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Studentification and Urban Transformation: A Sustainable Perspective

Fei Shi *

School of Civil Engineering and Architecture, Suqian University, Suqian 223800, Jiangsu, China; 20201@sqc.edu.cn

* Correspondence: 20201@sqc.edu.cn; Tel.: + 13179565536

Received: Oct 5, 2021; Accepted: Nov 15, 2021; Published: Dec 30, 2021

Abstract: As one of the 17 Sustainable Development Goals (SDGs), sustainable cities and communities has become a common pursuit in the contemporary urban era. Hence, a sustainable perspective is sensible to scrutinize tremendous urban transformation in rapidly growing global cities. This paper focuses on studentification-induced urban transformation and attempts to establish an evaluation framework revolving around sustainability through a systematic review of relevant literature on studentification. The new framework is designed to be more global, mutually beneficial, and operable, consisting of 5 dimensions, 19 criteria, and 37 indicators. Subsequently, an analytic hierarchy process (AHP) is suggested to analyze the value of indicators. Finally, this paper contributes to the research on sustainable urban transformation. There is a need to pay more attention to local constructs and the estimation of weights in the index system for studentification-induced urban transformation within the rubric of sustainability.

Keywords: studentification, urban transformation, sustainability, index system.

1. Introduction

During the last two decades, in juxtaposition to the rapid growth of cities is the reality of widespread poverty, increasing social polarization and inequality, increasing crime, growing congestion, and ongoing conversion of natural ecosystems [1-3]; hence, making cities sustainable is a growing concern across the world and is articulated in the Sustainable Development Goals (SDGs), which appeal for “creating career and business opportunities, safe and affordable housing, and building resilient societies and economies”[4,5]. This requires “investment in public transport, creating green public spaces, and improving urban planning and management in participatory and inclusive ways”. In other words, more attention should be focused on efforts “significantly changing the way we build and manage our urban spaces” [6].

Without doubt, the sustainable involvement of studentification in urban transformation can be viewed as an exemplar of such efforts since it has been widely recognized that the previously mentioned markers of unsustainable development are manifest in the processes of studentification [7–10]. Studentification as a concept is regarded as an urban process, tied to the rise of large concentrations of students in towns and cities [11]. This process is underpinned by the production and consumption of student houses of multiple occupation (HMO) and purpose-built student accommodation (PBSA). From a more generalized perspective, studentification can contribute to urban revitalization and redevelopment through a variety of urban consumption (e.g., housing, leisure, travel, or other cultural consumption) [8,12]. It is reported that these revitalizations and redevelopments include the regeneration of deteriorated residential neighborhoods and vacant brownfield or other sites, or the redevelopment of villages in the city (ViCs) within inner-city and suburban areas. Somewhat ironically, however, empirical findings suggest that studentification can act as a hinderance of urban revitalization. For instance, it may “deteriorate the properties’ condition and attract crimes such as burglary or theft from cars, making neighborhoods less desirable for nonstudent populations” [13].

Most important of all, processes of studentification may “inherently undermine many of the tenets of sustainable communities” [14], such as “decent affordable homes, [or] a diverse and inclusive community” [15].

From a sustainability perspective, this paper attempts to frame an index system which includes criteria, indicators, and potential measurements of studentification-induced urban transformation[16,17]. This attempt is important at a time when debates of how urban policies on sustainable cities, balanced communities, and “wellbeing” overlap with the diverse processes of studentification[14] and might accelerate the formation of a more comprehensive and operational tool for effectively monitoring and managing studentification-induced urban transformation.

2. Tracing the history of measuring studentification-induced urban transformation within the theoretical framework of sustainability

Scholars of studentification have already noticed the topic of sustainable urban transformation, though not explicitly employing the term. For example, Smith's (2005) cornerstone work indicates that studentification-induced urban transformation can be considered as a multifaceted construct with four dimensions (i.e., economic, social, cultural, and physical) [18]. This multifaceted construct was elaborated by Smith and Holt (2007) and encapsulated as relatively primitive criteria and indicators which have reached a wider consensus and been complemented in subsequent studies [19].

A framework incorporating these criteria and indicators is summarized in Tables 1 and A1. It reveals that the socioeconomic dimension of indices has predominantly been measured, in part, due to the fact that studentification has been viewed as "a highly contentious social and economic issue" [20] and widely penetrated public debates and policy-oriented agendas on sustainable urban transformation [20,21]. An analysis of this framework (Table A1) illustrates that the majority of measured indices have been from the criteria of demography, social interaction, and local housing market. Such criteria are tied to the integration of HE students in socially mixed neighborhoods, as well as the availability of affordable housing to all citizens, and are believed to be conducive to sustainable urban development [9,22].

Noticeably, there are two main disadvantages in the outlined framework in spite of advances previous attempts have made towards an index system for sustainable urban transformation. First, this attempt as a whole is not sustainability-oriented, as shown by the very few indicators that are measured from dimensions of culture and physical environment in Table A1. It is inappropriate that the cultural and physical or environmental indicators are almost unmeasured despite their significance in sustainable urban transformation. Second, further analysis of this framework points to its operable weakness. As illustrated by Table 1, half of the indicators never get a chance to be measured (26/51). Moreover, Table 1 indicates that the framework virtually advocates a prevention-based approach to sustainable urban transformation. It is apparent, for example, that few indicators are to be measured from the criteria of finance, local commercial service, and local employment, which may give studentification long-term credit for sustainable urban transformation in a broader spatial context. Arguably, this prevention-based approach is mostly likely to inherit from gentrification, which is also deeply rooted in western urban contexts. It is not surprising that the priority of the existing framework is to mitigate the negative effects of student-induced transformation in such urban contexts.

Despite the weaknesses of the existing framework, it should be acknowledged here that this system is still useful and can be applied to frame a new index system which will be mutual-benefit-based, sustainability-oriented, and globally operable for guiding studentification-induced urban transformation. With this in mind, the paper now turns to a review of measurements of dynamism of studentification.

2.1. Measuring the dynamism of studentification

As a stage model, the dynamism of studentification can be epitomized as an evolution from pre-studentification ("i.e., it does not usually involve the recommodification of single-family housing on a significant scale") to studentification, then to possible de-studentification (i.e., studentified neighborhoods or other sites in towns and cities are gradually "emptied" of student populations and student housing). As Sage [23] and Kinton et al. (2016) [7] revealed, processes of studentification have recently been more dynamic, underpinned by radical changes to the supply and demand of certain types of off-campus student accommodation and leading to (un)sustainable neighborhoods, even cities.

As a result, it is not surprising that the vast majority of measures reviewed by this paper (51 out of 64) come from the criteria of local housing market and demography, primarily in the sub-criteria of housing stock and population density and distribution (Table 1). Those measures focus on the proportion of the student population and occupied/unlet student accommodation in various properties, streets, wards, cities, and regions or nations. It is noteworthy that the assumption behind such measures is the concept of a threshold at which the population of students becomes dominant or a minority in particular neighborhoods [24]. As National HMO Lobby in the UK (2008) states [25], the threshold is reached "when the student population exceeds 20 per cent and a neighborhood has become studentified". However, Hubbard (2008) [26] indicated that the notion of a threshold is problematic, partly because of its neighborhood-specific nature, and should be cautiously utilized in order not to trigger the contestation of student residents by resident groups and local authorities in residential neighborhoods where negative effects of studentification are not so evident.

Interestingly, Foote (2017) [22] demonstrated how student enclaves can be highly suggestive by calculating mean z-scores and following K-means clustering. "In the analysis, z-scores were calculated for every variable in all neighborhoods", and then K-means clustering was used to analyze these data by using an iterative process. Finally, "the cluster is characterized by the mean z-score of each variable based on the variable values of all neighborhoods assigned to that cluster".

Cluster analysis is another method that is worth mentioning for analyzing the density and distribution of a student population. This method is generally used by geographic scholars [27–29] and is particularly useful when sustainable action is needed based on

the location of one or more clusters of studentified urban enclaves [30]. We summarized the hierarchical structure of research topics based on Dimensionality (D), Criteria (C), Sub-criteria Indicator (Sub-c), Indicator (I), Frequency of the Indicator (FOI) that was measured, and Noteworthy Measurement (NM), as shown in Table A1.

Table 1. Frequency of indicators to be measured aggregated on dimensional and criterion bases.

Dimensionality	Criterion
Economic (23)	Finance (0)
	Local housing
	Market (21)
	Local commercial services (2)
Social (41)	Demography (30)
	Wellbeing (0)
	Security (3)
	Social Interaction (8)
	Public engagement (0)
Cultural (0)	Lifestyle (0)
	Cultural facilities (0)
Physical (2)	Physical environment (2)
	Mobility (0)

Note: The numbers in parentheses are the aggregated frequencies on dimensional and criterion bases.

2.2 Measuring studentification-mediated social interaction

On the whole, the social effects of studentification on urban transformation have been largely perceived as detrimental [19]. These detrimental effects are more evident in studentification-mediated social interaction, clearly expressed as issues about the complicated reconstruction of a sense of place [27,31], conflictual social relations between student and settled populations [20], and ongoing entrenched segregation in towns and cities [9,32]. Such issues are the focus of measures in a growing body of research about studentification-mediated social interaction.

Sage (2010) [27] remarked that rapid changes to a sense of place constitute the hallmarks of studentification-induced urban change and can be indicators of social (e.g., intergenerational) conflict, negotiation, and intersectionality in the dominant values and social identities of the area. As one key requirement, therefore, a sense of place has been listed in the “place-making” agenda for sustainable communities [33] and measured by uni- and multi-dimensional psychological scales. Both scales are developed as five levels in ordinal scales and involve ranking procedures; the key difference here, however, is that the multi-dimensional scale is composed of three dimensions (i.e., familiarity, identification, and attachment).

Clearly, there is an impetus for the measurement of changes in community interaction due to many reports of painful memories about studentification-led social conflicts [10,27]. To date, community interaction is measured by relying on subjects’ (i.e., students and established residents) self-reporting. It is noted that Garmendia et al. related self-reports of conflicts between student and established residents to characteristics of the physical environment of student accommodation by mapping the vertical distribution of student residences across floors in blocks of apartments.

It is noteworthy that social segregation has become entrenched in wider processes of segregated societies and can frustrate any political aspiration to foster socially mixed communities (Smith, 2014). Despite this significant profile, it has been seldom measured in the research of studentification. Munro et al. (2009) [34] once illuminated the measurement of the degree of separation of the student population from other residents via the index of dissimilarity, D. This index is “a statistically robust and widely used method of measuring the residential segregation of two populations”. It is calculated as

$$D = \frac{1}{2} \sum_{i=1}^N \left| \frac{S_i}{S} - \frac{P_i}{P} \right| \quad (1)$$

where S_i is the student population in super output area (SOA) i and S is the total student population in the primary urban area (PUA); P_i is the nonstudent population in SOA i and P is the total nonstudent population in the PUA; and N is the total number of SOAs in the PUA. The index produces a score with a value of 0 to 1, where higher values indicate greater segregation [34].

2.3. Measuring studentification-led changes in the affordable housing market

As Kinton et al. (2018) [20] commented, studentification can disrupt wider existing local housing markets, pushing up housing prices or rental costs and thereby creating pressures on the provision of affordable housing in university towns and cities. A likely effect of this is increasing constraints on the possible housing choices for first-time buyers, young households, and marginal social groups [8,20], and this might ultimately undermine inclusive and sustainable urban development. In this sense, it is necessary to quantitatively measure the effects of studentification on local affordable housing markets.

Studentification-led changes in affordable housing markets are usually estimated from indicators from the sub-criterion of housing stock, such as the proportion of HMOs and off-campus PBSA, as well as those from property price, such as the difference between the average house price and the average house price for the county (Table A1). Rigidly, such estimation can be viewed as an indirect evaluation; thus, dedicated indicators are needed for evaluating studentification-led changes in affordable housing markets

3. Framing a sustainable index system for studentification-induced urban transformation

3.1. The framework of a sustainable index system for studentification-induced urban transformation

As noted above, there is a need to develop a new framework of an index system for studentification-induced urban transformation under the rubric of sustainability. To consider this need, this paper frames a new index system which consists mainly of updates, adjustments, and additions to the previously summarized index system (Table 2). This framework is grouped into three categories: dimensionality, criteria, and indicators. In total, it includes 5 dimensions, 19 criteria, and 37 indicators.

As a key part of the additions, this framework involves the political dimension in the index system (Table 2), given the recognition that politics is needed to nurture social, economic, and environmental dimensions of sustainable development. This recognition is substantiated by the report of the United Nations Conference on Sustainable Development [35] indicating the request for strong politics in the quest towards sustainable development [36].

In addition, a large portion of indicators are updated to overcome some obvious weaknesses in the previous index system (Table 2). First, this framework embraces several environmental indicators, such as accessibility of green amenities (e.g., parks, waters, gardens), to favor diverse stakeholders. As key parts of public space, green amenities have wider implications for social interaction. Indeed, social interaction can be actively stimulated by preserving existing green spaces and integrating new green and blue structures into cities [37]. Hence, such additions will enable the new index system to identify some mutual benefits, for multiple stakeholders, resulting from studentification-induced urban transformation.

Second, this framework opts for indicators which are generally disengaged with western urban contexts, such as the number of self-employed people (Table 2). In much of Western literature, established residents are usually displaced or replaced due to an influx of student residents into neighborhoods, resulting in many local authorities considering studentification an unsustainable factor in urban transformation [8]. However, far from the victim stereotype depicted in the literature, a majority of local residents are self-employed as a petty rentier class in ViCs and resettled neighborhoods, owing to ongoing Chinese studentification [8,38]. This is a potentially positive effect of studentification on urban transformation and can be examined through a non-western style of indicators, such as the number of self-employed people.

Third, this paper tries to promote the operability of indicators, particularly those from the cultural dimension. For example, the paper includes the proportion of distinct behaviors by HE students as a new indicator to demonstrate whether lifestyle is (in)compatible between students and settled residents (Table 2). It is noted that new indicators, such as the degree of public participation in urban planning and management (Table 2), have also been involved to make the index system operable. These indicators can demonstrate how citizen and stakeholder participation interact with urban governance from the bottom up [39]. As Patterson et al. [40] contended, there appears to be a need for both “top-down steering and bottom-up self-organization” to achieve a successful transformation to sustainable urban governance.

Table 2. The index system for studentification-induced urban transformation under the theoretical framework of sustainability.

Dimensionality	Code	Criterion	Code	Indicator
Social (D1)	C1	Inclusion	C1.1	Degree of residential segregation
			C1.2	Degree of place-attachment
	C2	Security	C2.1	Number of crimes, alcohol/drug abuse, and other antisocial cases
			C2.2	Accessibility to policing and emergency services
	C3	Social insurance, assistance, and welfare	C3.1	Accessibility to health and wellbeing services
			C3.2	Accessibility to childcare, insurance, elderly care, and other social services
	C4	Temporary migration/fluidity	C4.1	Level of fluidity of the student population over time
	C5	Population diversity	C5.1	Demographical composition (age, sex, marital status, ethnicity, etc.)
			C5.2	Level of population density
			C5.3	Distribution of the student population
	C6	Facilities	C6.1	Proportion of student-centered leisure, recreational, and retail facilities
	C7	Interaction	C7.1	Level of cultural interaction/exchanges between students and local residents
			C8.1	
	C8	Lifestyle (in)compatibility	C8.2	Proportion of distinct behaviors by HE students
				Level of anti-student behavior among residents
C9	Desire for sustainable lifestyles	C9.1	Awareness of community maintenance (e.g., environmental protection)	
C10	Spending	C10.1	Level of spending within the local economy	
C11	Investment	C11.1	Level of inward investment capital	
		C12.1	Rate of employment	
C12	Employment	C12.2	Number of self-employed people	
		C13.1	Level of council tax revenue	
C13	Tax	C14.1	Growth rate of housing price	
		C14.2	Proportion of unlet properties/abandoned housing units	
C14	Housing	C14.3	Availability of affordable (rented) housing units	
		C10.4	Supply and demand for private student rented housing	
		C15.1	Size and quality of internal bedroom space	
C15	Internal physical environment	C15.2	Proportion of low-carbon building materials	
		C15.3	Proportion of eco-friendly furniture	
		C16.1	Level of litter and rubbish from HE students	
Environmental		C16.2	Levels of noise, visual, litter, and other pollution	

(D4)	C16	External physical environment	C16.3	Level of pollution management strategies		
			C16.4	Availability of private vehicle/bicycle parking		
			C16.5	Level of traffic congestion		
			C16.6	Accessibility to sanitation facilities		
			C16.7	Accessibility to green amenities (parks, waters, gardens)		
			C17	Participation	C17.1	Degree of public participation in urban planning and management
			Political (D5)	C18	Collaboration	C18.1
C19	Information access	C19.1				Degree of information access

3.2. Possible methods for evaluating studentification-induced urban transformations based on the new index system

After the development of a new index system, an analytic hierarchy process (AHP) [41–43] is suggested. Weights must be determined for specific dimensions according to the relative importance of the various dimensions in the index system. Subsequently, each indicator is rated at all levels; each value is then rescaled to a fixed range of [0,1]. A composite index was calculated as follows:

$$S_i = \sum_{j=1}^m W_j * V_{ij} \quad (i=1,2,3,\dots, n) \quad (j=1,2,3,\dots, m) \quad \forall \sum_{i=1}^5 W_i = 1 \quad (2)$$

where S_i is the composite index; W_i represents the weight in dimension i ; and V_{ij} is a normalized value at the respective level.

4. Discussion and conclusions

Our main focus in this paper was to demonstrate the need to steer studentification-induced urban transformation in a more sustainable direction. To consider such a need, this paper critically reviewed the existing index system and presented a new framework which emphasizes encapsulating more global, mutually beneficial, and workable indicators in one whole system, followed by quantitative analysis methods being suggested.

Certainly, it should be noted that the new framework is not a panacea for navigating through studentification-induced urban transformation. More detailed, innovative, and local constructs for this framework are needed in future explorations in order to increase its monitoring and management competence, owing to the complexity of sustainability itself. In fact, this complexity is manifest in country- or city-specific contexts [44]. In this regard, the future index system should be customized “based on a city context and according to its specific attributes, needs, local interests, starting point, and specific sustainability objectives” [45].

Another intriguing field is how to estimate the weights of dimensions and their criteria at all levels of the index system. This was not fully explored in this paper, yet it is pivotal to quantifying the impacts of studentification on sustainable urban transformation. Indeed, the estimation is difficult since it should determine the priority weights among all dimensions and criteria. However, it is not easy to evaluate weights in some dimensions, such as the cultural dimension, due to its hard-to-quantify nature. In this sense, it is suggested that innovative analysis tools should be crafted to quantify the cultural effects of studentification on sustainable urban transformation so as to suit the evaluation of cultural weights.

To conclude, this paper contributes to the research on sustainable urban transformation on the whole and emphasizes the need to take more seriously the negative and positive effects of studentification on urban transformation by quantifying such effects within the theoretical frame of sustainability. This is paramount as contemporary urban transformation is increasingly complicated by several agents (e.g., various gentrification processes) similar to studentification and may deviate from the original sustainability goals set up by local authorities.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Funding: This research did not receive external funding..

Acknowledgments: We would like to thank anonymous reviewers for their valuable comments and suggestions for improving this paper

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. The framework of the index system, frequency of the indicators that were measured, and noteworthy measurements summarized from the literature.

D	C	Sub-c	I	FOI	NM
		Spending levels	Spending levels within local economy	0	—
		Inward capital investment	Levels of inward capital investment	0	—
	Finance	Council tax revenue	Levels of council tax revenue	0	—
		Seasonality of local economy	—	0	—
			Proportion of HMOs and off-campus PBSA	6	—
			Number of bed spaces provided by commercial student accommodation providers	5	—
		Housing stock	Levels of housing abandonment	0	—
			Proportion of unlet/occupied off-campus HMOs or PBSA	1	—
	Local housing market	Property price	Difference between average house price in relation to average house price for county	1	—
Economic			Number of property transactions over time	3	—
		Tenure profile	Percentage/number of changes in tenure over time	3	—
			Turnover of residents/tenants	1	—
			Mean rate of turnover	1	—
		Retail, leisure, and recreational services	Proportion of different types of retail, leisure, and recreational facilities	2	—
	Local commercial services	Domestic services	—	0	—
		Childcare services	—	0	—
		Services of letting/estate agents, property maintenance, and building contractors	—	0	—
	Local employment	Student employment	Number of students in employment	1	—
Social	Demography	Demographic composition	Composition of the population	3	z-score means

D	C	Sub-c	I	FOI	NM
			Levels of population density	0	—
		Population density and distribution	Levels of student population density and distribution of student population	10	Cluster Analysis
			Proportion of student population	15	—
			Levels of population stability	0	—
		Migration	Percentage/number of changes in student population over time	2	—
	Wellbeing	Health and wellbeing of local people	—	0	—
		Schools, GPs, dentists, and other health services	—	0	—
		Crime	—	0	—
		Alcohol/drug abuse	Levels of alcohol/drug abuse	0	—
			Levels of antisocial behavior	0	—
	Security	Antisocial behavior	Number of self-reported antisocial behaviors by students	1	—
			Levels of vandalism	0	—
			Number of self-reported acts of vandalism by students	1	—
		Policing and emergency services	Percentage of more effective dealings with negative effects of studentification by polices	1	—
		Town-gown relations	Percentage of student unions effectively dealing with the negative impacts of studentification	1	—
			Number of self-reported conflicts with student residences	2	Mapping the vertical distribution of student HMOs
	Social Interaction	Community interaction	Levels of neighborliness	0	Uni-/multi-dimensional psychological scale
			Mean of familiarity to community	1	Uni-/multi-dimensional psychological scale
			Mean of identification to community	1	Uni-/multi-dimensional psychological scale
			Mean of attachment to community	2	Uni-/multi-dimensional psychological scale
		Segregation	Degree of separation of the student population from other residents	1	Index of dissimilarity D
	Public engagement	Political involvement	Levels of electoral voting	0	—
		Local volunteering	—	0	—
Cultural	Lifestyle	Lifestyle (in)compatibility	—	0	—

D	C	Sub-c	I	FOI	NM
	Cultural facilities	Student-centered leisure, recreational, and retail facilities	—	0	—
		Maintenance of internal/external environment	Levels of maintenance of internal space of housing	1	—
	Physical environment		Levels of noise nuisance from households, pedestrians, taxis/private vehicles	0	—
Physical		Pollution	Number of noise complaints	1	—
			Levels of visual pollution (to-let signs)	0	—
			Levels of litter and rubbish	0	—
		Commute modes	Levels of use of different commute modes	0	—
	Mobility	Traffic congestion	Levels of traffic congestion	0	—
		parking spaces	—	0	—

Note: 0 means the nonexistence of an indicator linked to the respective sub-criterion or a listed indicator that was not measured; — signifies the lack of a noteworthy measurement.

References

- Preston-Whyte, R. Sustainable urban development and the dynamics of change. *Urban Forum* **1997**, *8*, 137-152. <https://link.springer.com/content/pdf/10.1007/BF03036766.pdf>
- Liu, Y.; Lin, Y.; Fu, N.; Geertman, S.; van Oort, F. Towards inclusive and sustainable transformation in Shenzhen: Urban redevelopment, displacement patterns of migrants and policy implications. *Journal of Cleaner Production* **2018**, *173*, 24-38. <https://doi.org/10.1016/j.jclepro.2016.09.224>.
- Xu, H.; Hsu, W.-L.; Meen, T.-H.; Zhu, J.H. Can Higher Education, Economic Growth and Innovation Ability Improve Each Other? *Sustainability* **2020**, *12*, 2515. <https://doi.org/10.3390/su12062515>.
- Hsu, W.-L.; Shen, X.; Xu, H.; Zhang, C.; Liu, H.-L.; Shiau, Y.-C. Integrated Evaluations of Resource and Environment Carrying Capacity of the Huaihe River Ecological and Economic Belt in China. *Land* **2021**, *10*, 1168. <https://doi.org/10.3390/land10111168>
- Shi, F.; Lu, Y.; Wu, F.; Wang, C.; Hsu, W.-L. Evaluation of Green Cities in the Drainage Area of China's Beijing–Hangzhou Canal. *Water* **2021**, *13*. <https://doi.org/10.3390/w13162145>
- Goal 11: Sustainable Cities and Communities. Available online: <https://www.birmingham.ac.uk/research/global-goals/sustainable-cities/index.aspx> (accessed on 4 March 2021).
- Kinton, C.; Smith, D.P.; Harrison, J. De-studentification: emptying housing and neighbourhoods of student populations. *Environment and Planning A: Economy and Space* **2016**, *48*, 1617-1635. <https://doi.org/10.1177/0308518X16642446>
- He, S. Consuming urban living in 'villages in the city': Studentification in Guangzhou, China. *Urban Studies* **2015**, *52*, 2849-2873. <https://doi.org/10.1177/0042098014543703>
- Smith, D.P.; Hubbard, P. The segregation of educated youth and dynamic geographies of studentification. *Area* **2014**, *46*, 92-100. <https://doi.org/10.1111/area.12054>
- Garmendia, M.; Coronado, J.M.; Ureña, J.M. University Students Sharing Flats: When Studentification Becomes Vertical. *Urban Studies* **2012**, *49*, 2651-2668. <https://doi.org/10.1177/0042098011428176>
- Smith, D.P. *Studentification*; Wiley Online Library: Hoboken, New Jersey, 2019; <https://doi.org/10.1002/9781118568446.eurs0325>. <https://doi.org/10.1002/9781118568446.eurs0325>
- Malet Calvo, D. Understanding international students beyond studentification: A new class of transnational urban consumers. The example of Erasmus students in Lisbon (Portugal). *Urban Studies* **2018**, *55*, 2142-2158. <https://doi.org/10.1177/0042098017708089>
- Nakazawa, T. *Studentification*; Elsevier: Oxford, 2020; <https://doi.org/10.1016/B978-0-08-102295-5.10317-8>. <https://doi.org/10.1016/B978-0-08-102295-5.10317-8>
- Smith, D. The Politics of Studentification and '(Un)balanced' Urban Populations: Lessons for Gentrification and Sustainable Communities? *Urban Studies* **2008**, *45*, 2541-2564. <https://doi.org/10.1177/0042098008097108>
- What is a Sustainable Community? Available online: <https://sustain.org/about/what-is-a-sustainable-community/> (accessed on 4 March 2021).
- Mao, G.; Jin, W.; Zhu, Y.; Mao, Y.; Hsu, W.-L.; Liu, H.-L. Environmental Pollution Effects of Regional Industrial Transfer Illustrated with Jianguo, China. *Sustainability* **2021**, *13*. <https://doi.org/10.3390/su132112128>

17. Zhang, C.; Wang, C.; Mao, G.; Wang, M.; Hsu, W.-L. An Empirical Study on the Ecological Economy of the Huai River in China. *Water* **2020**, *12*, 2162.
18. Smith, D. *Studentification: the gentrification factory in Atkinson R and Bridge G eds Gentrification in a global context*; Routledge, London: London, 2005; <https://research.brighton.ac.uk/en/publications/studentification-the-gentrification-factory>. <https://research.brighton.ac.uk/en/publications/studentification-the-gentrification-factory>
19. Smith, D.P.; Holt, L. Studentification and ‘Apprentice’ Gentrifiers within Britain’s Provincial Towns and Cities: Extending the Meaning of Gentrification. *Environment and Planning A: Economy and Space* **2007**, *39*, 142-161. <https://doi.org/10.1068/a38476>
20. Kinton, C.; Smith, D.P.; Harrison, J.; Culora, A. New frontiers of studentification: The commodification of student housing as a driver of urban change. **2018**, *184*, 242-254. <https://doi.org/10.1111/geoj.12263>
21. Nakazawa, T. Expanding the scope of studentification studies. *Geography Compass* **2017**, *11*, e12300. <https://doi.org/10.1111/gec3.12300>
22. Foote, N.S. Beyond studentification in United States College Towns: Neighborhood change in the knowledge nodes, 1980–2010. *Environment and Planning A: Economy and Space* **2017**, *49*, 1341-1360. <https://doi.org/10.1177/0308518X17698962>.
23. Sage, J.; Smith, D.; Hubbard, P. The Rapidity of Studentification and Population Change: There Goes the (Student)hood. *Popul. Space Place* **2012**, *18*, 597-613. <https://doi.org/10.1002/psp.690>.
24. Sage, J.; Smith, D.; Hubbard, P. New-build Studentification: A Panacea for Balanced Communities? *Urban Studies* **2013**, *50*, 2623-2641. <https://doi.org/10.1177/0042098013477694>
25. Balanced Communities and Studentification: Problems and Solutions. Available online: <http://hmolobby.org.uk/39articles.pdf> (accessed on 4 March 2021).
26. Hubbard, P. Regulating the Social Impacts of Studentification: A Loughborough Case Study. *Environment and Planning A: Economy and Space* **2008**, *40*, 323-341. <https://doi.org/10.1068/a396>.
27. Sage, J.L. The micro-geographies of studentification in Brighton and Hove. University of Brighton, 2010. https://cris.brighton.ac.uk/ws/portalfiles/portal/4756101/SAGE+thesis+CORRECTED_static_Redacted.pdf
28. Hubbard, P. Geographies of studentification and purpose-built student accommodation: Leading separate lives?. *Environment and Planning A* **2009**, *41*, 1903-1923. <https://doi.org/10.1068/a4149>.
29. Kinton, C. Processes of destudentification and studentification in Loughborough. © Chloe Kinton, 2013. <https://core.ac.uk/download/pdf/288381202.pdf>
30. An overview of the Mapping Clusters toolset. Available online: <https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/an-overview-of-the-mapping-clusters-toolset.htm> (accessed on 4 March 2021).
31. Yu, S.Q.; Zhu, X.G.; Sun, J. Analysis of Studentification Phenomenon of the Residential Community under the Perspective of the Sense of Place: A Case of the New Community Near Zhejiang University. *Urban Problems* **2008**, *6*, 36-42 (In Chinese). <https://www.cnki.net/kcms/doi/10.13239/j.bjsshkxy.cswt.180605.html>
32. Hsu, W.-L.; Tsai, F.-M.; Shiau, Y.-C. Planning and assessment system for light rail transit construction in Taiwan. *Microsystem Technologies* **2021**, *27*, 1051–1060. <https://doi.org/10.1007/s00542-018-4023-y>
33. Office of the Deputy Prime Minister. *Sustainable communities: building for the future*; Office of the Deputy Prime Minister London: London, 2003; [https://uk.practicallaw.thomsonreuters.com/0-107-0582?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/0-107-0582?transitionType=Default&contextData=(sc.Default)&firstPage=true).
34. Munro, M.; Turok, I.; Livingston, M. Students in Cities: A Preliminary Analysis of Their Patterns and Effects. *Environment and Planning A: Economy and Space* **2009**, *41*, 1805-1825. <https://doi.org/10.1068/a41133>
35. United Nations. Report of the United Nations conference on sustainable development Rio de Janeiro, Brazil 2012; United Nations: New York, 2012. <https://www.unaids.org/en/resources/presscentre/featurestories/2012/june/20120620ario20>.
36. Aina, Y.A. Achieving smart sustainable cities with GeoICT support: The Saudi evolving smart cities. *Cities* **2017**, *71*, 49-58. <https://doi.org/10.1016/j.cities.2017.07.007>
37. McCormick, K.; Anderberg, S.; Coenen, L.; Neij, L. Advancing sustainable urban transformation. *Journal of Cleaner Production* **2013**, *50*, 1-11. <https://doi.org/10.1016/j.jclepro.2013.01.003>
38. Zhao, W.; Zou, Y. Un-gating the gated community: The spatial restructuring of a resettlement neighborhood in Nanjing. *Cities* **2017**, *62*, 78-87. <https://doi.org/10.1016/j.cities.2016.12.015>
39. Aina, Y.A.; Wafer, A.; Ahmed, F.; Alshuwaikhat, H.M. Top-down sustainable urban development? Urban governance transformation in Saudi Arabia. *Cities* **2019**, *90*, 272-281. <https://doi.org/10.1016/j.cities.2019.03.003>.
40. Patterson, J.; Schulz, K.; Vervoort, J.; van der Hel, S.; Widerberg, O.; Adler, C.; Hurlbert, M.; Anderton, K.; Sethi, M.; Barau, A. Exploring the governance and politics of transformations towards sustainability. *Environmental Innovation and Societal Transitions* **2017**, *24*, 1-16. <https://doi.org/10.1016/j.eist.2016.09.001>
41. Shi, F.; Chu, J.L.; Gu, K.K. Study on the Characteristics of the Level of Urban Sustainable Development in Anhui Province. *Journal of Shenyang Jianzhu University (Social Science)* **2012**, *14*, 286-291 (In Chinese). <https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD2012&filename=SJSH201203016&v=zulaAGhIPAxqyQC%25mmd2FCURFd%25mmd2F50maXbkx%25mmd2BOu4z%25mmd2BaZ8Gc6ZvHAYM2FDfIfIWGr6lw>
42. Hummel, J.; Bridges, J.; IJzerman, M. Group Decision Making with the Analytic Hierarchy Process in Benefit-Risk Assessment: A Tutorial. *Patient* **2014**, *7*, 129-140. <https://doi.org/10.1007/s40271-014-0050-7>.
43. Hsu, W.-L.; Tsai, F.-M.; Shiau, Y.-C. Planning and assessment system for light rail transit construction in Taiwan. *Microsystem Technologies* **2018**, <https://doi.org/10.1007/s00542-018-4023-y>. <https://doi.org/10.1007/s00542-018-4023-y>
44. Laprise, M.; Lufkin, S.; Rey, E. An operational monitoring tool facilitating the transformation of urban brownfields into sustainable neighborhoods. *Building and Environment* **2018**, *142*, 221-233. <https://doi.org/10.1016/j.buildenv.2018.06.005>
45. Ibrahim, M.; El-Zaart, A.; Adams, C. Smart sustainable cities roadmap: Readiness for transformation towards urban sustainability. *Sustainable Cities and Society* **2018**, *37*, 530-540. <https://doi.org/10.1016/j.scs.2017.10.008>

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