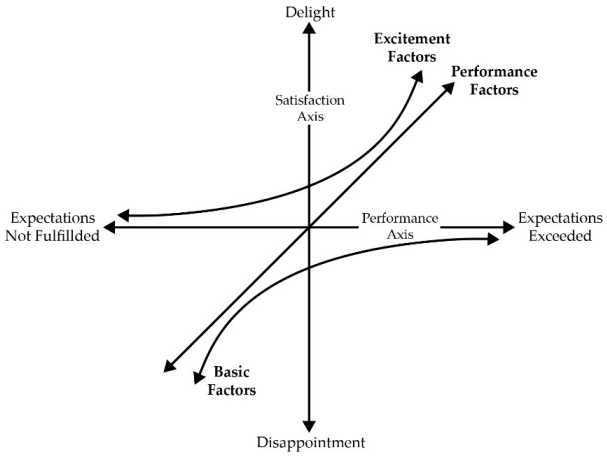

Figure 2. The three factors and their influence on satisfaction.

Scholars have proposed some methodologies for distinguishing the three categories of factors, including the critical incident technique [65], the importance grid method [66], and penalty-reward contrast analysis [67]. Among these methodologies, penalty-reward contrast analysis is widely applied, which creates two sets of dummy-variables through recoding the performance values of each attribute [68,69]. After regression analysis of attributes' impact on overall satisfaction with dummy variables, the factor structure can be found out with the help of the two coefficients [33], which represent the penalty-index (PI) and reward-index (RI) for each attribute [58]. Mikulić and Prebežac [70] took it a step further by emphasizing the value of impact range-performance analysis and proposing impact-asymmetry analysis (IAA) to categorize attributes based on their satisfaction-generating potential (SGP) and dissatisfaction-generating potential (DGP). In the impact-asymmetry analysis, SGP equals the ratio of RI over the range of impact on overall satisfaction (RIOS), which is the absolute

sum of RI and PI. Similarly, DGP equals the ratio of PI over RIOS. The impact-asymmetry index (IA index) of each attribute, calculated by the difference between SGP and DGP, and RIOS are positioned on the vertical and horizontal axes of a two-dimensional matrix respectively to help to prioritize the improvement of attributes.

Caber, Albayrak, and Loiacono [68] proposed an extended and simplified technique based on IAA, which is named asymmetric impact-performance analysis (AIPA). In AIPA, attributes' performance ratings, instead of RIOS, are positioned on the horizontal axis. AIPA has advantages in terms of visual clarity and comprehensibility, and its reliability and effectiveness have been confirmed by comparing it with IPA [51]. This technique has been employed in business-to-business and tourism research fields for identifying improvement priorities [51,68,71].

Although the three-factor theory, penalty-reward contrast analysis, and AIPA technique have become effective instruments in many research fields, no researches have applied these approaches in an urban conservation field. This study tries to fill the gap by introducing the AIPA technique to explore the asymmetric relationships between historical environment quality attributes and urban residents' satisfaction with HUL.

2.4. Survey Method

Research data was collected through a self-administered survey to residents living in the old town of Dandong in April-August 2018. As the largest border city of China, Dandong was built along the Yalu River, which demarcates the border between China and North Korea (Figure 3). Dandong has had a long and profound history because of its strategic location and its convenient access to both the ocean and the Korean Peninsula. The dynamic history, unique geographic condition, and frequent cross-cultural communication among nations and ethnic groups have all contributed to the shaping of this Historic Urban Landscape and its features. There are many urban heritage sites that have become landmarks and icons of the city, among which the Yalu River Broken Bridge and the far eastern end of the Great Wall are most famous.

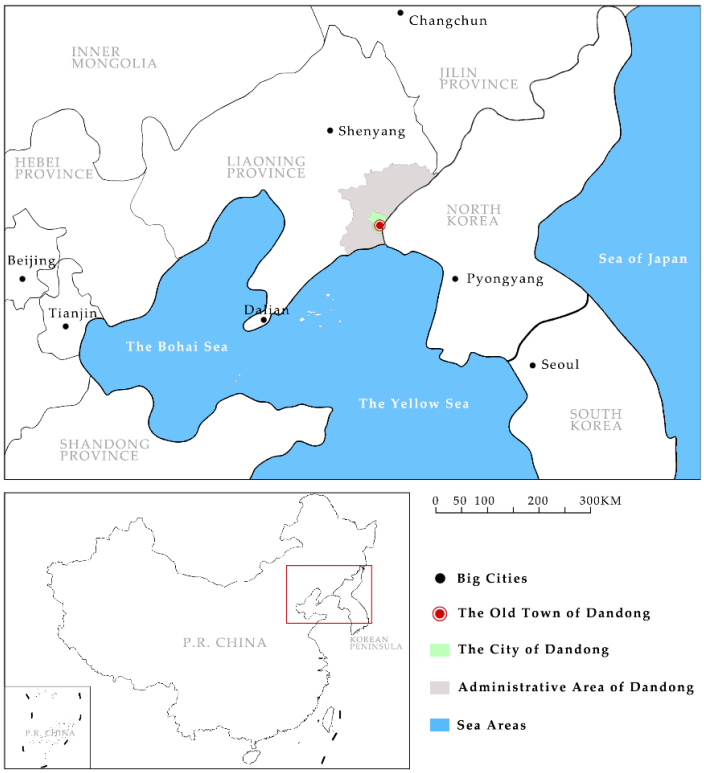

Figure 3. Location map of the old town of Dandong.

The questionnaire was developed using an online questionnaire design tool powered by wjx.cn. A pilot survey was tested by 20 residents, who are neighbors or acquaintances of the associated investigators, to detect potential sources of bias. The form and content of the online questionnaire were adjusted based on the feedback from the pre-testers. Invitations asking residents to participate in the survey were sent out through leaflets. A cover letter explaining the study and a QR code, which can direct respondents to the online questionnaire by scanning it with common smart mobile devices, were attached to each invitation. To guarantee the randomness of sampling, ten well-trained post-graduate students from our research team looked for respondents at different places in the old town area, including open spaces, commercial streets, residential units, transport facilities, etc. A total of 600 invitation leaflets were distributed and 464 residents participated in the survey, from which 451 valid questionnaires were obtained.

Three categories of variables were used in this study: perceived HUL characteristics, overall satisfaction with HUL, and demographics. For perceived HUL characteristics, specific items in the questionnaire were designed to find out how true a list of characteristics, which corresponded to the attribute set in Figure 1, is for the old town of Dandong on a seven-point ordinal scale from "extremely not true" (1) to "entirely true" (7). The overall satisfaction with HUL was measured by a single item. Specifically, respondents' attitudes toward the old town of Dandong were indicated on a seven-point scale from "strongly dissatisfied" (1) to "strongly satisfied" (7). Demographic items included age, gender, education, income, length and type of residence, and ethnic group.

For the sake of avoiding any half-heartedness problems aroused by using online questionnaires, in which case respondents completed questionnaires without the supervision of interviewers, the qualified samples were limited to those with a processing time exceeding 260 s. This benchmark was set based on question amounts and reading speed. By excluding unqualified samples, a final set of 383 valid samples (85%) were retained for formal analysis. IBM SPSS Statistics (Version 20.0.0) was used in the following section to analyze the survey data.

3. Results

3.1. Sample Profile

Of the 383 respondents, 71.3% were native-born, and 75.2% had lived in Dandong for more than 20 years (Table 1). Table 1 also compares some of the sample demographic characteristics with the 2015 census. Females and the middle two age groups (18–35 and 35–60 years) are overrepresented in the sample. The ethnic Manchu is underrepresented although the percentage ranking of different ethnic groups is similar to the 2015 census. However, since ample diversity of categories is guaranteed in all items, the effects they have on overall satisfaction could be properly captured and the difference with the census is not a problem [42]. Although in terms of univariate distributions, this sample is not perfectly representative, the relationships among the research variables (residents' perception and satisfaction) captured by the model are generalizable [72].

Table 1. Sample profile and the comparison with the 2015 census.

Items	Categories	Percentage
Gender	Female	64% (51%)
	Male	36% (49%)
Age	Under 18	0.8% (10.7%)
	18–35	29.75% (20.5%)
	35–60	65.35% (45.9%)
	Over 60	4.2% (22.9%)

Table 1. *Cont.*

Items	Categories	Percentage
Ethnic Groups	Han	82.8% (65.7%)
	Manchu	15.1% (31.5%)
	Other	2.1% (2.8%)
Type of Residence	Native-born	71.3% (N/A)
	Migrant	28.7% (N/A)
Length of Residence	<5 years	3.4% (N/A)
	5–10 years	4.2% (N/A)
	11–20 years	17.2% (N/A)
	>20 years	75.2% (N/A)
Education	Middle school and below	10.7% (N/A)
	High school	17.8% (N/A)
	Junior college	27.7% (N/A)
	College	40.7% (N/A)
	Graduate school	3.1% (N/A)
Income	2000 or less	7.8% (N/A)
	2001–4000	24.8% (N/A)
	4001–6000	26.9% (N/A)
	6001–8000	18.8% (N/A)
	8001–10,000	12.0% (N/A)
	10,001–12,000	3.9% (N/A)
	Over 12,000	5.7% (N/A)

Note: percentage data in parentheses came from the 2015 census; N/A means this data was not provided by the 2015 census; income here is household monthly income in RMB Yuan.

3.2. Reliability and Validity

Exploratory factor analysis and Cronbach's alpha coefficient were used to test the construct validity and reliability. Through principal components analysis, 17 variables were grouped into one factor with an eigenvalue of 9.147 and represented 53.804% of the total variance (KMO = 0.943); Bartlett test of Sphericity = 4365.719 (p = 0.000). The factor loadings ranged from 0.545 to 0.849. Therefore, the construct validity was good according to prior research evidence [73]. Overall satisfaction score and a grand mean of 17 attribute perception scores were used in computing the Pearson correlation coefficient. The construct validity was also supported by the high and statistically significant correlation (0.731, p = 0.000). Finally, Cronbach's alpha value was calculated (0.945) and showed good internal consistency within the data set.

3.3. Attributes' Influences on Overall Satisfaction

In spite of the integration of the perceptions of 17 attributes predicted overall satisfaction with HUL effectively, attributes may contribute differently. In order to find out the significant predictive variables of overall satisfaction, a stepwise multiple regression was conducted. After nine cycles of model-fitting, 10 attributes with low significance were removed from further analysis. Seven attributes (Table 2) remained and explained 56.5% of the total variance ($p < 0.001$). Among these attributes, "Historic Meaning" was the strongest predictor of residents' satisfaction with HUL, while "Historic Center" was the weakest.

Table 2. Multiple regression results of significant predictors.

Attributes	B	SE(B)	Beta
Constant		1.175	0.252 *
Landscape Pattern	0.073	0.026	0.132 **
Residents' Behavior	0.129	0.028	0.211 *
Heritage Maintenance	0.075	0.025	0.135 **
Historic Meaning	0.290	0.041	0.299 *
Historic Center	0.075	0.029	0.115 ***
Accessibility	0.123	0.031	0.156 *
Cultural Uniqueness	0.220	0.043	0.226 *

$R^2 = 0.565$ ($p < 0.001$), * $p < 0.001$, ** $p < 0.005$, *** $p < 0.01$.

3.4. Asymmetric Impact of Attributes and AIPA Results

A multiple regression analysis was conducted to identify the asymmetric impact [51,59]. Two dummy variables were created for each attribute to quantify the impact of low and high performance. In consideration of the positive skewness issue [74], attributes' perception scores were re-coded. The first dummy variable stood for low-performance and was formed by assigning the value of 1 to the three lowest scores of the 7-point Likert-type scale. While the value of 1 was assigned to the highest two scores when creating the second dummy variable for high- performance. The value of 0 was assigned to the middle two scores (5 and 6) to represent the reference group when residents' perception is neutral. Following this re-coding, the dummy variables and the overall satisfaction of HUL were used as independent variables and dependent variables, respectively in the multiple regression analysis.

Equation (1) was used to calculate the impacts (i.e., regression coefficients) of each attribute in case of different performance levels [51]. In this equation, $d_{low\_p.i}$ and $d_{high\_p.i}$ are dummy sets indicating low and high-performance levels; $\beta_{low\_p.i}$ and $\beta_{high\_p.i}$ represent the incremental change of OS_{HUL} when attribute *i* is at low and high-performance levels, respectively; n = 7.

$$OS_{HUL} = \beta_0 + \sum_{i=1}^{n} (\beta_{low\_p.i} d_{low\_p.i} + \beta_{high\_p.i} d_{high\_p.i}) + \varepsilon, \quad (1)$$

Significant differences between performance levels were revealed in the results (Table 3). Although numerical values varied in the same performance level, the impacts were negative when attributes' performances were low, while the impacts were positive when attributes' performances were high.

Table 3. Asymmetric impact of attributes' performance.

Attributes	Regression Coefficients of Dummy Variables	
	Low Performance ($\beta_{low\_p.i}$)	High Performance ($\beta_{high\_p.i}$)
Landscape Pattern	−0.144 *	0.049 (n.s.)
Residents' Behavior	−0.141 *	0.089 ***
Heritage Maintenance	−0.076 ***	0.055 (n.s.)
Historic Meaning	−0.152 *	0.158 *
Historic Center	−0.042 (n.s.)	0.107 **
Accessibility	−0.045 (n.s.)	0.135 *
Cultural Uniqueness	−0.056 (n.s.)	0.175 *

$R^2 = 0.498$, * $p < 0.01$, ** $p < 0.05$, *** $p < 0.1$.

The absolute values of the coefficients at low-performance level are penalty indices [58] and the absolute values of the coefficients at high-performance level are reward indices [72]. For each attribute, PI and RI were summed up to acquire their range of impact on overall satisfaction (RIOS). Each attribute's impact asymmetry (IA) value (Table 4) was calculated based on its dissatisfaction-generating potential (DGP) and satisfaction-generating potential (SGP) using the following equations.

$$DGP_i = PI_i / RIOS_i \quad (2)$$

$$SGP_i = RI_i / RIOS_i \quad (3)$$

$$IA_i = |SGP_i| - |DGP_i| \quad (4)$$

Table 4. Attributes' performance means and asymmetric impact indices.

Attributes	Means	RIOCS	SGP	DGP	IA
Landscape Pattern	5.15	0.193	0.254	−0.746	−0.492
Residents' Behavior	5.24	0.23	0.387	−0.613	−0.226
Heritage Maintenance	4.95	0.131	0.420	−0.580	−0.160
Historic Meaning	6.32	0.31	0.510	−0.490	0.019
Historic Center	5.46	0.149	0.718	−0.282	0.436
Accessibility	5.91	0.18	0.750	−0.250	0.500
Cultural Uniqueness	6.30	0.231	0.758	−0.242	0.515

The IA value is in the range of −1 and +1. The values of −0.1 and +0.1 are selected as cut-off points in order to distinguish impact types according to previous researches [51,68,70]. An attribute falls into basic factors if its IA value is in the interval between −1 and −0.1. An attribute is classified as a performance factor when its IA value is between −0.1 and +0.1. Excitement factors are those attributes with IA values between +0.1 and +1.

Attributes were located on the AIPA matrix (Figure 4) using their means of performance as horizontal axis values and IA values as vertical axis values. The grand mean of the means of seven attributes' performances was used for reference to subdivide the matrix into low-performance and high-performance zones. Using this matrix, improvement strategies for HUL could be developed according to attributes' asymmetric impact types and performance.

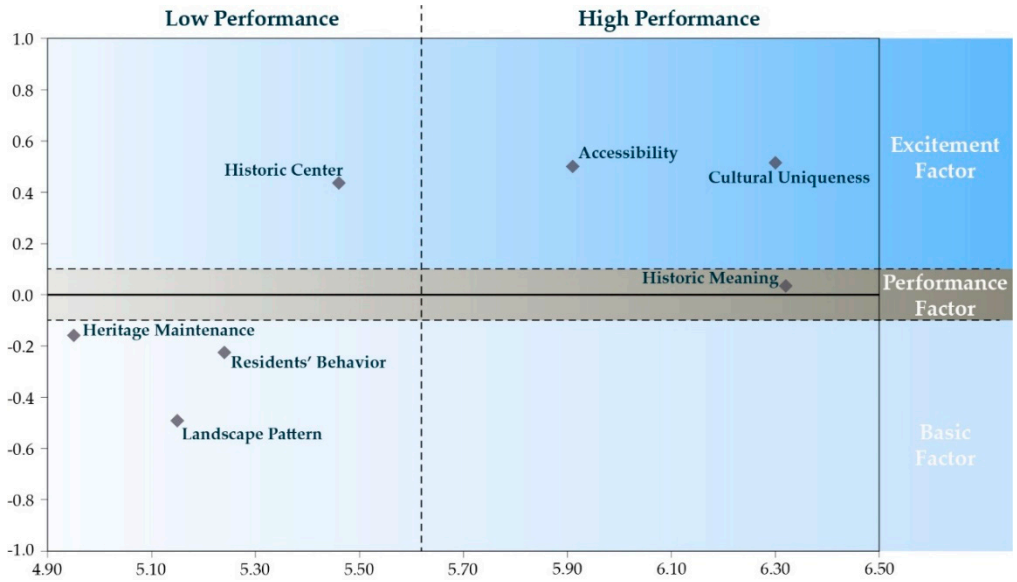

Figure 4. Results on asymmetric impact-performance analysis (AIPA) matrix.

"Landscape Pattern", "Heritage Maintenance", and "Residents' Behavior" are basic factors at the low-performance level. Although basic factors have less identifiable influence in terms of creating satisfaction, it is crucial to improve these attributes because their potential in leading to dissatisfaction with HUL is high. "Historic Meaning" is a performance factor that has the potential to cause both contentment and discontentment. In order to ensure residents' satisfaction, it is necessary to keep

its performance high. "Cultural Uniqueness" and "Accessibility" are excitement factors with high performance, which means they are good enough to create satisfaction and there is no need to focus on them. "Historic Center" is also an excitement factor, whereas its performance is low. Since excitement factors do not cause dissatisfaction, improvement in this attribute is not essential. Although it is still an option to boost satisfaction, it has a lower priority than dissatisfaction-causing attributes.

4. Discussion

In the process of urbanization and globalization, urban conservation reinforces the links among history, present, and future, which, from both spatial and spiritual aspects, contributes to the continuity of the sense of place and local identity. Although the outdated and isolated preservation paradigm is still active in some parts of China [10], the HUL approach provides a comprehensive way of interpreting the city and identifies urban heritage as resources in enhancing the livability and sustainability of urban areas [9].

Prioritizing conservation and development actions is one of the crucial procedures to perform the HUL approach [1]. References from the management research field can be used since the built environment could be considered as a service to people in it [31], which is provided by governments and developers. A variety of techniques can help planners and managers to identify priorities among resources or attributes. In this study, AIPA was selected for categorizing HUL attributes and indicating managerial policies, which is an efficient technique based on attributes' asymmetric impacts on overall satisfaction as well as their performance levels.

However, it is necessary to discuss the limitations and caveats regarding the interpretation of the results before drawing policy implications. Firstly, this study considers characteristics from natural, built-environment, and intangible dimensions but does not incorporate characteristics from other dimensions that also influence urban residents' satisfaction with HUL, such as social and economic characteristics. More comprehensive dimensions should be included in future researches, which is especially important when heritage disciplines come to the crossovers with landscape discourse [75]. Secondly, in the attributes' selection aspect, seventeen attributes were selected from three dimensions, but only one component, with the eigenvalue greater than one, was extracted through principal components analysis. Attributes from the same dimension may influence residents' satisfaction in different ways since the dimensions were not defined based on influence type or extent. Although we can get three components by lowering the threshold value of the eigenvalue to 0.9, it was not necessary because this study was performed on an attribute-level rather than dimension-level. Ten attributes with low significance were removed from further analysis after a stepwise multiple regression, which was also an influential factor. However, they may have a strong correlation with the other seven attributes that their influence on overall satisfaction was produced indirectly through influencing these attributes, which explained most of the total variance. Thirdly, the potential bias in the localization of the residents was not avoided in this study, namely, the results are generally instructive in Dandong old town, while there may be differences in some specific areas. Furthermore, the AIPA technique concerns more about attributes' impact types, which is based on the asymmetry degree of influence, while the influence intensity is neglected. In further studies, DGP and SGP of attributes should be integrated into the AIPA matrix in order to provide more rational policy implications. Moreover, the thresholds for distinguishing impact types are decisive for allocating attributes [76]. The allocation of attributes might have changed if the cut-off points were changed, which would lead to different managerial policies. In addition, since this study was undertaken in a specific historic urban area, the results and corresponding policies cannot be generalized to other cities. Nevertheless, this study offers a fresh perspective and some important insights on HUL management.

The results of this study reveal that Landscape Pattern, Residents' Behavior, Heritage Maintenance, Historic Meaning, Historic Center, Accessibility, and Cultural Uniqueness are the key attributes in terms of influencing residents' satisfaction with HUL, to which more attention should be paid by governments in managing historic cities.

AIPA results indicate that "Landscape Pattern", "Heritage Maintenance", and "Residents' Behavior" are basic factors at the low-performance level, which means their situation must be improved in the old town of Dandong. Since basic factors have a less identifiable effect on satisfaction if exceeded, comparing with causing dissatisfaction if not fulfilled, the improvement needed is the shift from lacking in protection to effective protection, meanwhile, excessive strengthening should be avoided. To be specific, landscape patterns and preserving and restoring the geographic characteristics could maintain the quintessential setting and ambiance of the city [77], while any type of beautifying or upgrading would not make residents happier because of the inconsistency with local identity. Heritage maintenance is not only about its appearance and durability, more importantly, it is also concerned with authenticity. Authenticity plays a vital role in heritage conservation [1,78], which needs to be protected while it can hardly be promoted. Human activities take an important part in the process of forming the landscape [9]. Residents' behavior, to a certain extent, represents the quality of the landscape and reflects the intangible aspects that people bring to the shaping of the landscape. In terms of residents' experience in HUL, poor behavior leads to dissatisfaction, but perfect behavior would not produce extra contentment. However, better residents' behavior can still be beneficial for the city in other aspects, such as education and the social order, which makes the city more competitive.

The AIPA matrix also shows that "Cultural Uniqueness" and "Accessibility" are excitement factors with high performance, which means they are good enough to create satisfaction and there is no need to improve their conditions, but rather to maintain the performance at the current level. In contrast, "Historic Center" is an excitement factor with low performance. This attribute is concerned with historic spatial patterns and order, involving landmarks, corridors, and connections of spaces [10], as well as the urban fabric and land use [79,80]. Since excitement factors do not cause dissatisfaction, improvement in this attribute is not essential. Although it is still an option to boost satisfaction, it has a lower priority than dissatisfaction-causing attributes.

Unlike the other attributes, "Historic Meaning" has a symmetric influence on residents' satisfaction with HUL. As a performance factor, this attribute has the potential to cause both contentment and discontentment. In order to ensure residents' satisfaction, it is necessary to keep its performance high. Historic meaning is inherited from historical accumulation, which cannot be produced or strengthened directly in the present. However, we can improve this attribute by promoting historical discoveries and strengthening the link between history and people through the interpretation of culture and heritage.

5. Conclusions

This study proposes a collaborative approach to identify community-engaged priorities for HUL management by introducing the AIPA technique into the urban conservation field. In general, HUL management plays an important role in enhancing the cultural sustainability and livability of urban areas, within which to prioritize actions for conservation and development is one of the critical steps. It is important to involve communities in discussions and more attention should be paid to residents' satisfaction on HUL in urban conservation and regeneration process. This study provides a framework for integrating residents' aspects of urban conservation and heritage management. The first step is to clarify residents' perceptions of HUL attributes and their satisfaction with HUL. Next is to find out the significant predictive variables of overall satisfaction. Then, the asymmetric impact of attributes' performance on overall satisfaction should be identified, which helps to categorize attributes into three groups. Finally, by integrating three factors and attributes' performance, attributes are located on the AIPA matrix, based on which improvement priorities can be identified and policies can be developed. For example, in this study, "Heritage Maintenance" and the other two attributes are basic factors at the low-performance level. Although basic factors have a less identifiable influence on creating satisfaction, it is crucial for the planners and managers of Dandong old town to improve these attributes because their potential in leading to dissatisfaction with HUL is high. In contrast, it is not essential to improve "Historic Center", which was identified as an excitement factor with low performance, since excitement factors do not cause dissatisfaction. Although it is still an option to boost satisfaction, it has a lower

priority than those dissatisfaction-causing attributes. These community-engaged priorities allow city managers to make rational choices and deploy scarce resources in managing historic cities towards a sustainable future.

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